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**Populat.io**

**PROJECT COREPHASE**

PROCESS REPORT

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# Overview

## Kick-off

The project was developed using iterative development. It was divided into four phases - kick-off, iteration one, two and three. Our kick-of phase lasted for two weeks and in these weeks we had to focus on developing an idea for our simulation, presenting it to the client and the mentor. After getting the client approval we could begin preparing some documentation. For this phase it was required that we create a full version of our project plan which described our problem, the solution and the way the project will be developed. Apart from the project plan we had to begin working on the user requirements specification document.

## Iteration 1

At the end of the kick off phase we had made a plan for iteration 1, with tasks for every team member included and what we were going to primarily focus on. This iteration was mainly focused on making the GUI of our simulation application. Here some team members were tasked with designing the gui, adding charts and other statistical overview items for example graphs. Other team members were tasked with researching how we were going to make the layout of the csv. We also had to implement the importing and exporting of csv files. The first iteration also had a lot of improvements to our project documents. At the end of the iteration we had to make a test report and the plan for the second iteration.

|  |  |  |
| --- | --- | --- |
| **Iteration 1 Work Division** | | |
| Assigned Team Member(s) | Activity Description | Hours dedicated |
| Emil | Import a CSV file with data | 06:00:00 |
| Emil | Create sample files with sample data | 06:00:00 |
| Ivelin | Pass the imported data to the pie chart | 06:00:00 |
| Ivelin, Vasil | Work on chart visualization (Pie, bar, line, etc) | 18:00:00 |
| Ivelin & Vasil | Update URS | 06:00:00 |
| Ivelin & Vasil | Debug and Test Report | 02:00:00 |
| Joseph | Parse data from the imported file | 06:00:00 |
| Joseph | WPF Project preparation | 06:00:00 |
| Joseph & Emil | Concept version and update of Test Plan | 08:00:00 |
| Joseph & Emil | Update Work Division Report | 02:00:00 |
| Lyubomir | Import a map in the project | 06:00:00 |
| Lyubomir | Adding functionality for rescaling | 05:00:00 |
| Lyubomir | Merging code process and master lock | 01:00:00 |
| Marina | Create standardized format for the input data | 06:00:00 |
| Marina | Sample GUI Version 1 | 06:00:00 |
| Marina & Lyubomir | Concept and update Design document | 08:00:00 |
| Marina & Lyubomir | Proof of concept | 02:00:00 |
| Team | Application structuring - discussion | 06:00:00 |
| Team | Concept and Final version of plan for iteration 2 | 08:00:00 |
| Team | Research and Introduction to WPF and CSV | 08:00:00 |

## Iteration 2

As we had already made a plan for this iteration all we had to do was stick to it. In this iteration we had a bunch of things planned. The main focus was the simulation of the application itself. Our group wanted to make sure we were done with the simulation at the end of this iteration. This unfortunately led us to removing the plan of implementing a database in this iteration as we had no time for it. We planned it in for the next iteration. At the end we delivered a proof of concept to the client. We also updated all of our documents in this iteration again, and they were beginning to look better.

|  |  |  |
| --- | --- | --- |
| **Iteration 2 Work Division** | | |
| Assigned Team Member(s) | Activity Description | Hours dedicated |
| Team | Update current functionality | 15:00:00 |
| Vasil | Display dots on map | 05:00:00 |
| Ivelin | Set parameters for tweaking - Delay | 02:00:00 |
| Ivelin, Lyubomir | Update GUI Design | 10:00:00 |
| Marina, Joe, Emil | Update Test Report Document, URS and Design document | 15:00:00 |
| Marina | Gather more information from past years | 05:00:00 |
| Joe | Test Application | 04:00:00 |
| Marina | Update use cases | 06:00:00 |
| Ivelin, Vasil | Add events to the simulation | 10:00:00 |
| Vasil, Joe (team) | Make population growth simulation | 20:00:00 |
| Emil | Fix csv bug | 03:00:00 |
| Marina | Display correct coordinates | 10:00:00 |
| Emil | Database research - Entity Framework | 05:00:00 |
| Lyubomir | Display polygon on map | 10:00:00 |
| Team | Crete plan for Iteration 3 | 01:00:00 |

## Iteration 3

This iteration was meant to be the “fine tuning” iteration in which we also implement extra features. We had to make some changes to our application since at the end of the previous iteration our application did not want to start on certain windows configurations. We also implemented a database which you could import and export to. Another extra feature was exporting to pdf. The application was also extensively tested in this iteration to make sure it is ready for deployment. In this iteration we also had to round up our documents.

|  |  |  |
| --- | --- | --- |
| **Iteration 3 Work Division** | | |
| Assigned team member(s) | Task description | Hours dedicated |
| Emil, Joseph | Database design and implementation | 10:00:00 |
| Lyubomir | Set parameters for tweaking | 03:00:00 |
| Team | Final URS, Design Document, Test Report, Work division and Process Report | 18:00:00 |
| Ivelin | Application Advanced Testing | 03:00:00 |
| Emil, Joseph | Saving/Loading city to/from DB | 03:00:00 |
| Vasil | Change map pins | 03:00:00 |
| Ivelin | Export data to PDF | 03:00:00 |
| Marina | GUI and functionality for creating new csv files | 03:00:00 |
| Emil | GUI and functionality for editing parameters of available years | 03:00:00 |
| Ivelin | Events Modifications/Improvements | 03:00:00 |
| Emil | Responsible GUI | 03:00:00 |

# Personal Reflection

## Emil Karamihov

The First Iteration

I have contributed more or less in every document. Of course, I cover only my parts of the documentation. I made some sequence diagrams for the csv helper. Made my csvhelper class in the design document and connected it to the other classes. I added the use case in the requirements document. I helped to make the MOSCOW table. Most of my work was placed in the project plan, design document and user requirements document.

In the first iteration I was tackling the csv functionality. At first, I made a default csv helper class with the StreamReader and StreamWriter classes. After that the strings from the csv file were being used to create an object of type city. Because of little miss communication I had to remake the cvs helper with a package from NuGet. So, the latest application implements the CSVHelper library. The problem which I mainly faced was the struggle to find the documentation and understand it. After some time, I found a way to implement it into the project, giving it a more clearer and clean solution. I and Joseph made the Load and Save function to the csv file.

The code for most of the classes was written by me, like City and Population. In this period, I made research on how to work with WPF forms, so I can have a better workflow while working on the GUI.

The Second Iteration

Through this iteration I roughly, did my research over how to implement entity framework into our application, so we can make the database. We considered the two approaches database first or code first approach. After some careful thought and discussion with the team we decide to make the database first approach. Moreover, though this iteration I and Joseph struggled to different patterns which we can use to make our application flexible. Additionally, I contributed a lot by updating the design document UML to the actual current back then situation. Made some of the use cases more specific and updated some minor thing in the project plan. Made changes to the test plan to indicate the csv helper crash.

Coding

My focus was to find a fix to the csv helper. We found out on the demo of our concept that C# uses the default settings of windows. If the decimal sign was set to a comma, not a dot this can lead to a crash in the system, since we use a comma separated values which contain decimals or doubles. It took a lot of time to find see what the issues was and to fix it.

The Third Iteration

I contributed in the creation of the process report based on this document. Fixed a couple of use cases (made them more concrete) in the user requirements document and made some suggestions to add the database (table) script in the design document.

I also implemented the database with the help of Joseph. We made use of MSSQL and entity framework based on the research done from the past iteration. The database was made in database first approach.

In this iteration my coding contribution was to create the opportunity for the user to modify his data from the loaded csv file. This way we make the application more flexible and customizable. First thing which I did was to create another form which holds the current information shown by years. Then I made the save function, which save the changed data per year. I also spent a significant amount of time to add structure to the GUI and make it rescale. I had to learn which components of the WPF form are resizable and most of their properties.

When I run into problems or difficulties, I use StackOverflow for an answer or go to youtube to gather more information

Overall, I had a lot of fun collaborating with my teammates and developing this application. It helped me grow as a programer, simply by encountering more problems and by solving them.

## Ivelin Slavchev

## Initially, I felt very enthusiastic about the project. I knew all the people in my team and I knew their work ethic, which meant I could trust they would do they part and that the code written would be readable and of high quality.

## As far as technology goes, we settled on Windows presentation foundation with C#. All of us agreed to do this, since we are familiar with C#, but we also wanted try something new and useful. I feel WPF was a reasonable choice of platform, since it suited the functionality and user interaction we aimed for.

## Personally, choosing the topic was the main hurdle of the project. We had some initial ideas that were either too optimistic or not marketable to customers. After much discussion, we ended up with an idea that can be of interest to clients and customers alike– simulating population changes in a chosen city, and I can say we managed to implement it the way we had planned to.

## During iteration one of the development of the project, I mainly focused on choosing which charts to include and what data to visualize with them. After doing some research, I stopped on LiveCharts, since they were easy to implement and visually pleasing. The main challenge was figuring out how to pass some test data to them and to make it clear to the user what is being shown.

## During iteration two I focused on creating the simulation functionality itself – setting simulation parameters, iterating year by year and visualizing the simulated data. Implementing the simulation itself was not difficult, since our class design allowed us to keep the code short and readable. The main problem I encountered was generating random variances for each year of the simulation. The solution came from Joseph, who created a static random generator class, which allowed us to generate reasonable values.

## Iteration three was the period in which I took part in developing the event functionality – choosing which events to simulate, making it possible to change the event chances and researching how each event affects the population. By this point we all were familiar with the framework and with how our system would behave, so implementing the events was straight forward. The only issue encountered was how to inform the user how exactly he can modify event chances and how to add scheduled events. To solve this, we added tooltips from the WPF platform to certain controls.

## Overall, I am very happy with the project and with the application we developed. I personally learned a lot about developing desktop applications and more specifically about WPF and the controls it employs. The team as a whole was able to work together and we mostly managed to stick to the development plan we created for each iteration.

## 

## Lyubomir Yankov

At the beginning of this project our team was faced with the interesting task of developing an idea for a simulation. We had a couple of meetings, after deciding on the team, to brainstorm and propose different concepts. With mutual agreement, after some discussion, we decided on the idea of a simulation for populations. On our mutual agreement, WPF was to be used for implementation of the GUI part. Having experience with XML, I had no problems learning and using it. We started preparing the documents while also meeting with the mentor weekly and discussing our progress. For the kick-off, I focused mainly on creating an initial WPF project for our idea which implemented the GUI elements, the map and some buttons, from the URS document.

For iteration one I worked on further implementation of the map. Initially me and the team agreed on using Google Maps as our main API for the map but later on had to change it to Bing maps since support issues. I contributed to the update of documents and handled merge requests at the end of the iteration. During this iteration things went well but communication was lacking a little at the end of the iteration.

For the second iteration, after some discussion, I had to change the way of displaying information on the map. Initially it was using push-pins, integrated as a functionality from the map library but after some arguing it was agreed on that we should use some polygons for easier understanding of the whole simulation concept. After that I worked on implementing the polygons.

In the third iteration I worked together with my group on fixing some bugs from iteration two and finishing up the documentation. This iteration I did not contribute much to the program.

In conclusion, throughout the project I improved my communication skills, having some falling points during the transition between the iteration one and two. Another thing I got familiar with is working with WPF and some third-party software. What went good with the whole project was the workflow and the division of tasks. Especially working with Git, since sometimes working with a lot of people can often result in merge conflicts.

## 

## Marina Tzenkova

Starting from the beginning I felt great enthusiasm for this project. Working with simulations was going to be a huge improvement for my skills and knowing I will be working with this team I knew we will be able to work together without any problems. As every normal project, of course, there were ups and downs and I am going to go through them, covering all three iterations and the kick-off of the project.

During the kick-off, we as a team agreed on creating a population simulation with the help of C# and WPF. While C# is familiar to me, since the start of my years in the university, WPF was some new knowledge, to which I had to grow accustomed. During this phase I mainly focused on the documentation and gaining some basic knowledge of WPF.

For iteration one my main task was research on CSV file, which we agreed will be our main source of information for the simulation, and how to construct them. After that I had to prepare some example files, gaining knowledge from demographic statistics of the capital of the Netherlands. I also contributed in the update of the documents and some sample GUI elements.

For iteration two, I handled some functionality of the map of our simulation, while also researching about other cities for future CSV file creations. Update on the documentation was handled by me and my team members. While research brought me some new skills, especially in the field of CSV files, my experience in WPF was still mainly in basics.

That is why in the third iteration I was able to work on that, by implementing a CSV file export functionality, while also working with WPF - the GUI elements, and C# - the functionality.

Overall, for the most part, working on the project has provided me with more knowledge on spheres like WPF, researching and analysing. Another key component, which I learned through my development in the project is communication and working in a team. As a student in this University, I’ve had some experience in working in teams but each time it grants me more knowledge. What I would focus on for future projects like this is being more proactive and engage more in discussing tasks and progress with the team.

## 

## Vasil Sirakov

Starting the project we were all very optimistic as a lot of us had already worked together with each other and we were friends. At first we were struggling to choose a topic for the project when we got the idea of trying to simulate a population and we all agreed on it.

Having a topic already, we decided upon what technology to use and stopped at a C# WPF project as we were all familiar with C# as a whole and just had to adjust to the WPF, having only worked with Windows Forms only.

A lot of iteration one was creating the first version of the main documentation which I worked on. Namely parts of the URS/Project plan. Other parts of the documentation which I contributed in throughout the rest of the project were the test report and also took part in creating the sequence diagrams for the design document.

During the first iteration the implementation of our product was GUI heavy. Not much the functionality, but the presentation/look of it was important., I added the line chart with a series that represented the number of people at a certain year. The rest of the iterations I primarily worked on the map and the showcasing of how the population is distributed around a certain radius(the city) and some other improvements in the visualization of data through our chart controls.

What I learned in this course is how work is managed within a larger group of people. Not only communication but also using a version system, everybody working on his own branch and how this affects workflow. Regarding programming I wouldn’t say I learned anything new in particular apart from working with different libraries for data visualisation, but the product we built as a team was challenging nonetheless.

Overall, I would consider our project a success as I am happy with how it turned out.

## Joseph Winterdal

At the start of the project it was nice that we could make our own group and that I knew everyone in the group. First week there was a lot of brainstorming going on and at some point someone suggested some disease simulation. But then we thought about who will we target our application towards and we decided it would be better to make a population growth simulation which could include disease as a parameter. Starting from the first weeks we mainly agreed on what technologies our application was going to be made on which was c# and using WPF forms as front end. At the time I was familiar with C# but had no previous knowledge of WPF so that was nice that I could learn some new technologies while still having a familiar language to develop in. At the start of the project we all had to focus on getting our documents up to standard and had to make documents such as project plan, plan for the first iteration, etc. In one of the first week we had some communication issues that arose with the plan for iteration one concept. I had made a concept version at some point and did not mention it to all our group members, who were vocally critical about it, as they did not know what we had planned for. It was good that this happened earlier on and I acknowledged my mistake and we moved on, this time with a better planning and more communication. Then the next week we made the final version of the plan for the first iteration which included the task of every team member. In this iteration we mainly focused up on the GUI and front end of the application. My main task was to implement the importing and exporting of the CSV files and then passing this information to the charts in the form. Our second iteration was mainly focused on the simulation functionality. This was probably the hardest part of the project as we needed to not only focus on the simulation and make sure it is somewhat realistic, but also keep track of all our changes to the design of the application and changes to the use cases if there were any. We originally had plans to implement the database functionality in the iteration number 2, but then once we were in this iteration the client wanted for the simulation to be completed by the end of the iteration. We focused all our attention to the simulation to make sure it was complete for a proof of concept. Here I mainly worked on improving the simulation accuracy and help with the implementation of the events. For the third iteration we had to do some extra features that we skipped on the second iteration, mainly implementing a database with import and export functionalities. Of course throughout all these iterations I worked on the documentation along with my group members to make sure they were always up to date. What I would improve looking back is a little more communication, since we had a hiccup in one of the first weeks, but we improved in this field early on in the project so that was really nice to see. New technologies I learned to work with was mainly WPF forms as I had no previous experience with it. Also learned how to plan and divide tasks among a group of 6 people. Overall our teamwork was outstanding and everyone knew what they had to do at most of the iterations, so I’m satisfied on how things turned out.