Milestone 4

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1 Motivation

Our team decided to focus on creating a visualization of the Sacramento real estate transactions in correlation to the crimes from the region. We focused on this topic because we find it very important to know as many details as possible about a residence before buying one and to have an overview of the market. Furthermore, we consider that the frequency of crimes represent an important factor for the people who are interested to invest in a property. Because of that we have decided to integrate the crimes record in the visualisation. Moreover, we have also agreed to this topic since we know how hard and time-demanding it is to move in a new city and to start looking for different informations about the safeness of the district, the average prices, without having a tool which combines both aspects.

1.1 Target users

The goal of our design is to make the decision-making about searching and evaluation of real estate very easy and visually understandable for each user. Since it is a tool which can be used by any persons, regarding the age, after careful consideration our team came to the conclusion that can be outlined three target users categories.

The first target group is represented by people with ages between 25 and 40 years old who would like to acquire a property in Sacramento, California. Due to the young age, those users do not have previous experience when it comes to buying a house. Because of that, it is important for this user group to have as much information as possible in order to make the best decision for their future. Furthermore, this user group is interested in buying a property which is not more expensive that the average price paid for a similar type of residence and has the best conditions taking into consideration the location and the different features that a property can have.

Another target user group is represented by people with ages over 40 who might have previous experience on buying a property but they do not know details about California, since they live in another state. They would like to invest money in a property which is safe taking into consideration the area where is situated, but which is also located close the the interest sales points, where there were made sales before. Taking those factors into consideration, they will be able to invest their money with minimum risks of making a bad business. This

group of users is able to visualise the transactions that were already made, as well as the districts in which those transactions took place, the number of properties that were sold taking into consideration different price intervals and the correlation of this in regard to the crimes rate. This would help them decide which neighbourhoods are preferred by people who want to acquire a residence and to invest there.

The third group is represented by any company which wants to make a new office in California and they are interested to buy properties in Sacramento. This user group might be interested in purchasing a big number of properties and, as a result, the prices are an important decision factor. Additionally, this group might be interested about the areas where there were not made many sales in order to take advantage of this and obtain them for a price lower that the average one. Moreover, different features of the residences might be of interest as well, depending on the business that they will open in Sacramento.

1.2 Data

Due to the fact that our team decided to create a project which focuses on real estate properties, we have decided to find a database from one of the official websites that publish the informations as an open data. Because of that we took the data to be analized from the website `https://support.spatialkey.com/spatialkey-sample-csv-data/` , where the official data about Sacramento is published.

2 Related work

One of the sites, where we can see the statistic about crimes in Sacramento is city-data.com. (`http://www.city-data.com/crime/crime-Sacramento-California.html`). There it is possible to find the safest district in Sacramento and to see the dynamics of crimes by type of crimes. Also on this site we can find static information about climate, schools in Sacramento, etc. However there isnt any information about real estates.

On the site `https://www.numbeo.com/crime/rankings.jsp` we can see the quantity of crimes and prices of real estate. Information about life index can also be found as well as health care, etc. The biggest disadvantage is that the information is shown by countries and a lot of information is shown in tables. We think that it is not user-friendly. Also there is some information about correlation between crimes and real estate.

To make our work the most convenient and user-friendly, we investigated the similar solutions, for example, here (`http://www.city-data.com/crime/crime-Sacramento-California.html`) is a very convenient visualization of full-time Law Enforcement Employees. We implemented the same graphic for showing the correlation between crimes and real estate.

3 Approach

Our team decided to approach a design study project using Tableau. We have decided for this type of project instead of choosing a technique or evaluation project, because this one combines both and offers us not only the possibility to create a visualisation for a particular dataset in order to gain insight, but also the chance to see how our visualisation is evaluated from the other persons and to receive feedback for our implementation and proposed solution. Moreover, the choice of using Tableau was made due to the fact that we have used the tool previously and we have more experience with it in comparison to other similar tools that can be used to create an interactive visualisation. Additionally, we considered that using Tableau would allow us to present the data graphically in a better and more comprehensible way than if we were to use another tool.

4 Implementation

Our team decided to create the website for this project using HTML, JavaScript and CSS. This decision came as a result to the fact that we have previously used those technologies during the university. Moreover, since our team decided for a design study project, we have used Tableau in order to create the visualisation of the data. This tool offers a great way of visualising the data interactively and makes it possible to integrate the dashboards created into the webpage. Additionally, for the realisation of the mock-ups we have used an online tool called draw.io .

4.1 Challenges

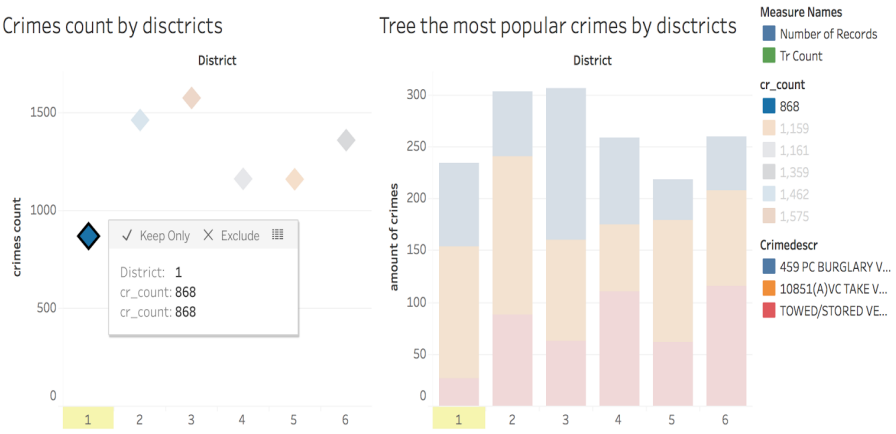
We started by considering the questions that we want to be answered when our tool is used. After this we made the mock-ups and the final visualization implementation. The challenges that came along to this approach were varied, starting with what should be kept and what should we do differently in comparison to the low-fidelity prototype of the visualisation. For this we had to reconsider which diagrams answer the most relevant questions and how do we integrate them in a dashboard such that it is not to overcrowded. Additionally, in the low fidelity prototype we were trying to express as much information as possible in the dashboards, but after we implemented the visualisation in Tableau we decided to make slight modifications and we kept only one dashboard with four diagrams. In order to decide what should be removed from the final visualisation and what should we leave as it was presented in the low-fidelity prototype, we have discussed as a team and tried to bring arguments in order to come to a conclusion. Another challenge that we have faced was regarding the join of two datasets in Tableau. We had some difficulties in the beginning, but we were able to solve them by reading the Tableau documentation and applying the hints that were provided there.

5 Results

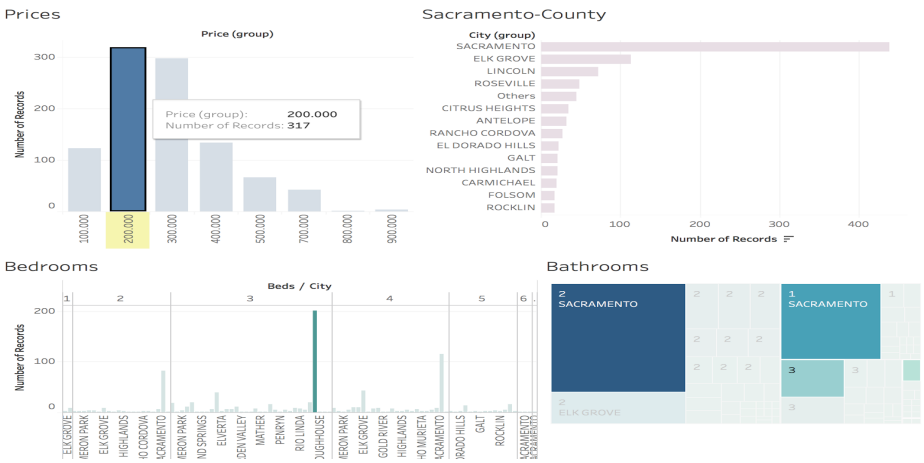
5.1 Scenario of use

Fictional user target group 1: Hello! My name is James Sandford and I am 30 years old. I am a lawyer, looking for a property in Sacramento. Since it is the first time when I am interested in buying a house, I do not have any experience regarding the prices or which districts are the safest. I am looking for a property which is not too expensive, but also in a safe place. I do not have a particular interest when it comes to the dimensions of the house, but I would like to know as many details as possible because I do not want to pay for a house more than it is supposed to cost on the market.

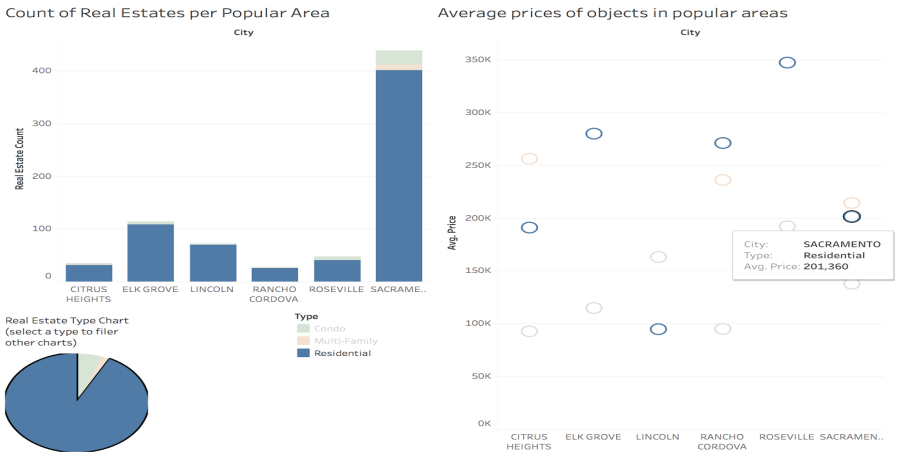
Scenario performing the tasks 1: After opening the website, it is possible to see from the first dashboard the answer to one of the main concerns of the user, namely the district safeness. Due to the design of the dashboard it is straightforward to see which area has the highest crime rate and which one the lowest. Therefore, a first impression is already created, which means that the user will probably try to find a residence in one of the districts with the reduced infraction rate.



From the second dashboard the user is able to see more information about the prices. It can be observed that the majority of the people opted for a house with a price lower or equal to 200.000 . Furthermore, the fictional user can find out more information regarding the features of the homes, such as number of beds and bathrooms.



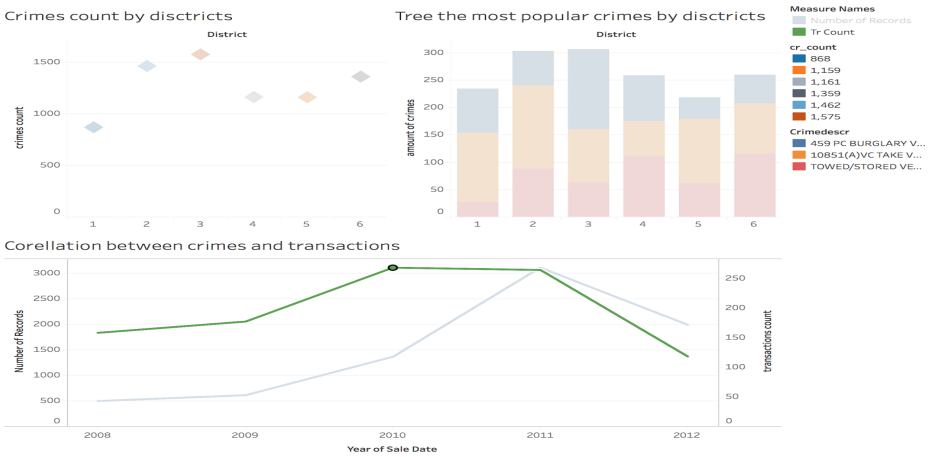
From the third dashboard not only the most popular type of house can be noticed, but also the most popular area taking the sales into consideration. This makes it possible for the user to see an overview of the market and help him choose a residence which fits his interests. It can be seen on the graph that the Residential type has the highest number of sales and that the majority of them are in Sacramento country. Moreover, it can also be detected that the lowest average price for this type of house it is in the Lincoln county.



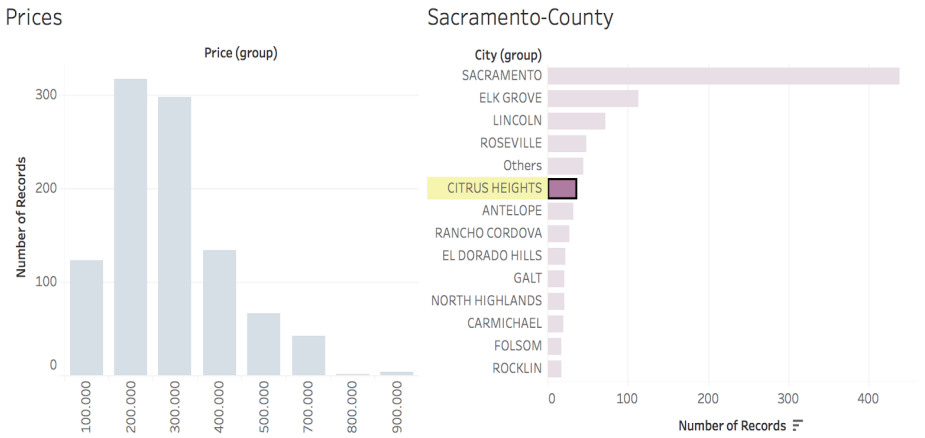
Fictional user target group 2: Good Morning! My name is Andrew McCallister and I am a 62 years old business person which focuses on the professional activity in the the domain of renewable energy in Seattle. I would like to invest in a property in Sacramento, California. I do have experience regarding houses and for me the most important thing is not only the price, but also the area in which it is located. Since I always wanted to move to California, I am looking for a family house with three or four bedrooms. Considering the fact that my experience regarding houses is limited to the Washington state, I need a tool in order to find the information that interests me. Hopefully I will be able to accomplish my dream and move there when I retire.

Scenario performing the tasks 2: From the first diagram the user can see that the district 2 and 3 are the most dangerous ones, so he would probably prefer to buy a property in

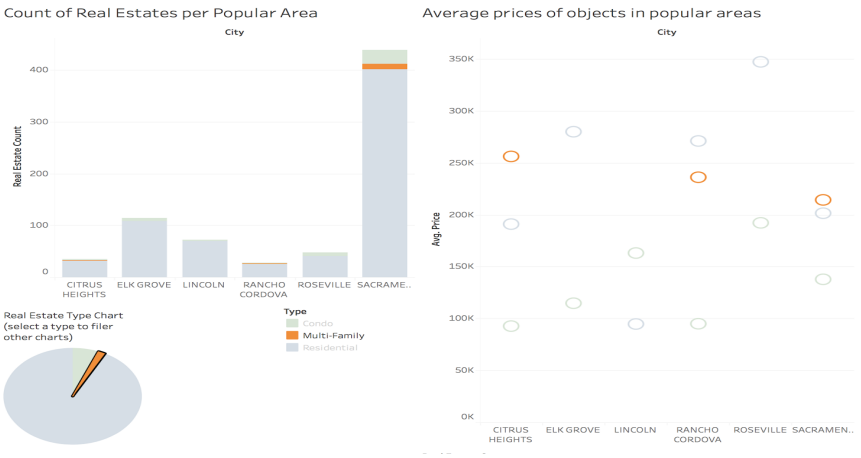
one of the other districts. Moreover, it can be observed that there has been a decline in the number of sales in the last period, which means that the prices might have dropped and it may be a good time to purchase a property now.



The second dashboard outlines that the highest amount of properties were bought with a price range from 100.000 to 300.000, which might represent the budget that the fictional target user would like to allocate for a property in Sacramento. Besides, the user might not look for a property in the most popular county and because of that, options like Citrus Heights, Antelope and Pancho Cordova can draw the attention.

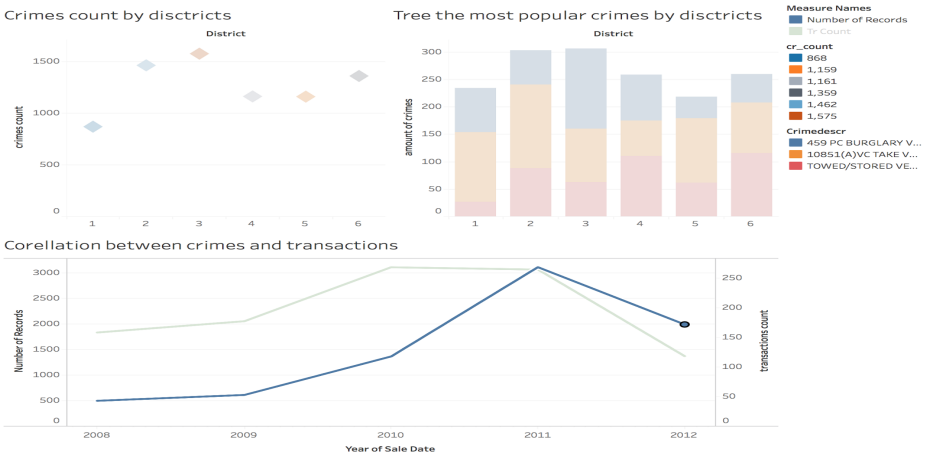


The third dashboard highlights the options that the user has for a Multi-Family residence and the prices for which there were sold. Moreover, he can see the counties in which those types of residence were sold and this could help the user, combined with other dashboards, to decide the most appropriate option according to his interest.

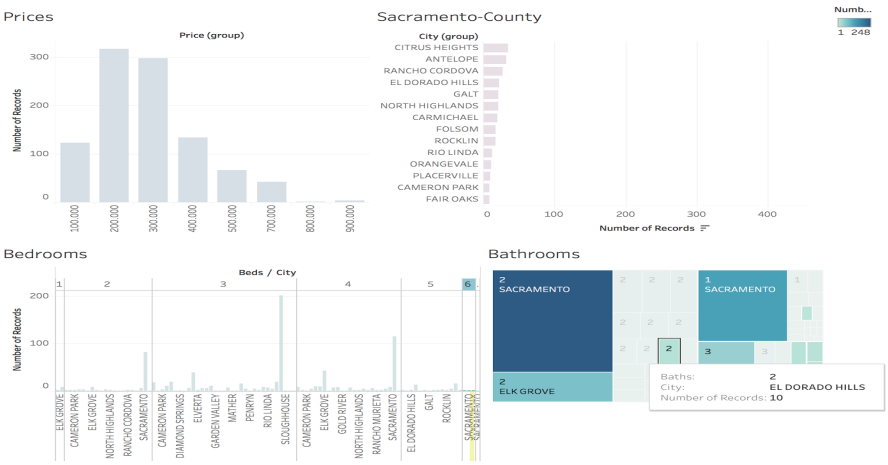


Fictional user target group 3: Hello! My name is Stacy Williams, 45 years old. I am working for a multinational corporation which wants to open an office in Sacramento and I am responsible to find the best option. Because of this, I am looking for a property in a quiet and cald district, with a low price and very spacious.

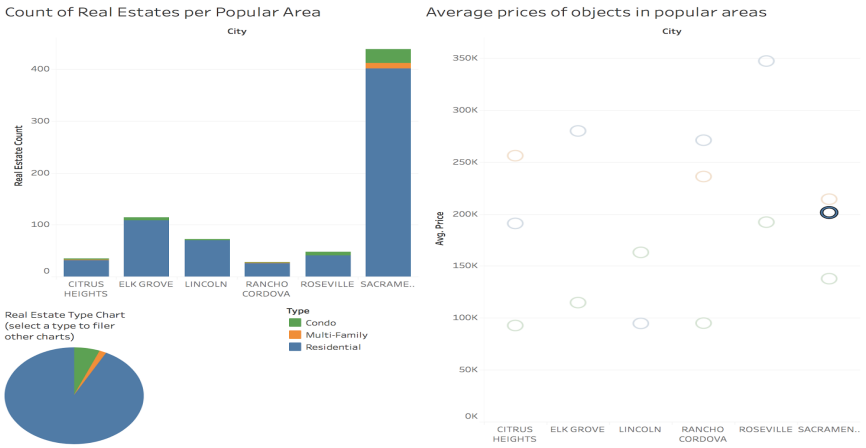
Scenario performing the tasks 3: From the first dashboard the user is able to see that districts 1, 4 and 5 would fit to her interest since the crime rate is the most reduced one here. Additionally, the dashboard indicates that there is a decrease in the amount of crimes that are happening in Sacramento, which definitely represents a good sign and another reason to open the new office here.



The second diagram highlight that the target user has to search for a property in either Sacramento, Elk Grove or El Dorado Hills if she is interested in acquiring one or more properties with a big number of bedrooms.



From the third diagram the user is able to observe that Sacramento county has an average price lower for residential type than Elk Grove, while in Elk Grove the average price for a Condo is smaller than in Sacramento. Moreover, in Sacramento there are also Multi-Family residence, which might represent an option if this can be transformed in an office. The Multi-Family type of house is not presented in Elk Grove, which reduces the decision to Sacramento.



5.2 Performance of the system

Our project includes 3 dashboards; each of them is responsible for different questions. The first one has 3 diagrams, and answers on three questions. The first question is How many crimes occur in every district. In this diagram is also possible to find the most and the least dangerous district. The second diagram shows three of the most popular crimes by every district. And the third diagram shows the correlation between crimes and transactions. In this diagram user can answer on the question: Do crimes influence the sales of real estate? .

The second dashboard answers questions that are connected with specifics of real estate and has 4 diagrams. The first diagram shows real estate grouping by prices. Here user can find the average, the most and the least popular price. The second diagram amount of transactions grouping by cities. The third and the fourth diagrams answer the questions that are

connected with bathrooms and beds in the real estate.

The third dashboard is focused on the different types of real estate and information relating these. The first diagram shows average prices of objects in popular areas. In the second diagram real estates are grouped by type (condo, multi-family, residential) and can see the most and the least popular type of real estate. And the last diagram shows count of real estates per popular area. All diagrams are interactive.

5.3 Conducted User Evaluations and Feedback gathered

In order to test our software and better it further, we conducted a questionnaire directed at some of the closest people to us as well as colleagues who study the field very closely connected to visualisation. We decided to take the qualitative and not the quantitative approach and the people that we targeted, besides the fact that some of them study something similar to what we made, are before all, just normal people who were on the lookout for a flat to rent. The version of the app that was evaluated is the one shown in the screenshots above. After we present the questions that were used, the responses of the questionnaire will be shown. We will draw a conclusion from them in the upcoming text and the program will be changed accordingly for the final presentation. The conducted questions were:

1. Have you ever been on the lookout for a flat and what were the difficulties that you faced whilst doing so?
2. What are the three most important things you look at whilst looking for a flat?
3. Now, after you used our application, what is your first impression?
4. What is the function of our app that you find the most useful?
5. Is there something that you found amiss or that you believe should be improved?
6. On a scale from 1-10 (1- not likely at all, 10 - very much likely), how likely is it that a friend of yours would find our application useful?

Person 1: Atanas:

1. I did look for a flat and I find crime really important and if the area is safe. I would also compare the object to other objects in the district to see if I am getting a good bargain.
2. Value is important, ratio of value/price needs to be good and construction and age of the building.
3. The app is very useful! First two dashboards could be improved, could use more interactiveness.
4. Information is really easy to find and the interaction is great.

5. Bathroom graph in Dashboard 2 looks very complicated and confusing at first glance, pie charts are great because they are very familiar, the bar charts in Dashboard 2 are barely visible, removing some parts of the county could improve visibility.

6. 8/10

Person 2: Zak

1. Yes and getting to know the websites to look the flats, finding good deals was hard and finding information for each district.

2. If the flat has a terrace, shops in the area and transport to it.

3. When I look at it, a few things are confusing, the way the info was presented can be cleaner, dashboard 3 is the cleanest.

4. Information for the prices and how many objects are there in which district, crime rate is very visible and clear.

5. UI, add information for infrastructure, bathrooms chart should be a different one, it's very unclear and should be sorted, bedrooms chart is cluttered.

6. strong 8 or 9/10

Person 3: Miroslav

1. Yeah and finding all of the specs that fit the price range, and there were ways to filter out missing from the website.

2. Price, location and the functionality of the place.

3. Looks good, has to be polished but can be very helpful.

4. Average price in areas and the types of real estate, if he wants to buy a condo he doesn't care about other types of objects, filtering is great.

5. Bathrooms chart should be a lot more simple, like a bar chart or whatever, if a specific zone is important it will never be found, it would be great if you can list out the crimes.

6. 8.5/10

Person 4: Iwo

1. Yeah, difficulties were getting in your price range.

2. Size of the occupied space, price and location of the object (whether close to centre or outskirts).

3. At first its a bit hard to comprehend the dashboards (a lot of information).

4. Comparing the price ranges of different types of objects, colours are easy for the eye.

5. The descriptions of the charts.

6. 7/10

Person 5: Ita

1. Yes and flats not looking the same as on the pictures of the website.

2. Price, infrastructure, division of rooms in the flat.

3. It contains the most important information that one would need when starting to look for a flat.

4. The correlation between the bathrooms and the bedrooms in dashboard 2, the prices and type in dashboard 3 are useful.

5. More information on districts is missing.

6. 5/10

6 Discussion

6.1 Strengths and weaknesses of our approach

At the time that we assembled the team, all of us had high hopes of the end product as we were all very motivated and felt like were going to make a tool that people will actually find useful. While following the great advices from the lecturers, we split the assignments for every milestone so that we all feel like all of us had a fair share of what needed to be done. As the project turned out to be quite flexible, we had enough space to decide and do a part that each of us really wanted to do and was excited to do the same. One of the main strengths of our team is that our communication was impeccable. When one of us was busy with an exam coming up the rest were very eager to cover and the person that was busy beforehand fought had to do more things afterwards, even though the separation of tasks was mostly evened out.

Another main strength was that all three of us are perfectionists, and we didnt stop until all three of us were sure that it looked exactly how we imagined it. A weakness in this strength was that we had issues in defining which perfection was actually the best, so some time was wasted in determining how we want it to look exactly and finding a compromise wasnt the easiest task as we never worked before in the same team. Getting used to each others way of thinking was very fast though, and therefore enabled us to provide satisfying results fairly quickly.

The idea behind our implementation comes from our raw passion for presenting beautiful things which are not only pretty but also very useful for the people who might need them. Even though usability was our primary goal at every point throughout the project, we gave high value to how it actually looks like. Another large aspect of our project was making the information as accessible as possible with each user being able to narrow down the data to

specific numbers that he or she might require.

Even though we weren't sure if we were supposed to conduct interviews with users who would test our program or not, we decided that we want someone to reflect upon our work anyway and went through with it. We all saw it as reaping what we have sown.

6.2 Lessons Learned

One of the biggest lessons learned is that even though it matters what each individual does, we are all a single unit working together to present something amazing and that we need to work as that single unit in order to succeed. Another lesson that we learned is that even though everyone from the need is busy with other projects or personal matters, an adequate amount of time needs to be paid to the project and to not leave anything for the last couple of days before the deadline. Luckily, this is a lesson that we learned early on in the project and we stuck to what we learned as the milestones passed by.

Furthermore, we all enjoyed hearing the user feedback on the tool (especially David who conducted it). It felt pretty good to see people reflect on something that you made and it also felt very motivating to change the tool in a way to meet the requests and critics of the users while still staying true to our primary idea for the three dashboards.

7 References

1. Tableau: `http://www.tableau.com/trial/tableau-software-video`
2. CSV data: `https://support.spatialkey.com/spatialkey-sample-csv-data/`
3. Working on interactivity in Tableau: `http://vda.univie.ac.at/Teaching/Vis/16w/Tutorials/tableauTutorial_16w.pdf`
4. Tamaras excellent web page for all kinds of brain food on visualizations: `http://www.cs.ubc.ca/group/infovis/resources.shtml`

8 Separation of tasks

Alina: Motivation, Approach, Implementation, Results - Scenarios of use, including screen shots of the system being used, LaTeXreport

Elena: Related work, Results - Performance of the system

David: Strengths and weaknesses, User Interviews and User Feedback, Lessons Learned, Report Proofreading