Cartography M.Sc.

Design and development of a location-based mobile city dashboard

Defense

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Outline

Design and development of a location-based mobile city dashboard

Section I – Introduction

1.1 Motivation and problem statement

Design and development of a location-based mobile city dashboard

Section I – Introduction

1.1 Motivation and problem statement

Design and development of a location-based mobile city dashboard
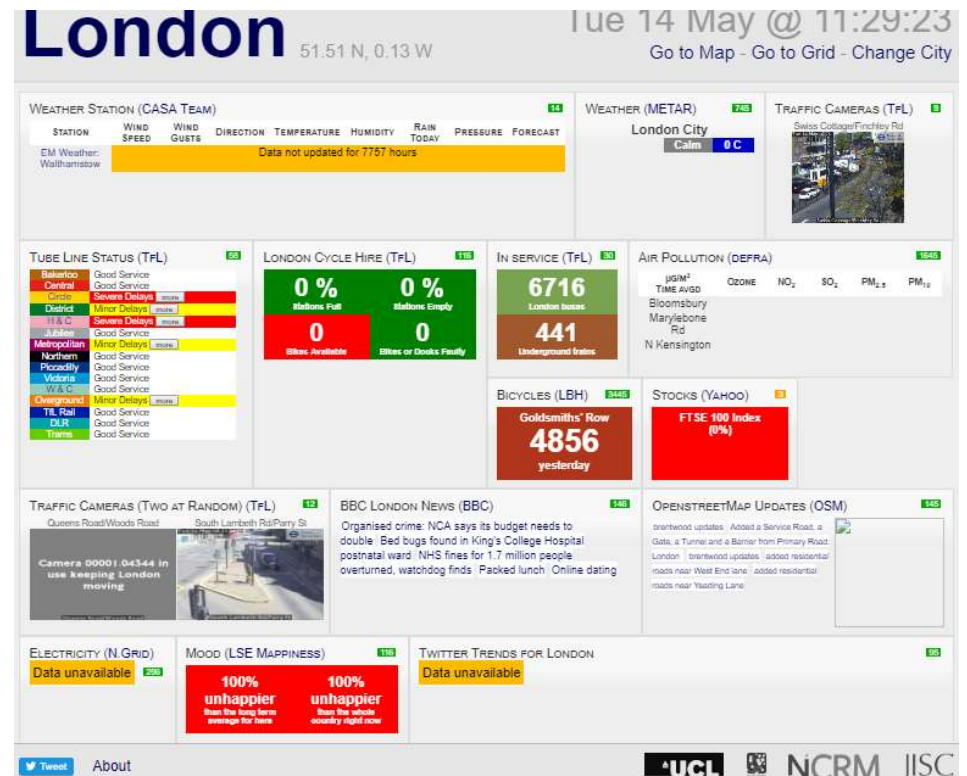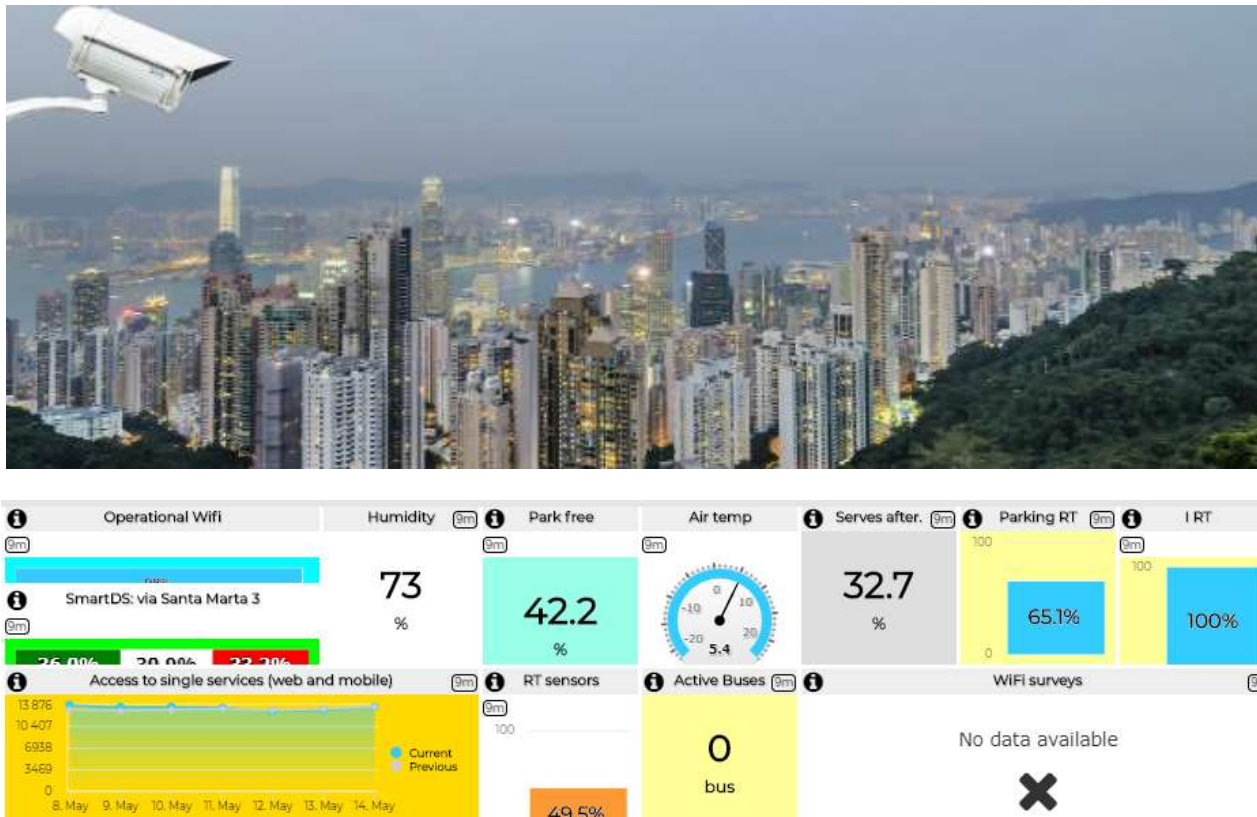
Section I – Thesis objectives

1.2 Research objectives

The main goal of this thesis is to propose an alternative to existing urban dashboards which
- gives a deeper insight into the evolution of the city,
- implements a bottom-up approach for informal city exploration according to the needs of the people.

Sub-objective 1:

To investigate the role of existing urban dashboards.

Research questions:

- RQ 1: What topics are displayed in existing urban dashboards?

- RQ 2: Do existing urban dashboards show urban transformations? If yes, how?

- RQ 3: What platforms are used to implement existing city dashboards?

- RQ 4: What aspects of urban dashboards do citizens find useful?

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Section I – Thesis objectives

Sub-objective 2

To develop a new map-based approach where urban dashboards inform the citizen about past, present and future scenarios transforming the city and engage citizens in the planning processes.
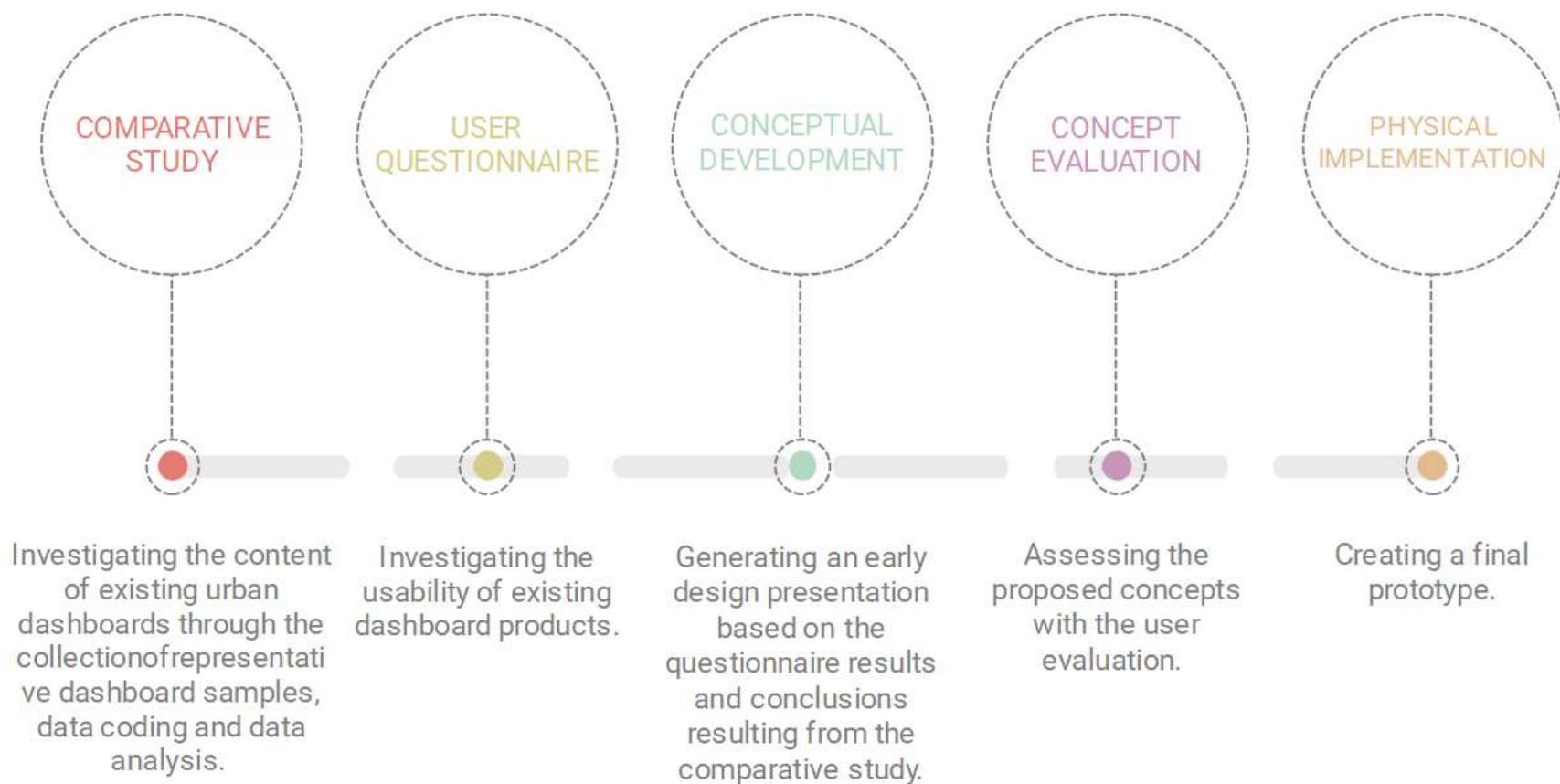
Research questions:

- RQ1: How to visualize (small-scale) existing urban transformations in urban dashboards?

- RQ2: How to visualize current and future urban transformations in urban dashboards?

- RQ3: What map-based functionalities would allow an active participation of citizens in the planning of the city?

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Section II – Methodology

2.1 Adopted methods

COMPARATIVE STUDY	USER QUESTIONNAIRE	CONCEPTUAL DEVELOPMENT	CONCEPT EVALUATION	PHYSICAL IMPLEMENTATION
Investigating the content of existing urban dashboards through the collectionofrepresentative dashboard samples, data coding and data analysis.	Investigating the usability of existing dashboard products.	Generating an early design presentation based on the questionnaire results and conclusions resulting from the comparative study.	Assessing the proposed concepts with the user evaluation.	Creating a final prototype.

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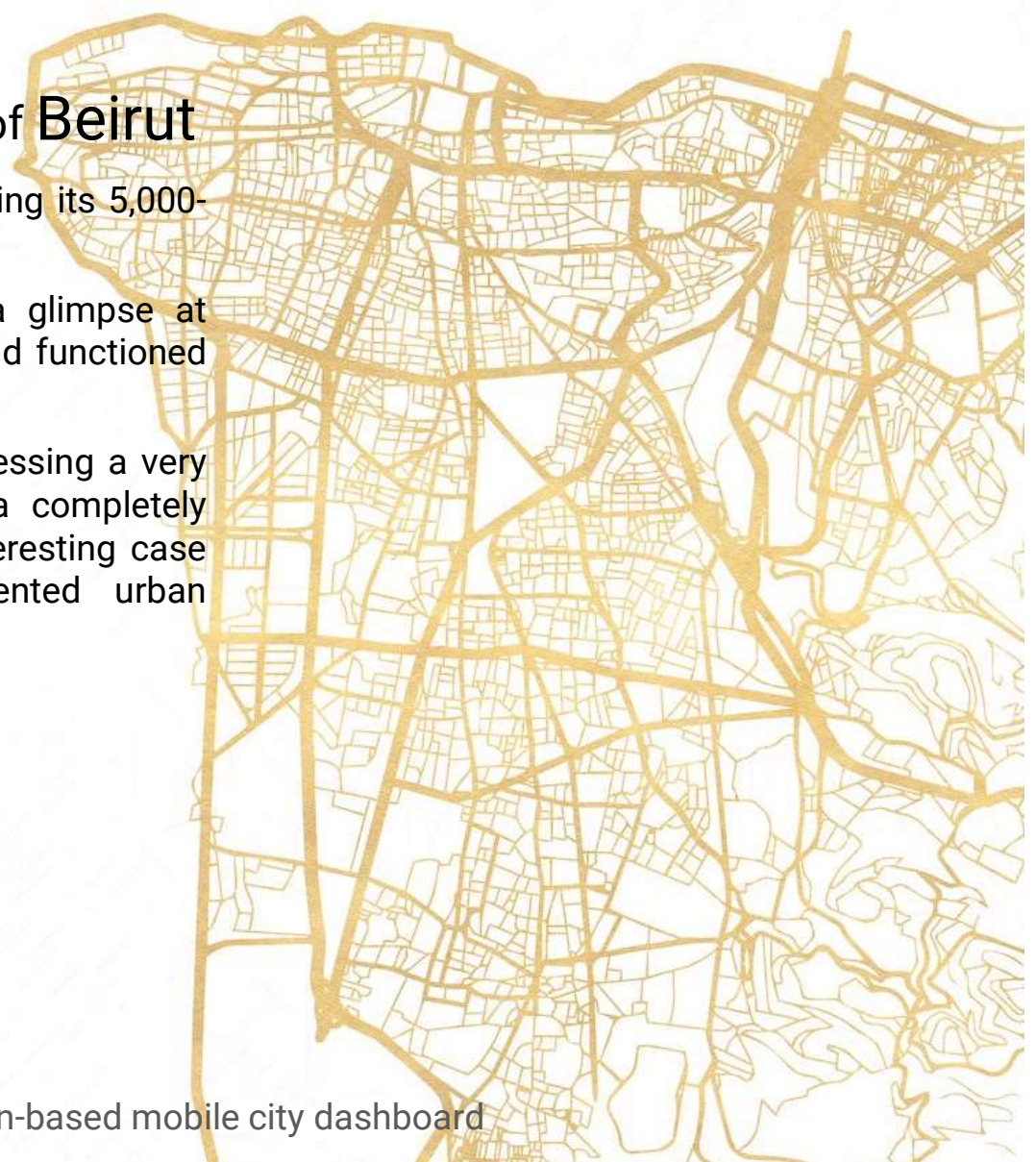
Section III – Case study

3.1 A city dashboard for the city of Beirut

- Destroyed and rebuilt seven times during its 5,000-year history.

- Archaeological excavations provide a glimpse at how the city neighborhoods looked and functioned in ancient times.

- Beirut is a city full of contrasts, witnessing a very rapid urban change with drives of a completely different nature, what makes it an interesting case study for developing a citizen-oriented urban dashboard.
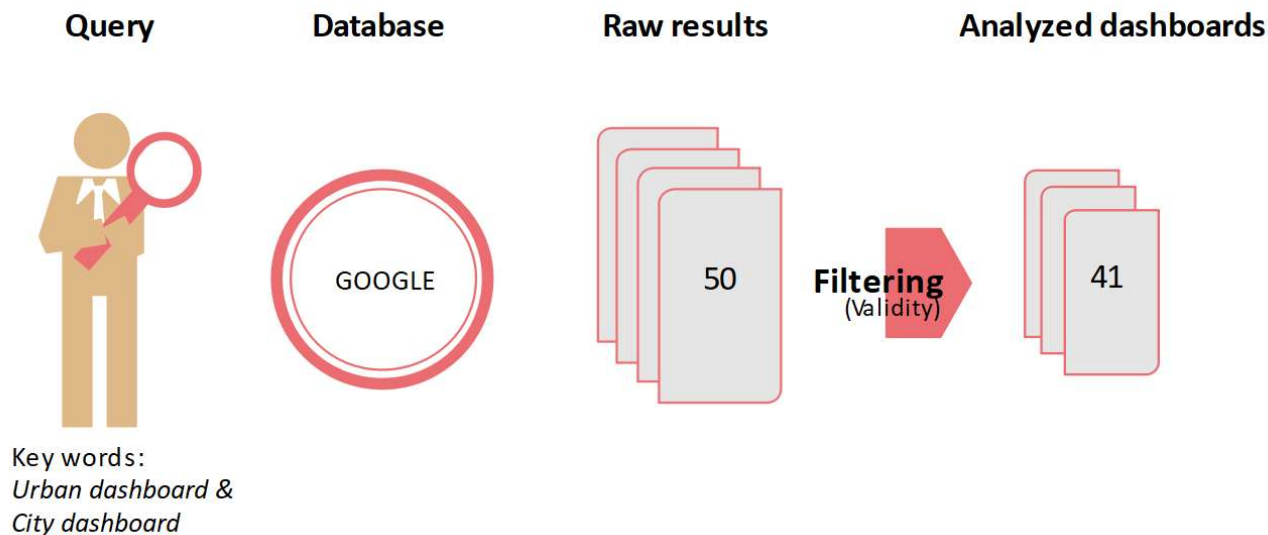
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Section III – Case study

3.2 Comparative study of urban dashboards

3.2.1 Dashboard sample selection

- capture the variety of existing urban dashboards,
- search based on keywords,
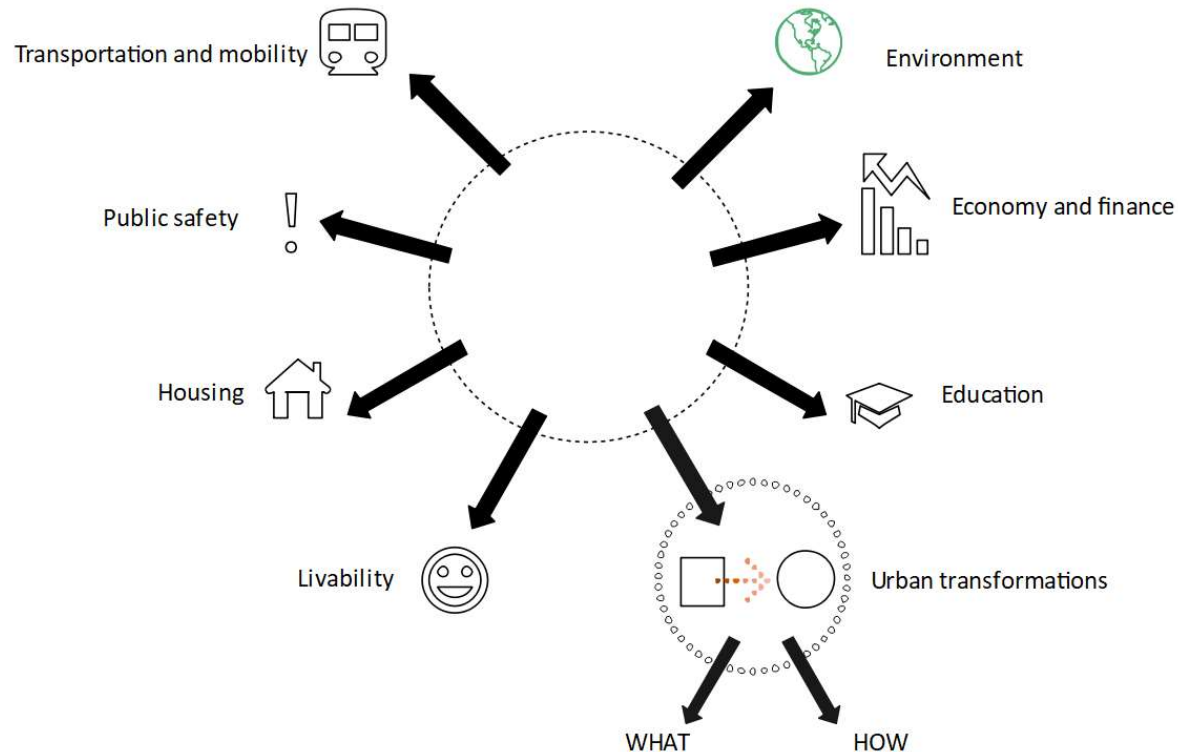- filtering the sample – removing outdated dashboards, prototypes under construction

Query	Database	Raw results	Analyzed dashboards
	GOOGLE	50	Filtering (Validity) → 41

Key words:
*Urban dashboard &
City dashboard*

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Section III – Case study

3.2 Comparative study of urban dashboards

3.2.2 Topics and indicators extraction
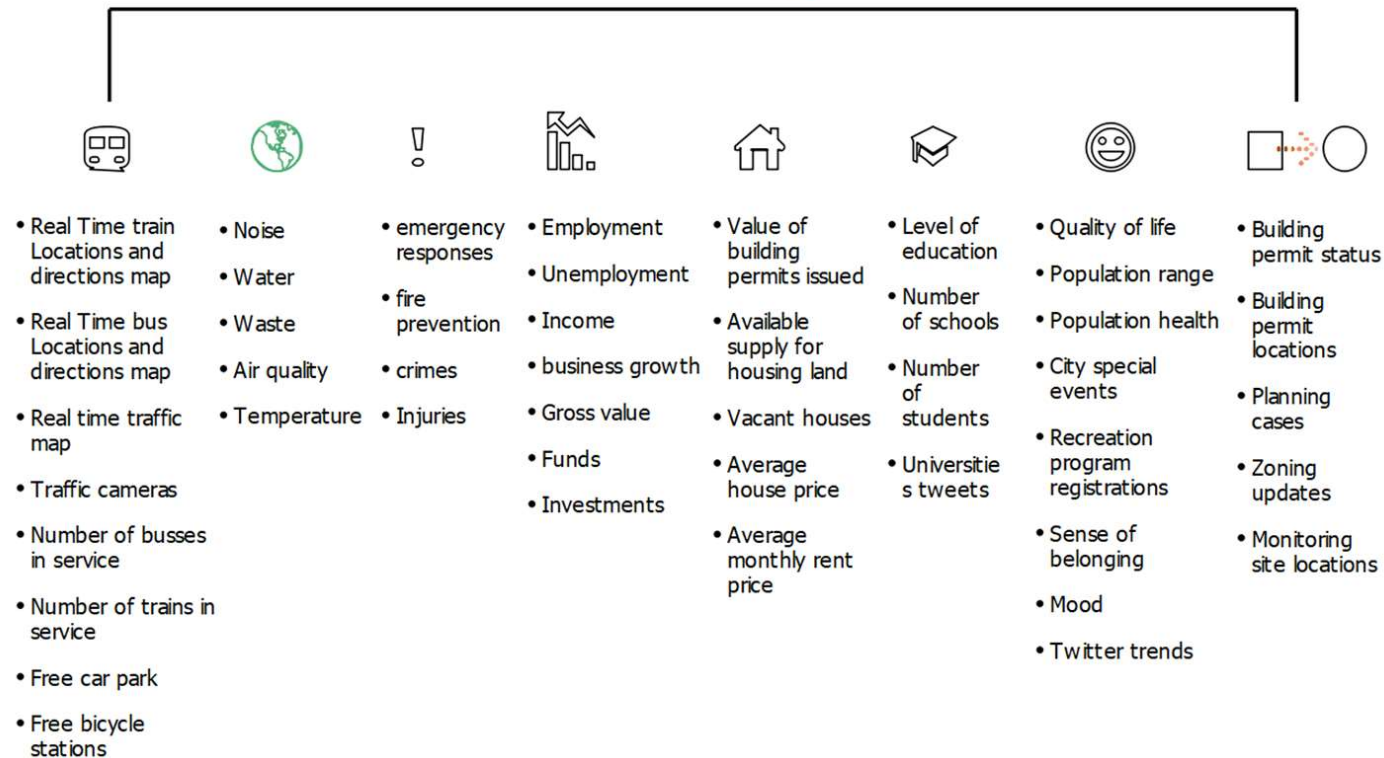*RQ1: What topics are displayed in existing urban dashboards?*

Transportation and mobility

Environment

Public safety

Economy and finance

Housing

Education

Livability

Urban transformations

WHAT

HOW

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3.2 Comparative study of urban dashboards

3.2.2 Topics and indicators extraction
RQ1: What topics are displayed in existing urban dashboards?

Transport	Environment	Safety	Economy	Housing	Education	Society	Planning
• Real Time train Locations and directions map	• Noise	• emergency responses	• Employment	• Value of building permits issued	• Level of education	• Quality of life	• Building permit status
• Real Time bus Locations and directions map	• Water	• fire prevention	• Unemployment	• Available supply for housing land	• Number of schools	• Population range	• Building permit locations
• Real time traffic map	• Waste	• crimes	• Income	• Vacant houses	• Number of students	• Population health	• Planning cases
• Traffic cameras	• Air quality	• Injuries	• business growth	• Average house price	• Universities tweets	• City special events	• Zoning updates
• Number of busses in service	• Temperature		• Gross value	• Average monthly rent price		• Recreation program registrations	• Monitoring site locations
• Number of trains in service			• Funds			• Sense of belonging	
• Free car park			• Investments			• Mood	
• Free bicycle stations						• Twitter trends	

Section III – Case study

3.2 Comparative study of urban dashboards

3.2.2 Topics and indicators extraction
RQ1: What topics are displayed in existing urban dashboards?

	%
Transportation and mobility	70
Environment	80
Public safety	48
Economy and finance	41
Housing	19
Education	34
Livability	78
Urban transformations	12
	100

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Section III – Case study

3.2 Comparative study of urban dashboards

3.2.3 Typology of urban dashboards

| TYPE 1 | - All of these city dashboards share both a semiotic and a semantic aspect.
- They aim to summarize quantitative data in a single screen.
- Live feeds of real time data are being communicated to citizens.
- The user has the ability to access a link provided by each module which links him to the initial data provider. | London
Birmingham
Brighton
Cardiff
Edinburgh
Glasgow
Leeds
Manchester
Sydney |
TYPE 2	- All of these city dashboards provide a live, colour-changing visual data. Rather than simply providing the raw data, these sites produce visualisations that aid the interpretation process.	Florence Pisa Hong kong Boston
TYPE 3	- Both city dashboards were designed so that all available open data about the city. - The user is able to download data to do their own analysis or build their own apps. - Modules are first divided according to the different ways of data collection and then according to the different topics.	Cork Dublin
TYPE 4	- Both city dashboards provide three kind of data visualizations: tables, maps and charts. - Offer the user the freedom to navigate to the one of the visualization option he would like to explore, it depends if the user is trying to understand a relationship between a data set or he is looking into a single value.	Brussels Bristol
TYPE 5	- All of these city dashboards introduce scrolling into the dashboard layout. - The dashboard flows vertically not horizontally. - The dashboard introduces spacing between dashboard modules thus higher ratio of blank space.	Adelaide Canberra Gladstone Osaka Tokyo Taipei
TYPE 6	- All of these cities provide a performance dashboard with statistical data. - The dashboard is developed as a list of indicators. - The information is presented in an infographic format.	Dallas Guelph Syracuse Berkley Boulder San Diego Muskegon Niles Hamilton Toronto
TYPE 7	- This city dashboard is different from the others considering its use for gauges to visualize data. - Gauges track single metrics that have a clear objective. They compare a current value and a target value, which often indicates whether the progress is good or bad.	Lake Oswego
TYPE 8	- Both city dashboards use a map to analyze data across a city. - The dashboards require heavily the user interaction with the map. - It is possible to lay out all filtering options on one map.	Townsville Paris
TYPE 9	- Both city dashboards examine how an area is performing on different metrics and compared to other areas within the same city. - The type of data provided is not updated regularly compared to all other types of dashboard such as New York dashboard which is updated every 2 years.	Galway New York
TYPE 10	- Both city dashboards provide the citizens the opportunity to track the progress of infrastructure projects going on in the city. - An interactive map communicates building permit applications.	Columbia Raleigh

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Section III − Case study

3.2 Comparative study of urban dashboards

3.2.4 Visualizing urban transformations in dashboards
RQ 2: Do existing urban dashboards show urban transformations? If yes, how?
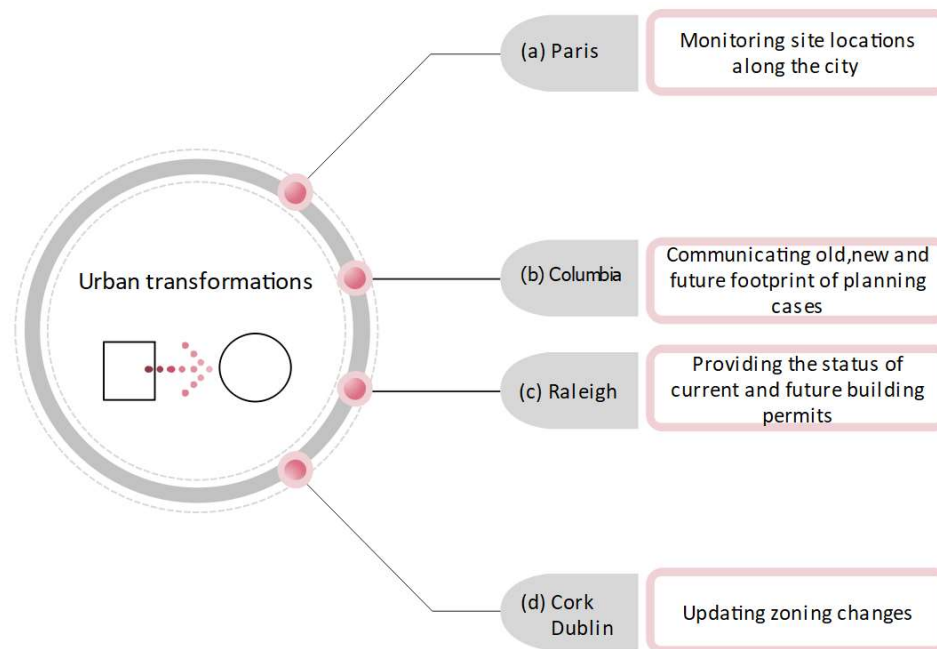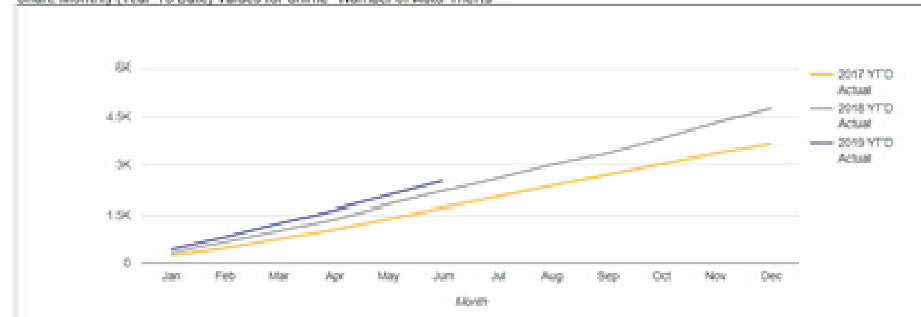
Section III – Case study

3.2 Comparative study of urban dashboards

3.2.5 Platforms adopted for urban dashboard implementation
RQ 3: Do existing urban dashboards show urban transformations? If yes, how?

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Section III − Case study

3.3 The design of the user questionnaire
RQ 4: What aspects of urban dashboards do citizens find useful?

- assessing the usefulness of existing types of urban dashboards

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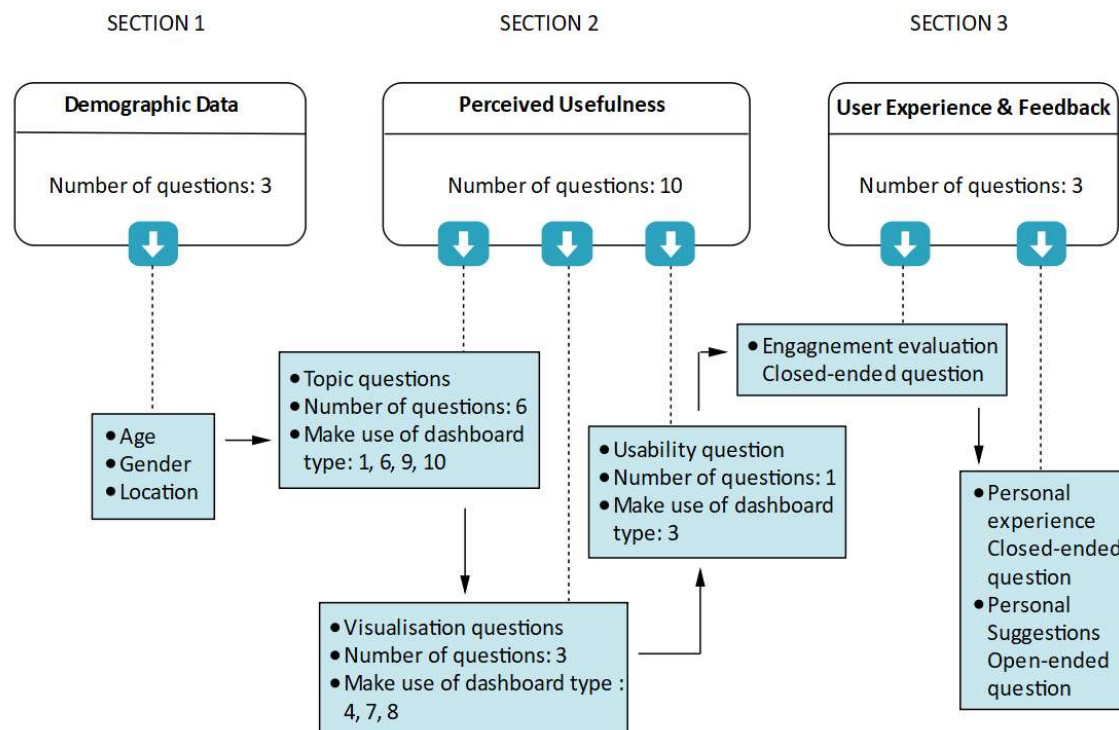
Section IV – Results

4.1 The questionnaire results

Germany	France	United Kingdom	Austria	Lebanon	Saudi Arabia	Australia	Canada	United States	Mexico
23%	12.5%	2%	4%	**35.5%**	4%	8.5%	2%	6.5%	2%

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Section IV – Results

4.1 The questionnaire results

Have you ever used a city dashboard?
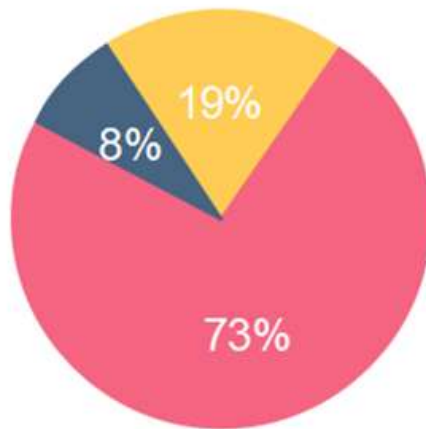
- No, I have never used city dashboards before
- Yes, I have used city dashboards
- Not specified

Sex	Percentage %	Number of respondents (total number =48)
Female	58.33%	28
Male	33.33%	16
Not specified	8.34%	4

Age	<18	18-25	25-35	35-45	45-55	55-65	>65
%	0%	21%	52%	6%	10.5%	8.5%	2%

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4.2 Requirements emerging from the comparative study and the survey
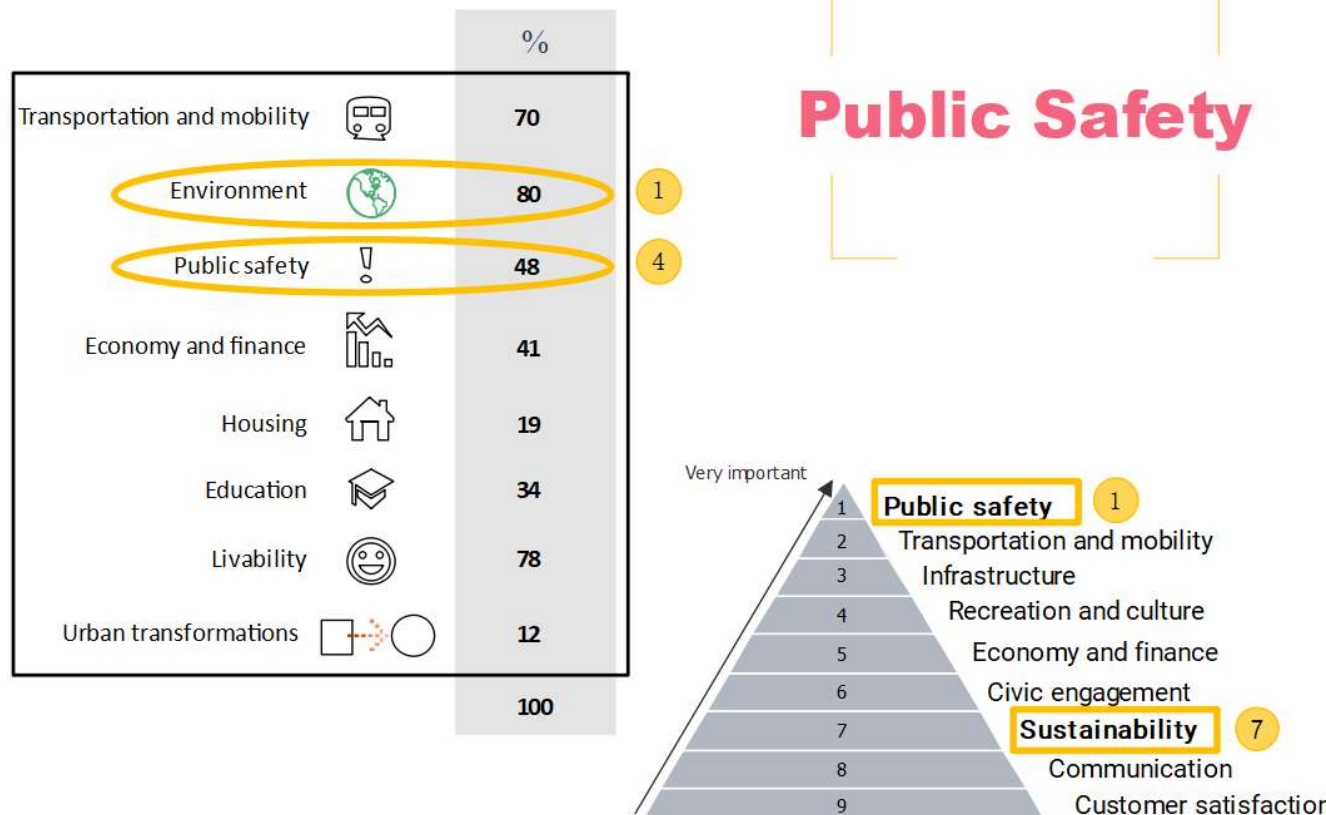
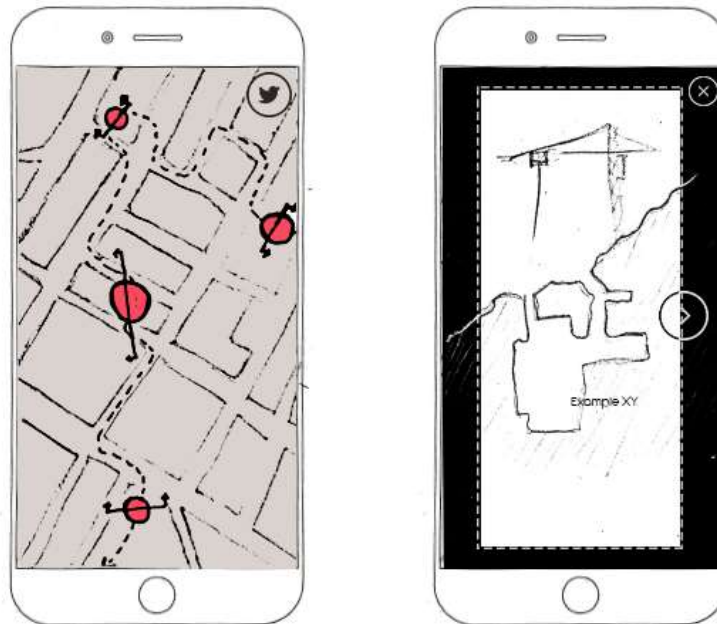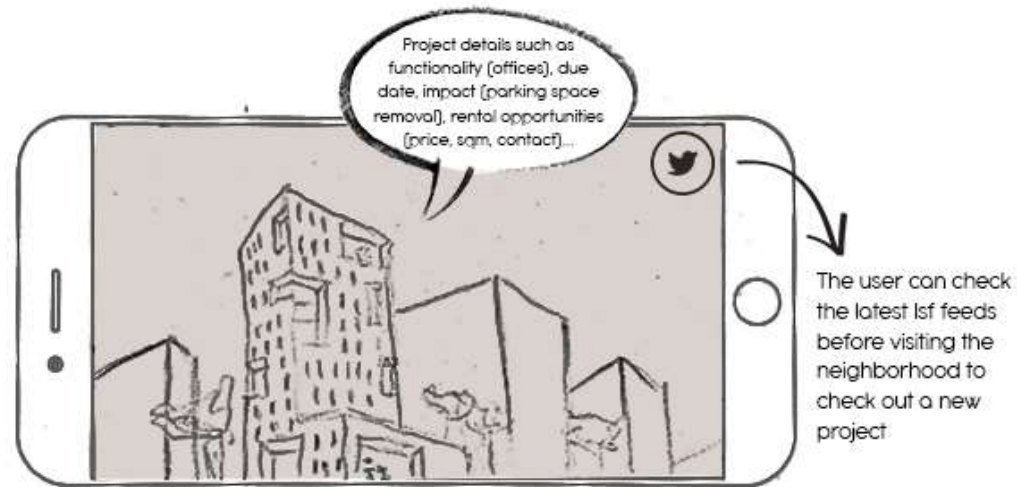## 4.2 Requirements emerging from the comparative study and the survey
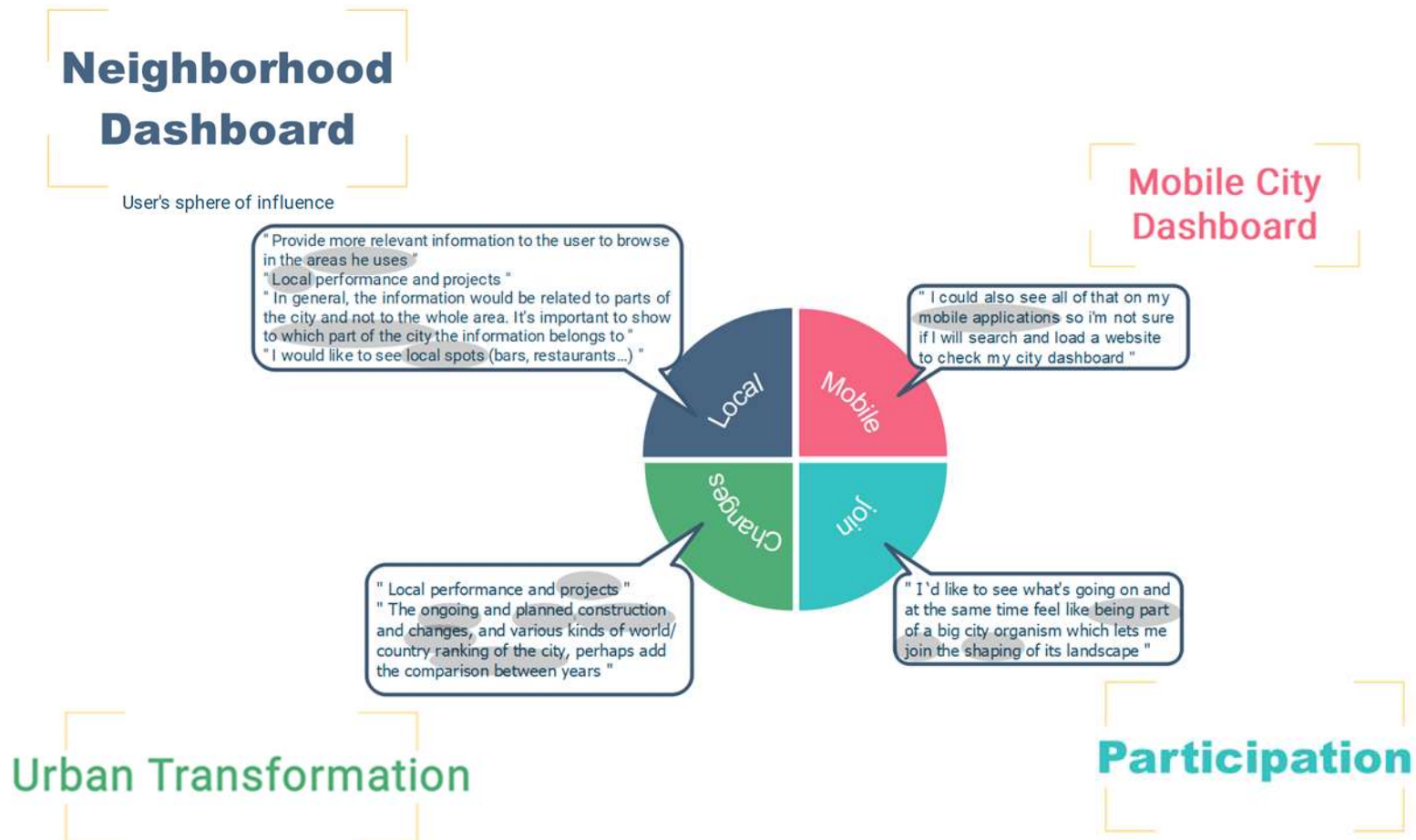
4.3 Conceptual development

RQ1: How to visualize (small-scale) existing urban transformations in urban dashboards?
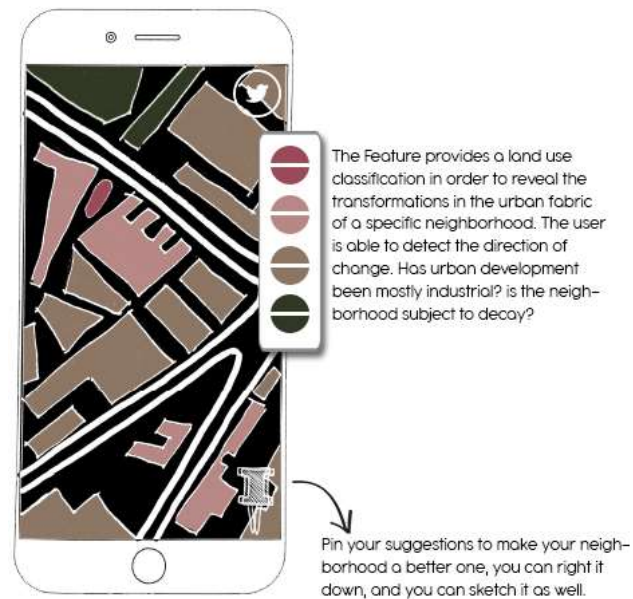
4.3 Conceptual development

RQ2: How to visualize current and future urban transformations in urban dashboards?

4.3 Conceptual development

RQ3: What functionalities would allow an active participation of citizens?

The Feature provides a land use classification in order to reveal the transformations in the urban fabric of a specific neighborhood. The user is able to detect the direction of change. Has urban development been mostly industrial? is the neighborhood subject to decay?

Pin your suggestions to make your neighborhood a better one, you can right it down, and you can sketch it as well.

4.3 Conceptual development

Public safety in favour of urban transformations

Set an alert notification system
Set a notification raduis (geofence)
Set your "home" neighberhood
Add another neighborhoods

RAS BEIRUT
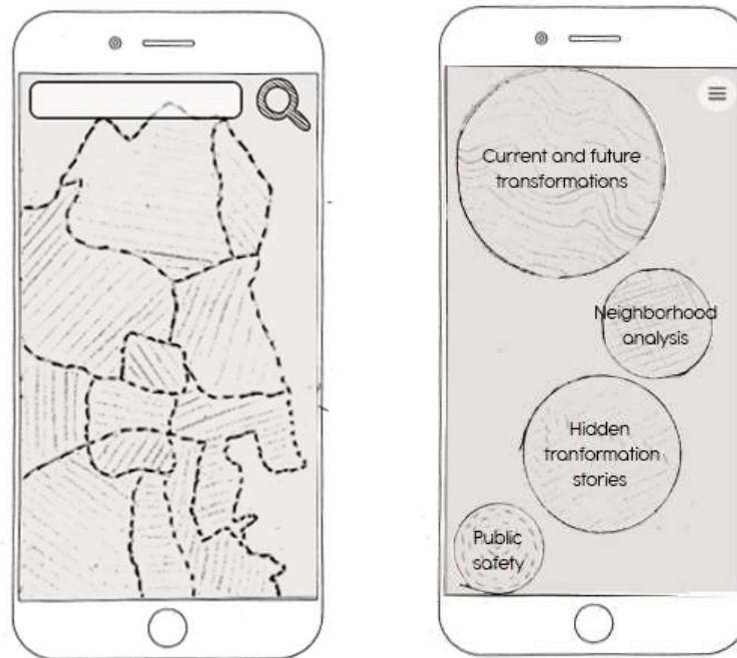
Set the location of a
Protest Alert within the
chosen neighberhood

12 Lebanese out of 17 ranked
Public Safety as top
necessity dashboard feature
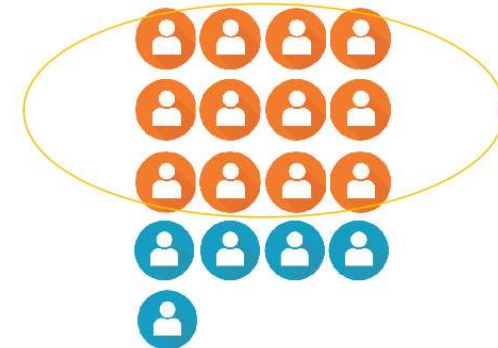
4.3 Conceptual development

Search page & Home page

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Section IV – Results

4.4 User evaluation results

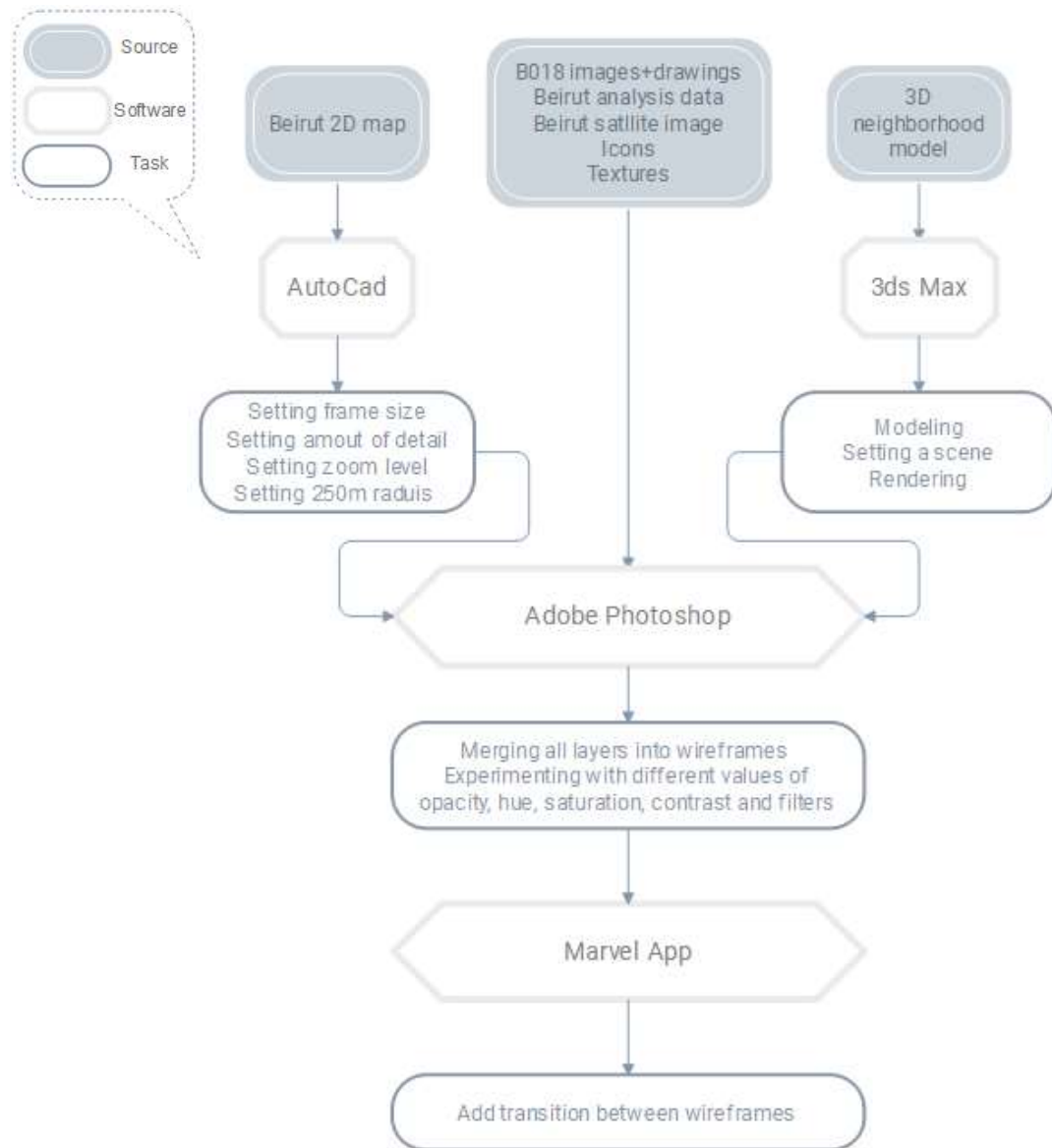|	Number of participants answering YES	Number of participants answering NO
Rate the urban solutions suggested by citizens	14	0
Keep track of the suggestions popularity	10	4
Check the public safety feature before visiting a certain neighborhood in Beirut	14	0

Imagine you want to discover hidden transformations in your city , how would you prefer to do it?

(5) By playing a game, like treasure hunt

(3) By receiving informative notification once a day, like an animated feed or story of maximally 60 seconds

(5) By receiving automatic notification when I am close to the 'hidden' location, like in a radius of 200 meters

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Section V – Mockup implementation

5.1 Data and tools

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Section V – Mockup implementation

5.2 The structure of the app

- Welcoming screen
- Search page
- Home page
- Current and future transformations
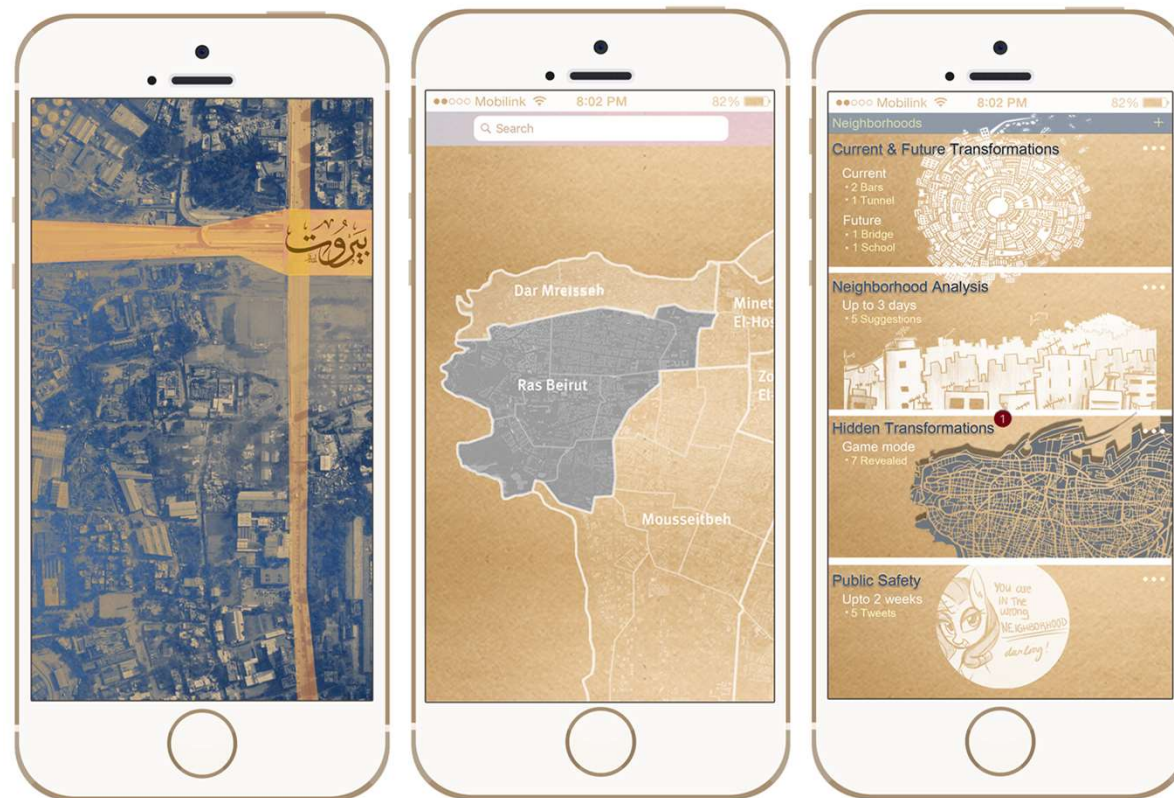- Neighborhood analysis
- Hidden transformations
- Safety feature page

https://marvelapp.com/1g41ab5g

Design and development of a location-based mobile city dashboard

Section V – Mockup implementation

5.3 Welcoming screen and home page

Design and development of a location-based mobile city dashboard

Section V – Mockup implementation

5.4 Current and future transformations

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Section V – Mockup implementation

5.5 Neighborhood analysis

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Section V – Mockup implementation

5.5 Neighborhood analysis

Design and development of a location-based mobile city dashboard

Section V – Mockup implementation

5.5 Neighborhood analysis

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Section V – Mockup implementation

5.6 The hidden transformations

Design and development of a location-based mobile city dashboard

Section V – Mockup implementation

5.6 The hidden transformations

| Design and development of a location-based mobile city dashboard
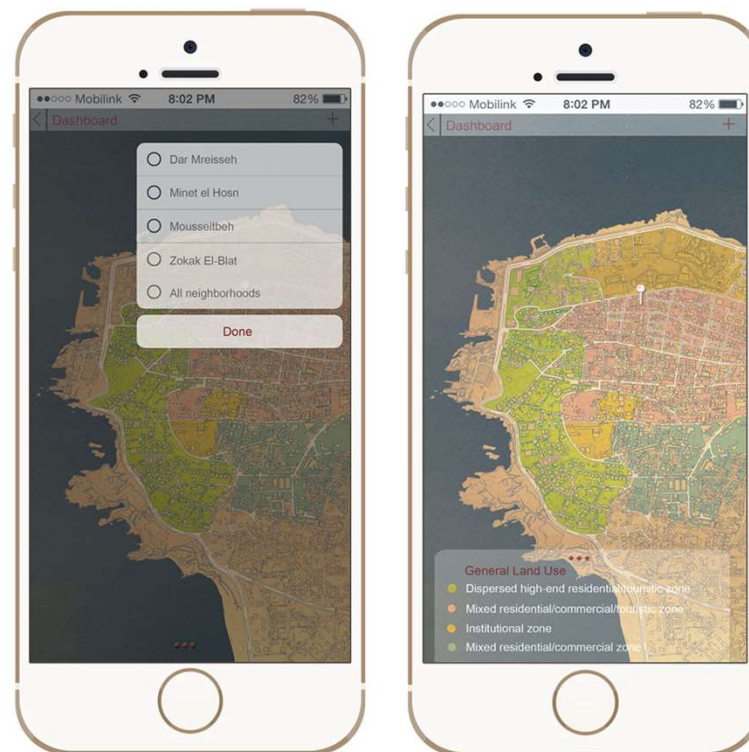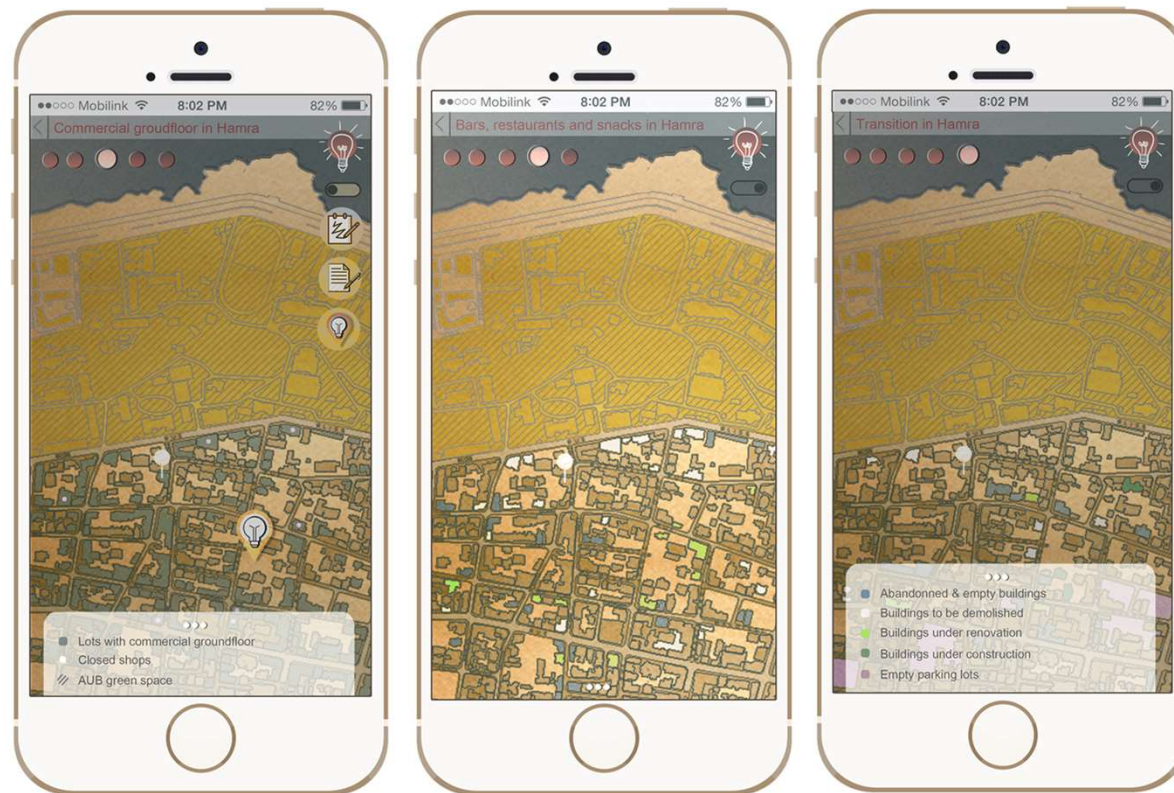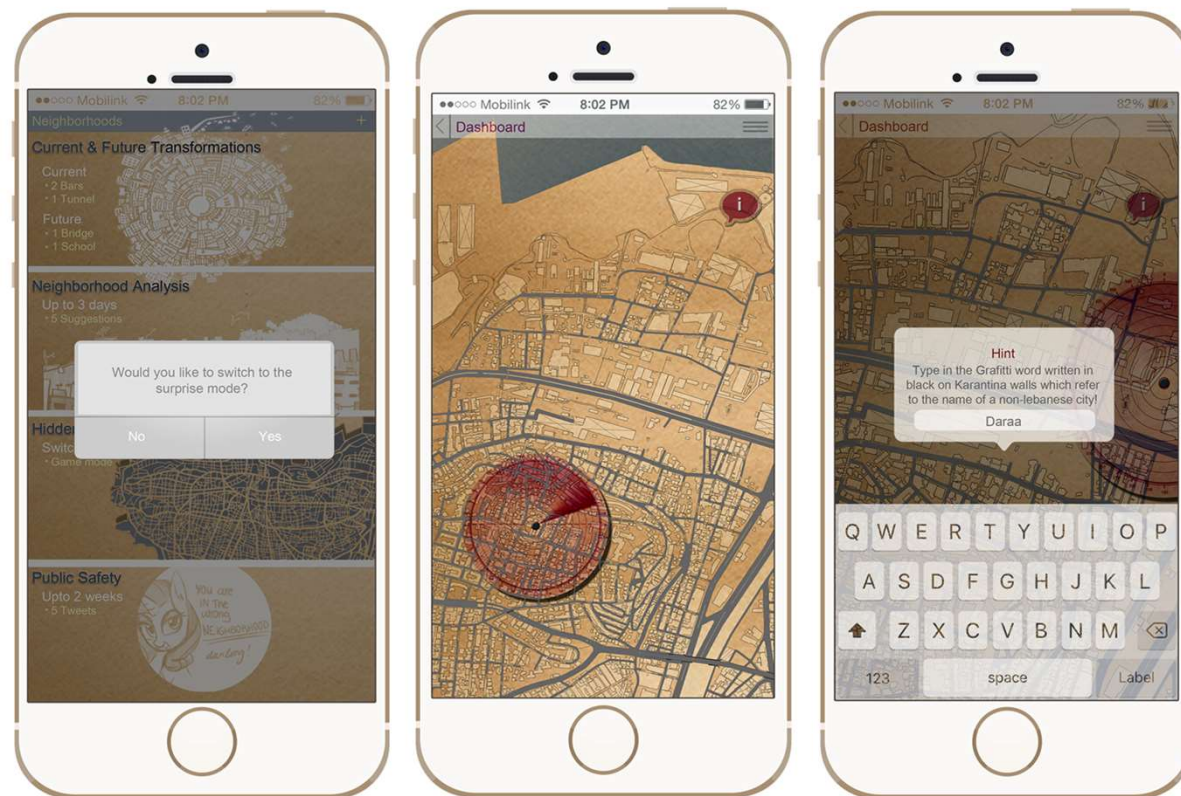
Section V – Mockup implementation

5.7 The safety feature

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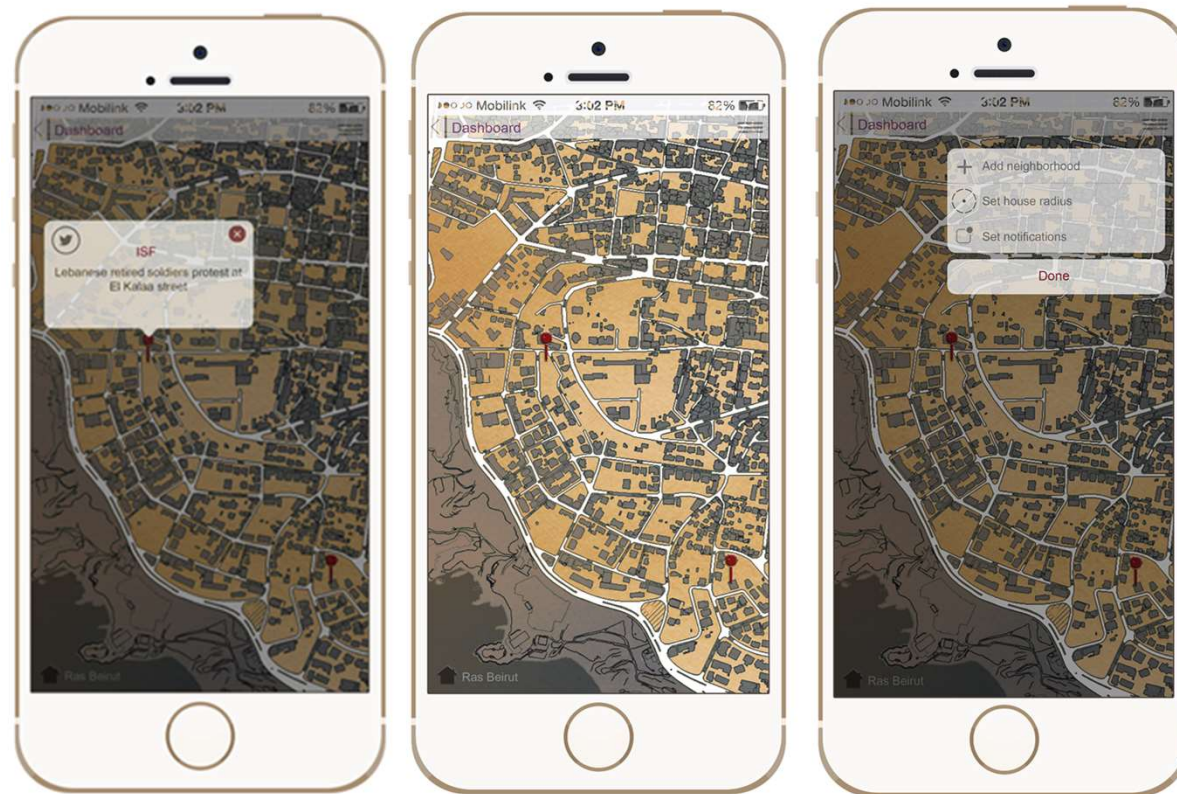
Section VI – Conclusion

6.1 Limitations

- The conducted comparative study is based on a selection of a limited number of existing urban dashboards.

- One indicator might be useful for one city more than the other.

- There is no guarantee that design guidelines from one category of indicators could be efficient for another.

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Section VI – Conclusion

6.2 Contribution

- The main objective of this thesis was to develop an alternative to existing urban dashboards.

- The proposed urban dashboard for Beirut achieved this purpose by taking into consideration people's need and by providing them tools to express their needs.

- The proposed prototype contributes to the exploration of a new design space for city dashboards.

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Thank you!

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