Designing dashboards based on stakeholders' perspectives to generate meaningful information: a case study in the urban factory demo setup

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This bachelor assignment proposes a framework for a dashboard design, with recommendations for how the Virtual Reality Lab can develop a dashboard to generate meaningful information based on stakeholders' viewpoints by capturing the stakeholders' critical concerns. The Virtual Reality Lab (VR Lab) is a research institution that employs technologies like virtual reality and digital twining to support the stakeholders' decision-making process in the Industry 4.0 production environment. Their facilities enable researchers to build, simulate, and enhance their hypothetical models, which include both physical and virtual components. The VR Lab has made the decision to develop a dashboard for the urban factory demo setup, manufacturing personalized smartphone holders after collecting the users' data input, to offer meaningful information to multiple stakeholders. The challenge of designing the dashboard is capturing the various critical concerns that stakeholders have toward the production system, by appropriately processing an enormous amount of disorganized and unfiltered data to meaningful information that can address the stakeholders' concerns.

How can the dashboard for the Urban Factory Demo be developed to generate meaningful information that satisfies critical factors from stakeholders' perspectives?

To answer the main research question, the assignment was conducted in five phases: Research plan – Literature review – Case study – Dashboard design – Develop framework. The study focused on a case study with two carefully chosen stakeholders, the users and the operators, who actively engage with the demo setup and make decisions given the available resources and the time constraints. This study demonstrates how to use scenarios to discover the stakeholders' concerns and points of view, verify the concerns derived from the scenario-based research through the focus group discussion, capture the information needed to address those verified concerns, transform raw data into meaningful information to provide the required information, and present that information on the dashboard efficiently and effectively. As a result, the dashboard was designed with the different views for the users and the operators, presenting the required information with the combination of 2D and 3D visualization elements via augmented reality technology, as shown in Figure 1.

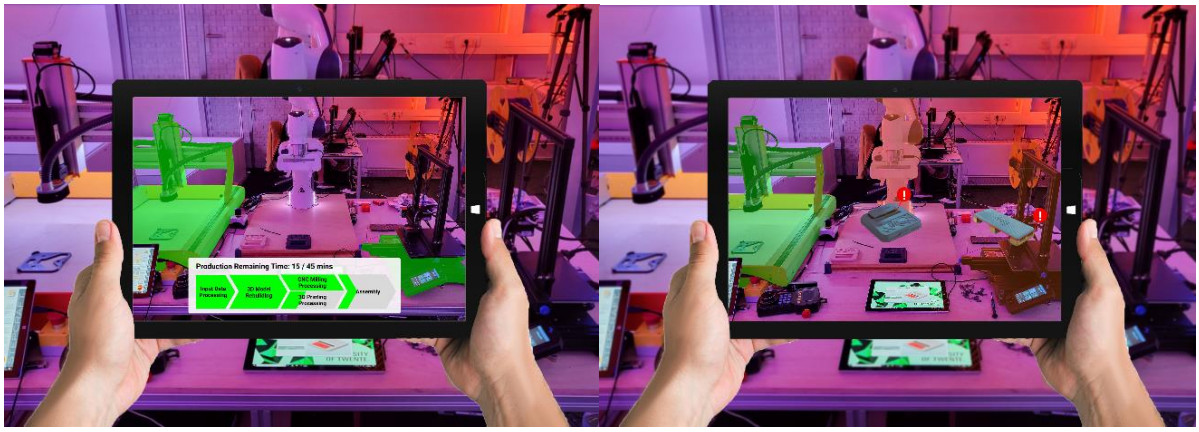

Figure 1. Dashboard design with the operator view (left) and the user view (right)

Due to time constraint, the dashboard designs for the users and operators were evaluated through comparison of the requirements as the last step of the dashboard design process. The dashboard design appeared to satisfy the set requirement of providing meaningful information with appropriate visualization features, but this is not yet decisive whether it is aligned with the stakeholders' concerns because the evaluation cannot be undertaken via a qualitative method, such as an interview or user testing with the stakeholders.

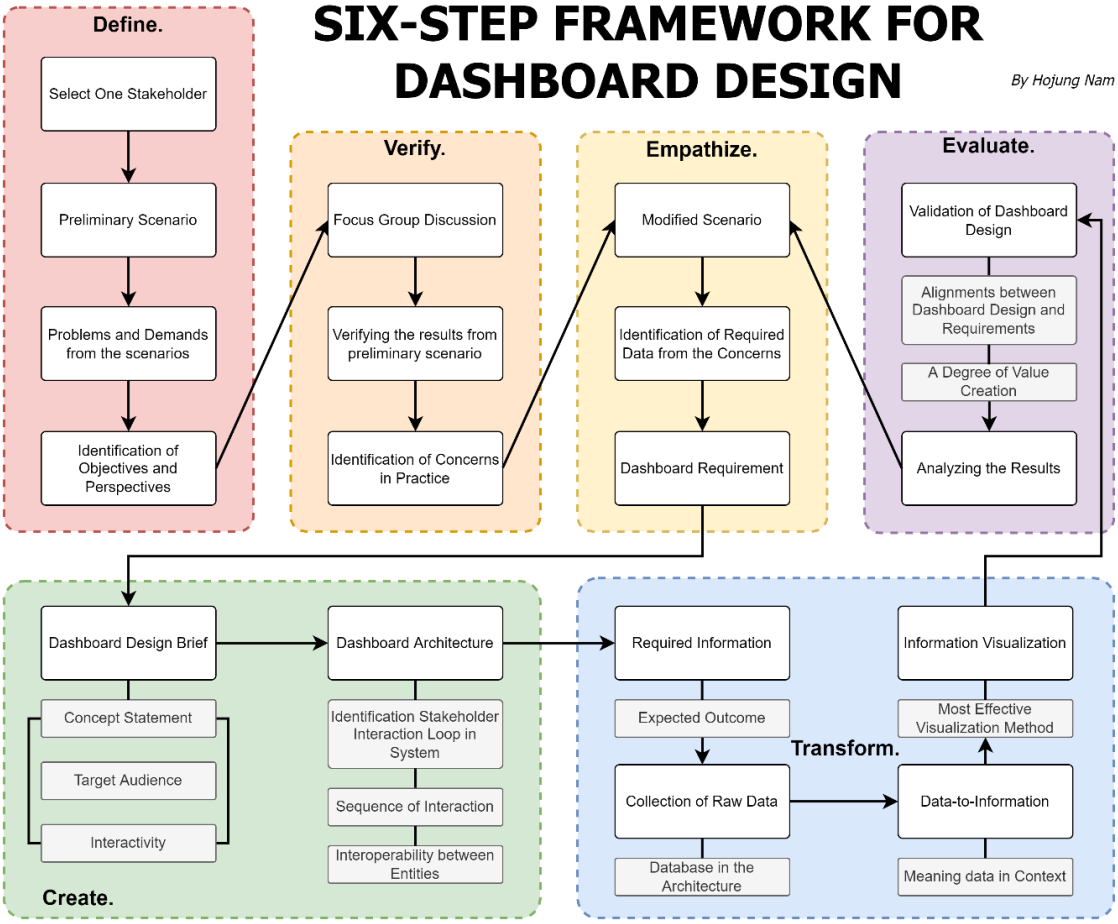

Figure 2. A framework for dashboard design with six-steps

In conclusion, it is suggested that the dashboard is developed by using a framework for the dashboard design, as shown in Figure 2. The primary purpose of the stakeholders using the dashboard should be captured during the designing process, and the use conditions should be studied to determine which crucial features should be displayed on the dashboard. The stakeholders' concerns and viewpoints regarding the use of the dashboard in the production environment are mostly what determines whether the information is meaningful. Therefore, it is essential to communicate and cooperate with the stakeholders during the design process, continuously check the dashboard design, and investigate the interface design possibilities. The stakeholder's concerns may also change over time, and technology is continually evolving, so the dashboard's developers should be on the lookout for opportunities to update and add new features.