A Case Study of Open Data Visualization System for Government Transparency in Thailand

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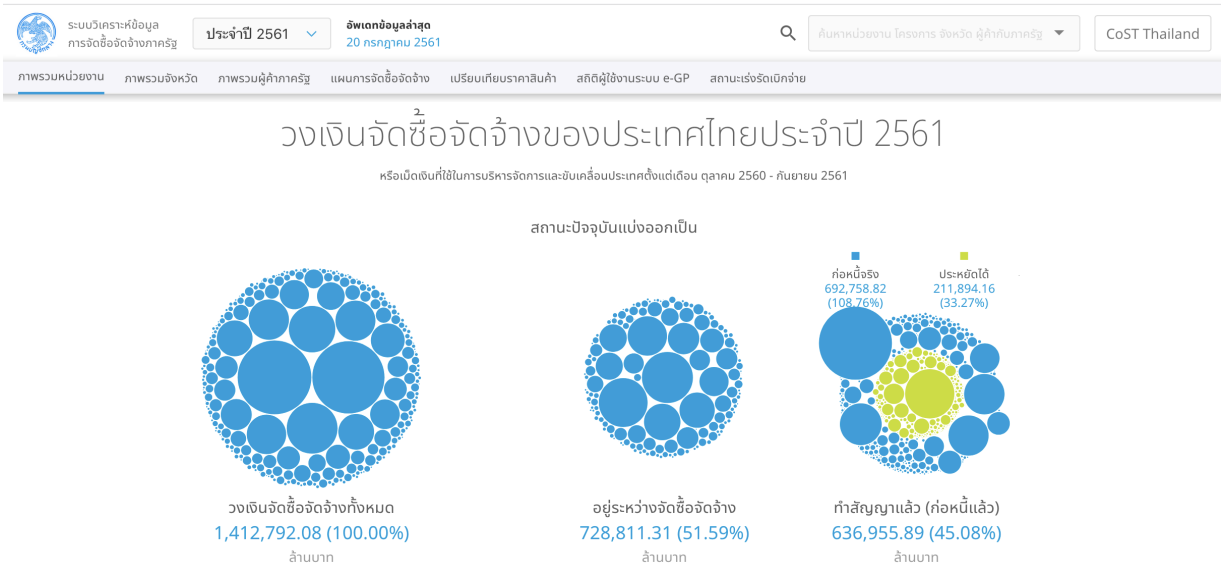

Figure 1: The overview of our system shows a financial snapshot of the Royal Thai Government of the fiscal year 2018. All texts are in Thai.

Abstract

Open data is essential to government transparency. However, simply opening access to the government data files does not guarantee data accessibility to the general population. An efficient way is to digest the data and visually present its insights. We designed and implemented a visualization system to communicate the data stories of Thai government procurement to both the public and journalists. Our iterative design process consulted two political reporters. The final design incorporated a scroll-based storytelling and several visualization elements which had not been available such as a hexagonal grid map of Thailand. We demonstrated the usefulness of this system with a scenario regarding government budget transparency.

Index Terms: Human-centered computing—Visualization—Visualization systems and tools; Human-centered computing—Visualization—Visualization application domains—Visual analytics; Applied computing—Computers in other domains—Computing in government;

1 Introduction

Thailand is not known for open and transparent government data [1]. In recent years, many government agencies have uploaded their data online to increase their data transparency. However, merely making their datasets is not adequate. Some are not in a machine-readable format, some are coarsely aggregated, and some simply do not attract attention due to imperceptible insights.

This project aims at increasing the government transparency, specially regarding the budget and finance of the Royal Thai Government. Data visualization is a key part in this system. Similar to other projects from other countries, data visualization can provide better data accessibility, for example, of the federal finance of the United States [2]. Visualizations can also lead to better data interpretation as demonstrated in a case study of Chicago urban data [3].

We employed an iterative design process with various parties to gather their requirements. Then, we designed a series of visualizations and presented an scenario supported by the implemented system.

2 System Design

There are various requirements from several parties. Our target users include government agency officials, journalists, and citizens. Because of several parties and requirements, they are oftentimes conflicting due to different interests. We decided to design the system in many rounds.

The very first round gathered basic requirements from the officials that they would like to have a visualization system for government data. We had an convenient access to the government officials in the Ministry of Finance. They had no particular idea how it should be implemented except that they would like journalists to look at the data and possibly write news articles about the fiscal decisions.

We interviewed two journalists who are famous for their anti-corruption coverage. We then designed the first draft according to their requirements and showed it to them. They provided feedback regarding how the journalists would write a story out of each parts.

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In the end, we came up with a scroll-based narrative visualization to provide data story examples to those who are unfamiliar with the government budget.

The iterative design process helped propelling this multi-objective project forward. Otherwise, we would have to reach a consensus between many stakeholders which might not have seen the alternatives or from different points of view without a concrete prototype.

2.1 Data

The Thai government's procurement datasets are bigger and detailed than other open government data. The dataset is updated weekly through a series of script on Sunday. The pre-processing and aggregation are ready by Monday morning.

This data cycle was partly encouraged by the journalists we interviewed. They suggested that we emphasized on the frequency of information updates as well. If the web looked static, a journalist might see it once and never come back.

2.2 Visualization

For this project, we designed and implemented a hexagonal grid map of Thailand as shown in Fig. 2. The position of each province was manually placed to closely match the mental image of the geographical map of Thailand. To the best of our knowledge, we had not seen a prior implementation in any other systems.

After the first round of design, we received a concern that the visualizations are not "attractive." We tried to pinpoint the cause of this comment. It can be broken down into two factors: spectacle and invitation to interact. We then added animations to some visualizations in order to alleviate the concern.

For the bubble chart shown in Fig. 1, the first animation triggers when the chart comes into view for the first time; the bubbles will drop and bounce before easing into their pre-computed static positions. Each bouncing starts at 20ms apart. With hundreds of objects in each visualization, the animation starts and finishes within a few seconds. This does not aid data reading but definitely catches user attention when all other visual elements are completely still. Another benefit of the first animation is data physicality. Although the bubbles do not possess collision avoidance to each other, the animation registers a sense of physical objects to the moving bubbles.

A similar animation applies to some visualizations such as the grid map as well. When toggled between map and list views, each hexagon translates with a delay and bounces before it lands into its position.

The second animation of the bubble chart jiggles the bubbles around. It does not draw attention like the first animation but also indicates interactivity, inviting mouseover for further information on each data point.

3 Implementation

We implemented the system in web standard technologies and D3.js so it is viewable on any modern browser. Note that the system is currently under the final step of data integration and has not been released to the public.

3.1 Usage Scenarios

One common question the journalists asked us during the interview was whether this system can find which department received the most budget, on what they spent, and to whom most purchase orders went. The user of the system can see different views, for example, as shown in Fig. 2 and drill down into a particular area of interest. As the visualizations are linked, the user can switch the view and drill down further on a different aspect. For instance, the journalist can focus on the department with the most budget in the bubble chart, then break down its budget by procurement types, and change to a seller view to find to where the budget of this certain department goes.

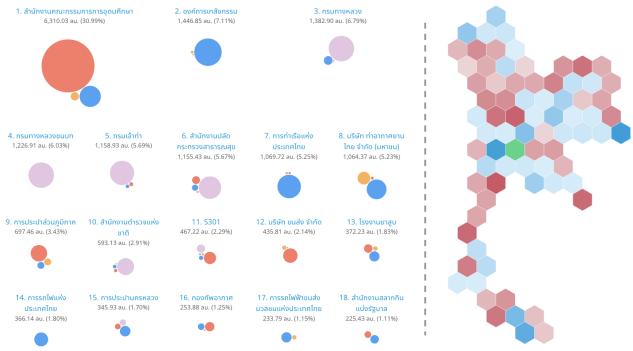

Figure 2: Other views of the budget by various government departments (left, color-coded by procurement types) and by administrative regions (right, color-coded by monetary values). The hexagonal grid map of Thailand is custom-designed and all texts are in Thai.

Another common inquiry was whether an item bought by different departments had the same price. We pre-processed the data and created a special table to answer this question. Only the products that had standardized product codes such as medicines could be aggregated in this way. We found out that many public hospitals purchased the same medicine at various prices, sometimes of different orders of magnitude.

4 Conclusion and Future Work

Through the mentioned iterative design process, we implemented a visualization system for open financial data. Our larger goal is to advocate a more open and transparent data policy. We would like to conduct a larger study to prove the usability of the system to the public.

We have had some feedback regarding the balance of the amount of information in the presentation. With too much information, some government officials showed concern of data accountability and trust in the government, although a study has shown that a lot of information does not decrease the trust; functional and operational transparency indeed increase trust and engagement [4]. In the later phase, we will communicate this finding and encourage more open data through the visual and Application Programming Interface (API).

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References

[1] V. L. Lemieux, S. E. Trapnell, and C. Excell, "Transparency and Open Government: Reporting on the Disclosure of Information," *JeDEM*, vol. 7, no. 2, pp. 75–93, 2015.

[2] C. Böhm, M. Schmidt, M. Freitag, A. Heise, C. Lehmann, A. Mascher, F. Naumann, V. Ercegovac, M. Hernandez, and P. Haase, "GovWILD: Integrating Open Government Data for Transparency," *Proceedings of the 21st international conference companion on World Wide Web - WWW '12 Companion*, pp. 321–324, 2012.

[3] R. Barcellos, J. Viterbo, L. Miranda, F. Bernardini, C. Maciel, and D. Trevisan, "Transparency in practice: using visualization to enhance the interpretability of open data," in *Proceedings of the 18th Annual International Conference on Digital Government Research - dg.o '17*, (New York, New York, USA), pp. 139–148, ACM Press, 2017.

[4] R. W. Buell, E. Porter, and M. I. Norton, "Surfacing the Submerged State: Operational Transparency Increases Trust in and Engagement with Government," working paper, Harvard Business School, 2013.