

Virtual Humans for Serious Gaming Product Vision

Made by Virtual Humans Context Groups 1, 2, 3 and 4

Introduction

In this product vision document you can find a description of our target customers and their needs, key elements of the product, a comparison with existing products and the time- and budget frame of the project. Our product is a Virtual Human that can interact with other humans in a game that simulates urban planning. This product vision encompasses every part of the Virtual Humans for Serious Gaming Context project, because all groups implement a part of the project that does not work on its own, but rather makes up a part of a whole. Therefore, the end product will be the result of the collaboration of all groups.

Target Customer

During this project, we have to fulfill the needs of three different stakeholders who all have an interest in serious gaming. In this section we will describe each stakeholder and its needs.

Tygron

Tygron is a company with an engine whose goal is to support city planning by allowing stakeholders to experiment different scenarios in a realistic 3D environment¹. This urban planning tool can be used by different parties involved in urban city planning to prevent conflicts and to increase the return on investment of projects.

Currently, all the different roles in this serious game need to be represented by actual humans playing the game. Tygron wants to replace one or more of these actual humans with Virtual Humans, which will be used for educational purposes. These Virtual Humans need to replace some of the roles in the serious game, in a way that they respond like a real human would.

Tygron is our main customer because they will be the main users of the final product.

Koen Hindriks

GOAL is an agent programming language for programming rational agents². Koen Hindriks is closely connected to the GOAL development. He wants GOAL to be used in the area of serious gaming for belief and goal based AI. He is also one of the leaders of this project, which means that he also has an interest in getting the virtual human to work.

Joost Broekens

GAMYGDALA is an easy to use emotion engine for games. It enables developers to simulate emotions in NPC's by being provided with goals and events³. Joost Broekens is one of the main researchers working on GAMYGDALA, which was developed to work with GOAL

¹ "Tygron | Next Generation Planner." 2006. 1 May. 2015 <<http://www.tygron.com/>>

² "GOAL - Interactive Intelligence group." 2013. 1 May. 2015 <<http://ii.tudelft.nl/trac/goal>>

³ "Phaser - Making your GAMYGDALA - based emotional game." 2015. 1 May. 2015 <<http://ii.tudelft.nl/~joostb/gamygdala/index.html>>

emotion based agents. It's within his interests to see GAMYGDALA deployed with GOAL to provide agents to Tygron. He is also one of the leaders of this project. Just like Koen Hindriks, he also has an interest in finishing the virtual human.

The Aim

The goal of our project is to create an Artificial Intelligence Virtual Human that can take the place of a human player and that can play the game while taking into account the facets a normal human player would think about. The AI player will be able to negotiate and make decisions based on its environment and the other players' actions.

To simulate realistic behaviour for the Virtual Humans they need to have some strategy which their decisions are based on and, since humans aren't solely strategic, they should have an emotional component that influences their decisions. These emotions should be based on the events happening in the game. The strategic component needs to be implemented in GOAL and the emotional component needs to be implemented in GAMYGDALA.

Negotiating a time slot in which all stakeholders can be present to play the game can prove to be difficult. With our product, a Virtual Human could take the place of a human stakeholder, allowing stakeholders to experiment, practice, plan, and negotiate better solutions for city designs and development projects, even if not all stakeholders are present. A Virtual Human will save many hours and streamline the creation of iterations of preferred development strategies. The Virtual Humans also allow simulations in which every stakeholder is a Virtual Human. With these simulations, new solutions to urban problems can be found. The Virtual Humans will enable stakeholders to make informed decisions and discuss them.

Key Elements

A key element of our product will be the artificial emotion based decision making backed by the GAMYGDALA engine. The emotions of our virtual player will make its decisions much like a human's decisions, and will make it seem like an actual human is playing alongside the planners. This is vital to the success of the product because it simulates human behavior better than a system based purely on logical decisions. This will provide the players with a realistic environment to develop their decision making skills and realistically replace players who are not present. Also, GAMYGDALA is scalable, which means that it can be extended with more facets of emotional psychology even after the development of the project has been discontinued.

Another key element of our product is that it provides an interface from GOAL to Tygron which takes into account both low- and high level decisions. It can easily translate high level actions to low level actions so the GOAL agents aren't overloaded with information. Additions to both Tygron and GOAL can easily be implemented with the use of the EIS (Environment Interface Standard) which connects them. With few changes to the EIS, multiple new agents in GOAL can be introduced to Tygron to replace multiple players.

Comparison with existing products

In this section we will describe the different competitors of the Tygron engine with Virtual Humans. In the table an overview of differences and similarities between the products can be found. First we will describe three different sections of competitors.

The B3 game was made for the government in Hamburg to allow for public input on the market place in the city district Billstedt. They wanted to know how the citizens envisioned the marketplace so that it would be a nice place. The B3 game allowed the citizens to design and send in their view of a nice marketplace and other citizens were able to vote on their favorite ideas. It was also meant as a way to learn about the current situation and issues in the district. The game was implemented with Adobe Flash. Other areas could also be included in the game.^{4 5}

Several researchers have tried/researched public participation in urban planning. Wu et al. (2010) have made an experimental 3D virtual visualization of the Chinese city Shenzhen using “GeoGlobe, a prototype platform developed by the State Key Laboratory of Information Engineering in Surveying, Mapping and Remote Sensing (LIESMARS), Wuhan University”. Users can use tools to alter the city.⁶

There are also some board games that are used for urban planning. The company Play the City makes board games specific for a certain area/city to help different stakeholders involved in urban planning to overcome challenges. The organization Cordaid also has developed two games for urban planning also meant to be played by different stakeholders at the same time and is meant to stimulate development in poor areas. Whereas the Play the City games are developed to help with city planning in a specific area/city the games by Cordaid are used to make stakeholders “aware of the power of collaboration in slum development”.⁷

While the B3 game and the experimental game from Wu et al. (2010) are meant as experiments in public participation in urban planning, the game by Tygron is meant as a commercial tool to help different stakeholders in urban planning. Just as the games by Play the City Tygron makes games specific to the cities/areas that are being worked on, whereas the games by Cordaid are meant to stimulate development in poor areas. Advantages of Tygron over the Play the City games are that they can be played online, it is easier to adapt them and to start over.

⁴ Poplin, A. 2013. Digital serious game for urban planning: B3 – Design your Marketplacel, Environment and Planning B: Planning and Design, Volume 40 (3), 493-511.

⁵ Poplin, A. (2011). Games and serious games in urban planning: study cases. In Lecture notes in computer science (LNCS), Springer LNCS, ICCSA 2011 proceedings, Santander, Spain.

⁶ Wu, H.,Zhengwei,H.,Gong,J.,2010.A virtual globe-based 3D visualization and interactive framework for public participation in urban planning processes .Comput. Environ. Urban Syst.34,291–298.

⁷ https://www.cordaid.org/media/publications/Cordaid-2Pager_Serious_Gaming_October_2014-LR.pdf
www.playthecity.nl

Now we will expand on the unique selling points of our product. First of all, of the products mentioned Tygron is the only commercial company with city planning software. Working with software instead of hardware means it is a lot easier and faster to make changes to a project and to create new projects. Additionally, since it can be played online you can also play the game without all being at the same location. Since Tygron is commercial it offers services for making games tailored specifically to a certain area/problem whereas the B3 game and the product by Wu et al. (2010) are less flexible. Tygron also is the only one that offers a climate game to integrate city planning with adapting to climate change. Finally, the addition of Virtual Human offers multiple advantages. One of the advantages is that it is possible to replace some of the stakeholders with Virtual Humans, making it possible to play a game and still have all stakeholders be represented without the need for all stakeholders to be present/willing to play. Another advantage of Virtual Humans is the possibility to simulate games. This way a lot of simulations can be done to present stakeholders with multiple possible solutions.

Product	Type	Differences	Similarities
Tygron (with Virtual Humans)	Software	Has a climate game to integrate city planning with adapting to climate change. Useful as educational tool due to the ease of creating specific projects. With Virtual Humans games can be played without having all the stakeholders present. Instead of playing games, simulations can be done to present stakeholders with multiple solutions.	Commercial similar to Cordaid and Play the City. Games are made for specific cities/areas and for stakeholders in city planning similar to Play the City.
B3	Software	Informational. Public voting system. 3D but less accurate/detailed than Tygron and Wu et al. (2010).	Similar to Wu et al. (2010) in experimenting with public participation and user created content.
Wu et al. (2010)	Software	Users can comment on urban planning projects and user uploaded content. Detailed information, e.g. building properties, measurement and sunlight tools.	3D visualization similar to Tygron. Experiment in public participation similar to B3 game.

Play the City	Board Game	Games can be made for purposes other than city planning, e.g. violence prevention, issues related to refugee camps.	Games are made for specific cities/areas and for stakeholders in city planning similar to Tygron. Commercial similar to Cordaid and Tygron.
Cordaid	Board Game	Meant to improve quality of life in slums. Made for public and private stakeholders in city planning. Game is not made for a specific city/area.	Commercial similar to Play the City and Tygron.

Time- and Budgetframe

This project is divided evenly between 4 groups, with 5 members each. Each group will implement a separate part of the product. The target time frame for developing our Virtual Human starts on the 28th of April and will continue on until the 24th of June, which gives our teams two months to complete the project. The estimated time needed for this project is 280 hours per person. Per project group, the estimated time needed will be 1400 hours. The budget for the whole project, expressed in man hours, is 5600 hours. This includes development time, the time spent attending informational lectures, homework from said lectures, and the plenary session in which the project is evaluated.

The draft and final version of the product planning should be delivered on the 7th and the 15th of May, respectively. The draft and final version of the emergent architecture design should be delivered on the 30th of April and the 19th of June, respectively. The draft and final version of the software should be delivered on the 26th of May and the 19th of June, respectively. The draft and final version of the final report should be delivered on the 18th of June and the 24th of June, respectively.

Because this is an educational project, the budget for this project is €0.