

Improvement of Decision Making and Communication in Disaster Risk Management through Cartographic Dashboards



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Floods, droughts and tropical storms - disasters are becoming increasingly present in our everyday lives [1]. The Tianjin explosion in 2015 [2] is a disturbing illustration of how devastating the effects of poor disaster risk management can be. Since disaster risk is a complex interplay between vulnerability, exposure and hazards, the analysis and evaluation of these factors is of critical importance.

In this context, the general aim of this master's thesis was to evaluate the usability of dashboards for disaster risk management [3] and to investigate whether decision making and the communication flow could be significantly improved in comparison to traditional solutions such as static maps.

RESEARCH OBJECTIVES

- I. Identify whether decision making and communication flow could be improved by the interactive character of a dashboard compared to static maps.
- II. Identify whether dashboards as interactive cartographic visualizations are a useful tool for risk and vulnerability assessment for disaster risk management purposes.
- III. Investigate whether the concept of a dashboard as an interactive cartographic visualization is applicable to other potential user groups, working in the disaster risk industry in different sectors.

METHODOLOGY

The methodology [Figure 2] can be roughly divided into **four** different steps:

1. **Requirements analysis:** two qualitative expert interviews and an additional interview with the **core user GAF AG**.
2. **Potential analysis:** simple dashboard creation for comparison between dashboard and static map in the scope of a user test
3. **Dashboard prototype:** creation and design of the *sophisticated dashboard prototype* for the **core user GAF AG** with ArcGIS Enterprise
4. **Sector analysis:** perception of concept of the dashboard prototype by stakeholder working in different sectors in the field of disaster risk management through an online survey

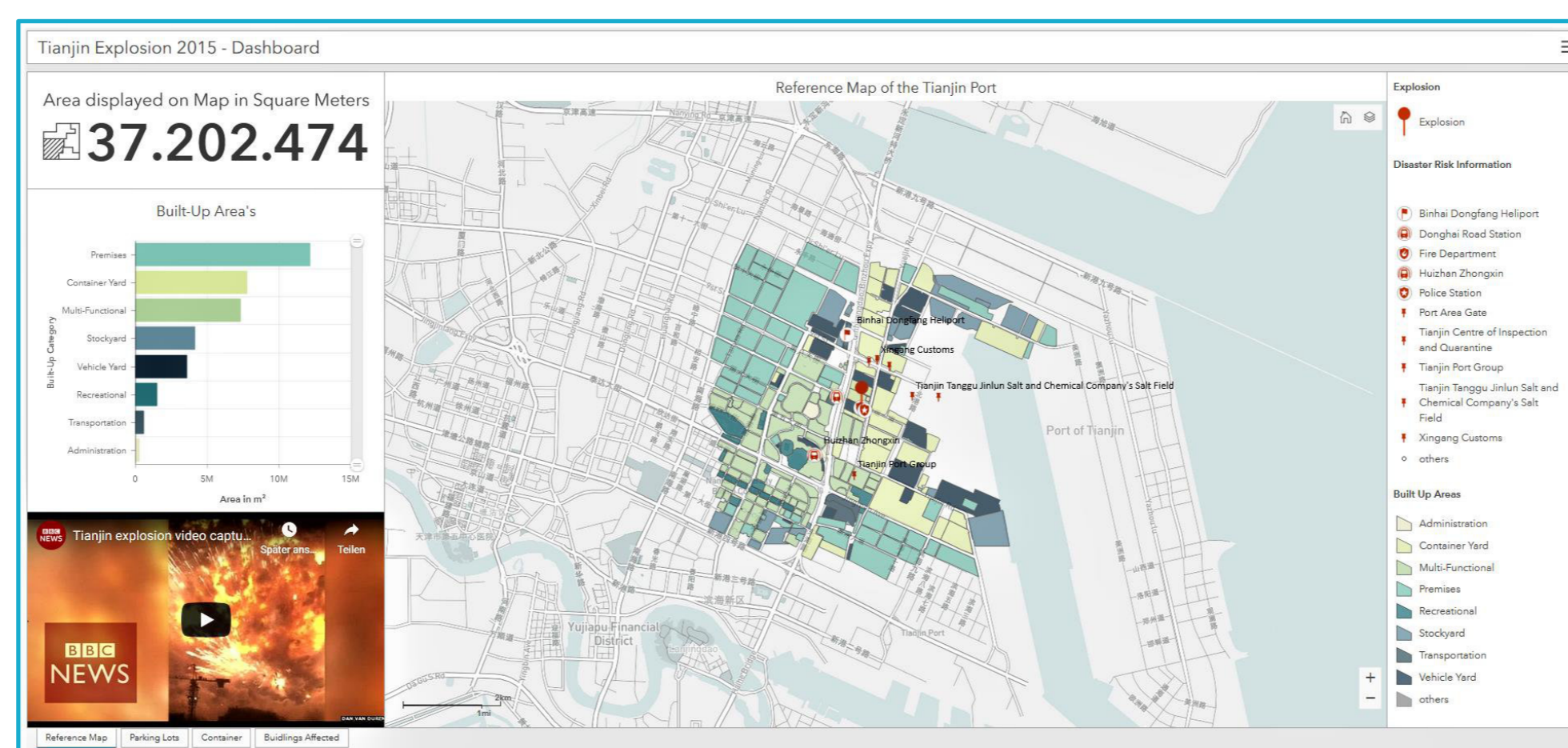


Figure 1: The reference map of the Tianjin harbor within the Tianjin Dashboard

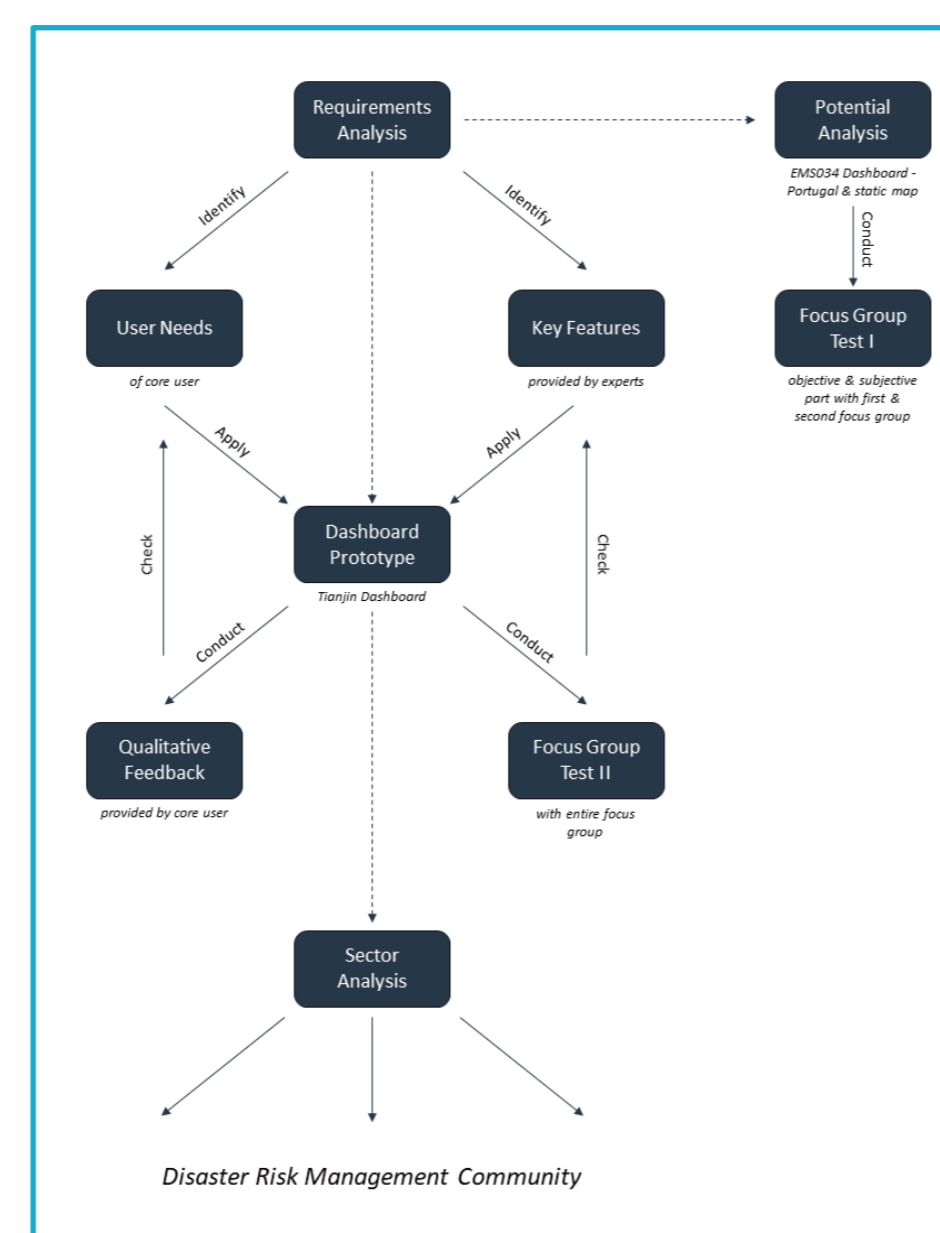


Figure 2: Individual conducted steps of the methodology visualized as a workflow-chart

DASHBOARD PROTOTYPE

The dashboard [Figure 1] was created in collaboration with the **core user GAF AG** who usually conducts disaster risk management with the use of static maps.

Based on a static map of the Tianjin explosion 2015 the dashboard prototype was developed, in order to provide an intuitive possibility to explore the complex underlying data in an interactive way.

Features and advantages include:

- Little effort in the use and high intuition
- Efficient bundling of risk information
- Exploring the complexity of the database
- Enabling the identification of trends
- Graphs supporting comprehension
- Easy to use, regardless of expertise and knowledge of topic and fun to operate

RESULTS AND CONCLUSION

Requirements analysis: results included the identification of key features by experts and the needs of the **core user GAF AG** which were successfully implemented in the design and creation of the dashboard prototype.

Potential analysis: the results proved that the communication flow and decision making processes could be significantly improved through the interactive character of the dashboard.

Dashboard prototype: the dashboard prototype was received very positive by the **core user GAF AG** and got a high user satisfaction.

Sector analysis: over **80%** of the stakeholder within the disaster risk community indicated interest in using dashboards for disaster risk management purposes.

Summarized, the research of this thesis proved that through their innovative character dashboards represent a useful tool in disaster risk management. The interactive features and comprehensive presentation of large and complex information facilitate decision making processes and enable the understanding of risk-relevant information at a profound level.

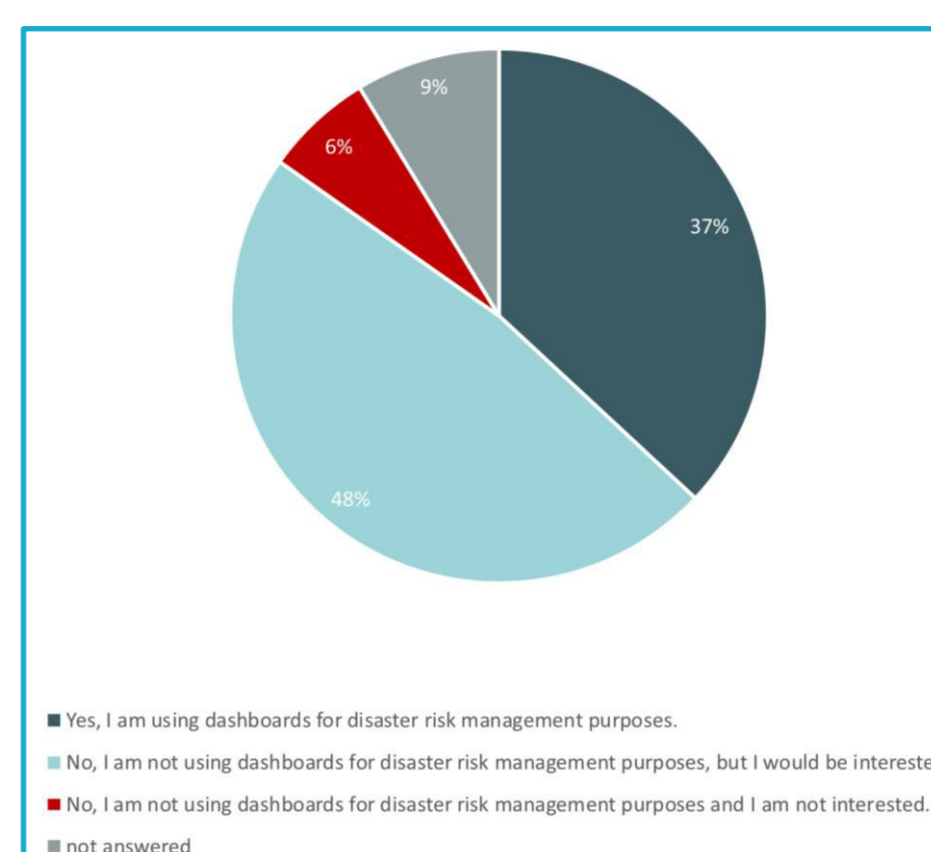


Figure 3: Opinion of stakeholder with regard to the perceived relevance of dashboards for disaster risk management purposes

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KEYWORDS

disaster risk management, dashboards, communication flow, interactivity, usability, cartography

PROTOTYPE LINK



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