

Airport Traffic Simulator

[Project Plan]

Teacher:

Chung Kuah

ProCP

19/02/2018

Developers:Yoanna Borisova,Teodor Genov,Vladimir Katrandzhiev,Monika Kerulyte,Ignas Kybransas,Rostislav Tinchev

# Document History

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***Version*** | ***Status*** | ***Description*** | ***Date*** | ***Responsible*** |
| *V1.0* | *C M A* | Create initial business plan, adding phases and milestones, abbreviations, acronyms and filled in the table of risks. | 22.02.2018 | IK, YB, VK, RT, MK, TG |
| *V2.0* | *M A* | Added details about deliveries, modified document history, added description about tools and technology that we are gonna use. | 01.03.2018 | VK, RT, MK, TG, IK, YB |

\*Legend: C means Create, A means Add, M means Modify, D means Delete.

\*When a small change is done to the document, the version number is increased by 0.1.

\*When a big change is done to the document, the version number is increased by 1.0.

# Table of Contents

## 

[**Document History**](#_30j0zll) **1**

[**Table of Contents**](#_1fob9te) **2**

[**Abbreviations and Acronyms**](#_tyjcwt) **4**

[**Project Team and Way of Working**](#_1t3h5sf) **4**

[Attendance](#_4d34og8) 5

[Meetings](#_2s8eyo1) 5

[Communication](#_17dp8vu) 5

[Escalation Procedure](#_3rdcrjn) 5

[**Formal client**](#_26in1rg) **5**

[**Current situation**](#_lnxbz9) **5**

[**Problem statement**](#_35nkun2) **6**

[**Project goal**](#_1ksv4uv) **6**

[**Project boundaries**](#_44sinio) **6**

[**Project Phasing**](#_2jxsxqh) **7**

[Project Initiation](#_z337ya) 7

[Activities:](#_3j2qqm3) 7

[Deliverables:](#_1y810tw) 7

[Project Planning](#_4i7ojhp) 7

[Activities:](#_2xcytpi) 7

[Deliverables:](#_1ci93xb) 7

[Project Execution](#_3whwml4) 8

[Iteration 1](#_2bn6wsx) 8

[Activities:](#_qsh70q) 8

[Deliverables:](#_3as4poj) 8

[Iteration 2](#_1pxezwc) 8

[Activities:](#_49x2ik5) 8

[Deliverables:](#_2p2csry) 8

[Iteration 3 (Final)](#_147n2zr) 9

[Activities:](#_3o7alnk) 9

[Deliverables:](#_23ckvvd) 9

[Project Closure](#_ihv636) 9

[Activities:](#_32hioqz) 9

[Deliverables:](#_1hmsyys) 9

[**Milestones**](#_41mghml) **10**

[Milestone 1](#_2grqrue) 10

[Milestone 2](#_vx1227) 10

[Milestone 3](#_3fwokq0) 10

[Milestone 4](#_1v1yuxt) 10

[Milestone 5](#_4f1mdlm) 10

[Milestone 6](#_2u6wntf) 10

[**Requirements**](#_19c6y18) **10**

[Must](#_3tbugp1) 10

[Should](#_28h4qwu) 11

[Could](#_nmf14n) 11

[Won’t](#_37m2jsg) 11

[**Risks**](#_1mrcu09) **11**

[**Constraints**](#_46r0co2) **12**

[Project Constraints](#_2lwamvv) 12

[Application Constraints](#_111kx3o) 12

## 

# Abbreviations and Acronyms

VK - Vladimir Katrandzhiev

RT - Rostislav Tinchev

TG - Teodor Genov

MK - Monika Kerulyte

YB - Yoanna Borisova

IK - Ignas Kybransas

TM - team member/s

PL - project leader

# 

# Project Team and Way of Working

The project members are designated with the abbreviations listed in Table 1-1.

Table 1-1: Team member names and abbreviations

|  |  |  |  |
| --- | --- | --- | --- |
| Project Member | Role | Abbreviation | Contact |
| Vladimir Katrandzhiev | Project leader,  software engineer | VK | v.katrandzhiev@student.fontys.nl |
| Rostislav Tinchev | Software engineer | RT | r.tinchev@student.fontys.nl |
| Teodor Genov | Software engineer | TG | t.genov@student.fontys.nl |
| Monika Kerulyte | Software engineer | MK | m.kerulyte@student.fontys.nl |
| Yoanna Borisova | Software engineer | YB | y.borisova@student.fontys.nl |
| Ignas Kybransas | Software engineer | IK | i.kybransas@student.fontys.nl |

## Attendance

Attendance is mandatory during meetings with the mentor/client. Whenever a meeting with our client, Mr Johnson, is required, he will be added to the attendance list of the weekly agenda.

## Meetings

Weekly progress meetings and at least once per week more in depth meeting.

## Communication

For communication e-mail will be used most of the time. Face to face meetings with ProCp mentor.

## Escalation Procedure

There can be miscommunication between the students or the students and the ProCp mentor which can have impact on the quality of the simulation. Students should contact their assigned mentor, Chung Kuah, about the issue. The mentor will further discuss and solve the problem.

# Formal client

Client is SIM Software Inc., a growing company dealing with simulation software. Their current focus is mostly traffic simulation, but they are looking into broadening their scope of activities and start dealing with the simulation of other things as well.

Contact information: -

Company name: Sim Software Inc.

Company contact person: Mr. Johnson, Board of Management

# Current situation

The client, SIM Software Inc., deals with simulation software and their current focus for some time has been on traffic simulation. They wish to broaden their scope of expertise and are looking for fresh ideas on different things which could be simulated and their subsequent implementation.

# Problem statement

The client company, SIM Software Inc., is requesting an application in the area of simulation software from our team. It has to cover a set of requirements they have placed for us.

To satisfy this request, our team will be developing an application, which would be simulating the automated control of the lower airspace around an airport, namely the handling of aircrafts approaching for a landing or such preparing for take-off. This application is what will be delivered in the end.

The time frame for the whole project is 16 working weeks, split into two general periods, beginning from 12.02.2018.

# Project goal

The goal of the project is to create a user’s configurable benchmarkable program which simulates probable real air space traffic conditions and its automated handling by the application itself. During continuous improvement phases and testing the project will provide in its final version with the following: a forecast for future events that will help with the operational planning of airplane companies, traffic monitoring and control, possibility to train employees in a safe environment, analysis of how the separate elements interact with each other. Apart from the upper mentioned functionalities, the application will also be abiding a set of rules defined by the client.

# Project boundaries

The boundaries of the project are defined as parts of the project that are in-scope and parts that are out-of scope.

The following activities are included in-scope of this project:

* Research
* Documentation
* Software development

# Project Phasing

## Project Initiation

During this phase, the team’s goal is to gather information regarding the Airport Traffic Simulator, proving to the board of directors of SIM Software Inc. that the concept is worth investing time and resources into and providing the needed documentation of the project.

#### Activities:

* Presentations of the main idea behind the project
* Excessive research regarding the topic

#### Deliverables:

* Project Plan

**Duration of this phase is from the 5th of February 2018 until the 23rd of February 2018**

## Project Planning

During this phase, after the approval of the project, the team is going to start planning the whole process behind creating the final product. This includes precise deadlines and timespan of each phase and detailed description of each iteration of the project, including deliverables and activities.

#### Activities:

* Gathering of user requirements
* Creation of a Design Document
* Creation of work division report

#### Deliverables:

* Final version of plan for iteration 1
* User Requirements Specification (URS) Document
* Process report

**Duration of this phase is from the 26th of February 2018 until the 9th of March 2018**

## Project Execution

During this phase, the team is going to create the first, second and final iteration of the software application. Each iteration will be described in detail and will have a separate deadline.

### Iteration 1

#### Activities:

* Creation of the design of the first iteration
* Creation of a test plan for iteration 1
* Work on the first iteration of the product
* Updating work division report
* Updating user requirements specification

#### Deliverables:

* Iteration 1 of the product
* Final version of plan for iteration 2
* Source code of proof of concept
* Proof of concept

**Duration of this iteration is from the 12th of March 2018 until the 30th of March 2018**

### Iteration 2

#### Activities:

* Creation of the design of the second iteration
* Creation of a test plan for iteration 2
* Work on the second iteration of the product
* Updating work division report
* Updating user requirements specification

#### Deliverables:

* Iteration 2 of the product
* Final version of plan for iteration 3
* Source code of proof of concept
* Working Prototype

**Duration of this iteration is from the 23rd of April 2018 until the 25th of May 2018**

#### Iteration 3 (Final)

#### Activities:

* Creation of the design of the final iteration
* Creation of a test plan for iteration 3
* Work on the final iteration of the product
* Updating work division report
* Updating user requirements specification

#### Deliverables:

* Iteration 3 of the product
* Final version of plan for iteration 3
* Source code of proof of concept
* Proof of concept
* Process Report

**Duration of this iteration is from the 28th of April 2018 until the 15th of June 2018**

## Project Closure

During this phase, the product of the project will be presented to the board members of Traffic Sim INC.

#### Activities:

* Preparation of the final product

#### Deliverables:

* Presentation

**Duration of this iteration is from the 18th of June 2018 until the 29th of June 2018**

# 

# Milestones

#### Milestone 1

Initiation Phase complete (0%, approved)

#### Milestone 2

Planning Phase complete (10%)

#### Milestone 3

Iteration 1 complete (35%)

#### Milestone 4

Iteration 2 complete (55%)

#### Milestone 5

Iteration 3 complete (90%)

#### Milestone 6

Presentation complete (100%)

# Deliverables

* Project Plan
* User Requirements Specification
* Work Division Report
* Air Traffic Simulation Application
* Design document
* Test report document
* Presentation

# Requirements

### Must

* Simulate air traffic
  + Random flights entering and exiting the airport’s airspace are going to be generated, displayed and controlled.
* Simulate arising of emergencies
  + Every once in a while or, for example when prompted by the user, emergencies should arise. Those should interfere with the management of the air traffic (this could be expressed in causing reroutes or changes in planes’ attitudes/speeds, changes in the take off/landing order, etc.)
* Save and load simulation states
  + This means that the current position, routes, etc. of all the relevant flights should be saved, maybe things such as previously handled flights (in the current session) should be able to be saved to either a file or database and then reloaded.
* Queue up incoming and outgoing traffic adequately and efficiently
  + In other words, the program should be able to guide the traffic safely and efficiently through the air space and figure out a consequence in which the planes should take off and land on its own.

### Should

* Be able to handle the closure of an air strip and manage the traffic related to that strip adequately without breaking everything else (i.e. reroute traffic to other airfields, put planes on wait, etc.)
  + In case something happens and an airstrip needs to be closed, this should not break the whole airspace. The program should instead react adequately in such a way that the air traffic flow should be disturbed as little as possible.

### Could

* Simulate severe weather conditions
  + These could be either randomly generated, or dependent on the user. These could interfere with the air traffic in different ways. Examples of different types of weather are fog, change in wind direction, rain, sun, etc.
* Indicate preferable speed in bad weather conditions
  + The above mentioned weather types could interact with the air traffic management in different ways. Examples: low visibility could lead to different speed and altitude requirements, strong winds could change the direction in which the airplanes should take off/land, etc.
* Have the possibility to implement different airfields (number of strips, etc.)
  + In reality, there are different types of airfields. Some have more airstrips, other have less, the airstrips point in different directions, etc. The support of such features of the airport is a thing that could be implemented.

### Won’t

* Provide any kind of support or maintenance after the end of the project

# Risks

To successfully develop a software that meets all the requirements, you have to apply a structured way of handling different design issues when they arise. A risk analysis is part of this way of working.

|  |  |  |  |
| --- | --- | --- | --- |
| Risk | Description | Responsible | Preventive measures |
| Unsatisfied | Client is not satisfied with a final product. | TM , PL | Frequent client involvement to the process. |
| Unskilled | Team members are  In lack of skills or the set of skills is imbalanced (there is no variety). | TM, PL | Before making a team, check what everybody are capable of or try to improve your skills at the beginning of the project. |
| Team problems | Team members don’t get along, a lot of fighting going on or because of the personal issues somebody has to leave team . | TM, PL | Have introduction meeting, spend some time to get to know each other. Also have a backup in mind if somebody has to leave team. |
| Lack of time | There can be not enough time and deadlines can be missed. | PL | Good time management, constant check what is done and what has to be done. |

# Constraints

## Project Constraints

* The time frame for the whole project is 16 working weeks, beginning from 12.02.2018.
* This time frame is split into different parts, every one with it’s predefined objectives, which should be followed strictly.

## 

## Application Constraints

* The application should be able to perform certain simulations – it should implement a simplified model of real world objects and contain a randomization factor, through which possible external events which could influence the state of the modeled objects.
* Simulation models and results should be able to be saved and loaded to a file/database.
* The language of implementation will be C#.
* The tool for making simulation will be Visual Studio,
* The most important object-oriented concepts should be followed, namely things like classes, objects, properties, interfaces, inheritance and events should be present