A Dashboard Development Environment – Language, Library, and Workflow

This master thesis describes the design and development process of a prototype enabling staff without informatics background to create intuitive dashboards. Up to now, development of interactive and intuitive data visualizations and their aggregation to dashboards mainly is non-generic. Repetitive and redundant developing tasks bear the risk of loss in quality due to human error and are cost-intensive for companies like the industry partner of this thesis Synergy BTC AG.

1

Initial situation

Synergy BTC, the industrial partner of this master thesis, offers advanced, customized planning and management information systems in the form of a software-as-a-service (SaaS), which can be employed to implement dashboards for data visualization. The current dashboard implementation process bears improvement potentials regarding its non-generic character, quality, and costs as well as to its dependency on expensive third-party software.

Objectives

The objective of this master thesis is an automated dashboard development process and the reduction of the dependency concerning commercial software for the industrial partner. Achieving this involves designing, developing, and evaluating a prototype of the dashboard development environment that employs the free and open-source programming language TypeScript. Subsequent, this dashboard development environment includes:

– a defining language
– a development library as well as
– a workflow for automated development.

Method

In a first step, we have conducted detailed research and evaluated existing dashboard generation technologies. Secondly, we have designed and developed a dashboard defining language that has been implemented within a development generation library. Thirdly, we have realized a demon capable version of the dashboard generation library which we evaluated in the final stages applying various scenarios that included criteria like efficient dashboard generation, straightforward embedment, and simple manipulation and extension of defined dashboards.

Implementation and Testing

Applying a dashboard defining language enables the dashboard developer efficiently generating and an easily embed, manipulate, and extend defined dashboards and their components. Also, specify interaction possibilities as well as setting data input sources. Briefly, the language allows to easily, shortly and intuitively define dashboards. Also, simple reusing and manipulating predefined dashboards or their subparts is possible. Tests by the industry partner with our dashboard development environment and its language indicate that this approach leads to a fast and comfortable way for developers without comprehensive computer science background to generate viable dashboards.

Discussion and Outlook

This master thesis provides a comprehensive presentation of an automated dashboard creation processes and reducing dependency on third-party software. Our prototype has been proven feasible and practical. As a result of the modular language design, natural language and state of the art environment dashboard development became easy and intuitive. Personal learnings within the language design as well as environment and library construction enable the development of a suitable language for defining dashboards, allowing efficient and further developments for the industrial partner.

Tobias Clemens Sebastian Schäuble

bfh@klecks.info

Illustration Peter Schäuble