

One Pane Dashboard for Performance Monitoring

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Abstract: This study examines the use of one-pane dashboards for performance monitoring across multiple domains. Through case studies and literature review, examples of single-pane dashboards implemented in digital mapping, healthcare, and education are explored. QualDash, a configurable dashboard generator developed for clinical quality reporting, is evaluated through interviews with healthcare analysts. Benefits and considerations for the application of template-driven single-pane dashboards are identified.

Keywords: One Pane Dashboards, Performance Monitoring, QualDash, DigitalGlobe, Single Pane of Glass

1. Introduction

One Pane Dashboard which is commonly known as ‘Single Pane of Glass’ (SPOG) is a predominant phenomenon that is required to access the entry at every point to admittance the User Interface (UI) to incorporate the varied performance in the function of job [1]. Moreover, developing the team can gain from a single pane view of a system that can lead to spending less time identifying the tier where the issue lies. There are good Application Performance Management (APM) tools that can be regarded for performance monitoring and can report on the status of the systems and even send notifications by detecting performance issues [2, 10].

Since the competition in IT industries has grown, investment, business management, and corporate data are rising exponentially [3]. Therefore, the business proprietor should be very careful and should consider all the aspects while coming up with a decision. Therefore, it requires a great extent of a tool that can identify and assess the growth of the business and support that the business is on the right track toward the profitable zone. Even though there are limited numbers of techniques to determine the evolution of the business, these are modest to measure or they have certain constraints in exploring the performance of the business. Thus, it fails to offer comprehensive assurance to the business possessors in decision-making [3].

This effort offers an effective Nobel clarification for these issues, as it emphasizes the creation of a Performance Dashboard. Moreover, the dashboard can provide real-time exposed data and the ability to form such data feeds that hold great probability and provide ‘just-in-time’ data [4]. To actualize such a concept, especially in business involves a lot of planning, and understanding of the bigger population to whom the concept is important and the conflict and challenges can lead to non-embrace of the concept [1, 10]. There are several dashboards are being developed by different industrial and educational sectors to monitor the performance. Therefore, the purpose of this present paper is to provide evidence with real-life examples of industries adopting one-pane dashboards to monitor performance through secondary methodology.

2. Literature Review

The shift from the native, static building and calculating structure to cloud-based coordination has become a common

transition among corporations. Nowadays, especially, for those companies that are transferring and processing massive amounts of data like DigitalGlobe has decided to adopt the cloud-based construction for its new milled system because the previous one has aged and does not offer permanent installations and to improve the performance of the system. This decision meant they many of the presently employed systems, which were patented and/or dependent on certain computer hardware, would have to be replaced, refactored, or endowed with precise applications to facilitate interactions through the cloud [1].

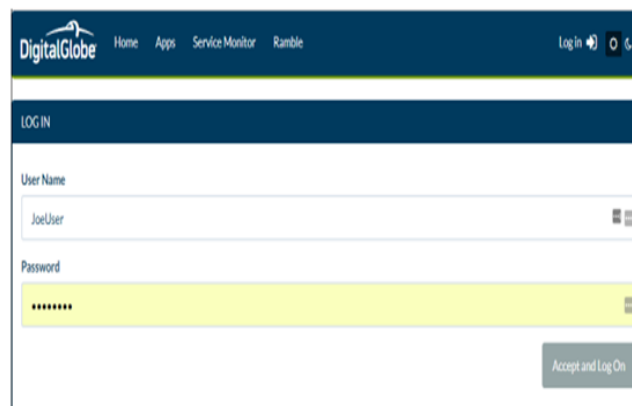


Figure 1: Login Screen for Single Pane of Glass (Source: Gacy et al., 2018) [1]

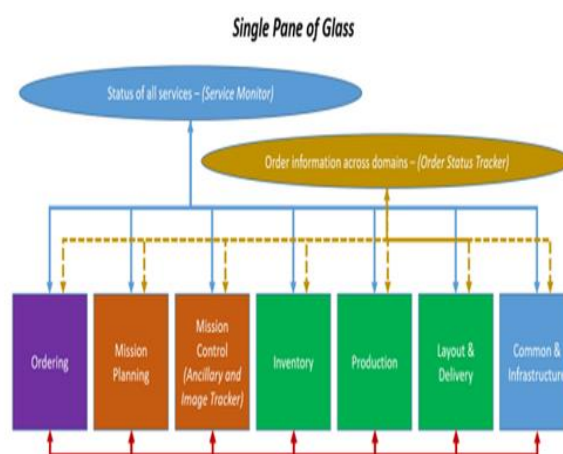


Fig. 1 Single Pane of Glass structure indicating domains and connections among domains

Figure 2: Single Pane of Glass for DigitalGlobe (Source: Gacy et al., 2018) [1]

The above figure shows the conceptual framework that builds the user interfaces created on the operational domains and has the desire for more prominence across each domain. In addition, these colors show the broader separation and the level of interconnectedness between the UIs where these interfaces' containers reach another domain [1].

On the other hand, in the healthcare sector, it remains an open research question how to adapt the design of single pane of dashboards to different contexts of use [6, 11, 12]. For this, while designing a dashboard, decision-makers have tried to find a balance between dashboard flexibility, modifiability, and usage convenience. They have found that the problem of dashboard utilization stems from a huge number of focal indicators, data models, and the number of users at the various levels of the organizational network. For this, one of the healthcare sectors has introduced a one-page dashboard named QualDash, a dashboard generation framework that can be used to configure and deploy the visualization dashboards for enhancing healthcare quality [6].

QualDash as a single-pane dashboard generation engine intends to bring ease to the process of customizing the dashboard through the utilization of templates. Following the universe of analytical responsibilities in healthcare, they have introduced a pattern in the method of a Metric Specification Structure (MSS), a JavaScript Object Notation (JSON) structure, that briefly describes visualization views for task sequences associated with individual metrics. However, the QualDash engine takes an array of MSSs and creates an equal amount of visualization vessels in the dashboard [6, 8].

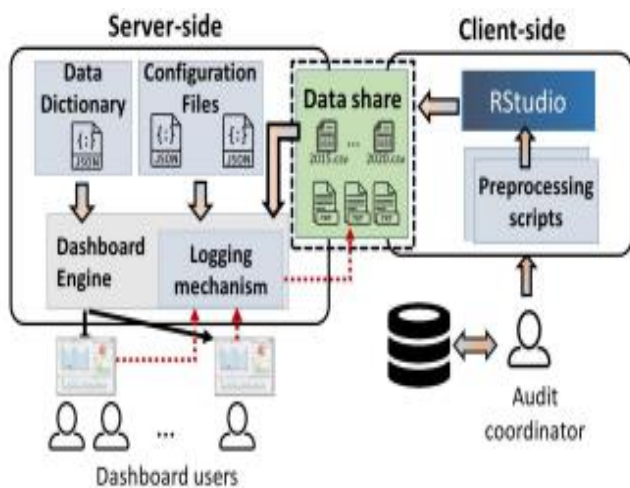


Figure 3: Qualdash Client-Server Architecture (Source: Elshehaly et al., 2020) [6]

The above figure shows that QualDash architecture is made up of client and server interfaces. In each site within the hospitals, the client and the server are set up locally so that the data does not go out of the site and review data is inputted by an audit planner on a client mechanism and stored at an information exchange on-site that can be retrieved from the server. For timeliness, QualDash provides an Rscript that preprocesses the data and uploads them to the common location [6].

On the other hand, in the educational sector institutions have adopted Blackboard or Moodle Learning Management Systems as a single-pane dashboard. As, there have been several attempts were made to use the data that is automatically generated from single dashboard systems for students' training and learning process [4, 7]. In addition to this study, an instructive dashboard has several roles and standards. First, it enables instructors to be informed of the learning status of the students in real-time. In particular, the pattern of students' learning actions reported in the dashboard is beneficial in the framework of online learning when the teachers and learners are geographically distant from each other.

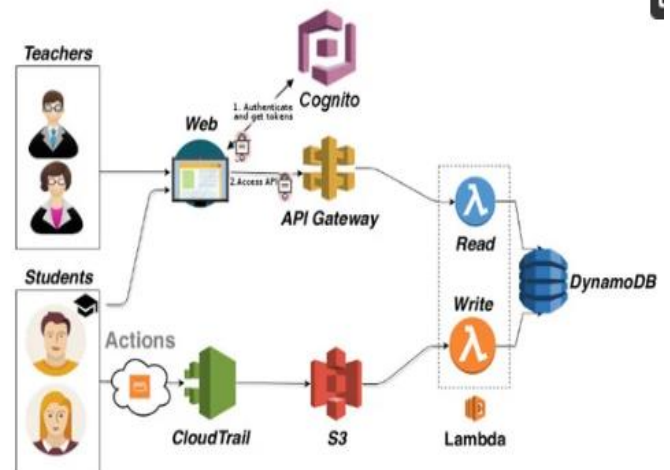


Figure 4: Architecture for Cloud Tracker (Source: Naranjo et al., 2019) [9]

Second, it assists students in enhancing self-awareness concerning the status and history of learning. It allows students to make use of the quantified data visualization in observing their learning patterns while they adjust learning-related tactics and behaviors [11]. Most importantly, as data quarrying technologies are advanced, the information exhibited in the dashboard can help in making better choices. For example, a dashboard allows for indicating at-risk scholars or predicting high-performing along with offering appropriate feedback and guidelines for students. From a motivational perspective, the dashboard might assist the students, enhance their self-directed insight skills, and enable them to accomplish their intelligence objectives efficiently [4].

3. Monitoring Tools Impacted

The impact was monitored for a single pane dashboard through the secondary qualitative methodology in the case of healthcare, where QualDash was noticed to facilitate informed decision-making among the key decision-makers to enhance awareness of the risk factors and the vulnerable groups. They also noticed that some people have asked about the addition of more visualization options, for instance, mapping for GIS data. They extended the potential for the engine's functionality and included more types of referrers like the geographic location.

Lastly, the plan was to determine new design criteria and their impact that might commence the transition across the

QualCards. Here, the researcher expects the self-contained and fully integrated nature of the QualCard to help direct these design decisions on the dashboard to discreet sections to defined sequences of tasks. That is such transitions were not considered to be necessary for healthcare dashboards within healthcare experience in the current application but may be considered necessary in applications.

Considering the impact of DigitalGlobe Dashboard The decision initially was to assume a cloud-based architecture key over dedicated hardware and exclusive software. This permitted for a measure of regulator and interactivity that would be much harder to produce with externally established and supported UIs. Furthermore, the decision has obstructed to development of a new service-driven, cloud-based approach in combination with the promotion of WorldView-4 with SPOG, which meant that the risk to existing operations was measured as low. With this reduced risk, they concluded to worry less about overwhelming a working solution 'out of the box' and they were able to build in-house ability to generate and test new thoughts for the instant need, future UIs, and updates of existing UIs through a new single pane dashboard.

4. Tasks

These industries have measured the task through a pane dashboard approach in DigitalGlobe where the current state of operations overlapped. This approach may significantly affect the time it takes to realize that there is an issue within the operator's domain or in a domain beyond it. This common ground facilitates the faster transfer of information about the problem and provides the ability to gauge the extent of the impact and also factors for upstream events to predict problems that can enable the shared space awareness of operators to solve issues and problems that companies have faced with traditional systems.

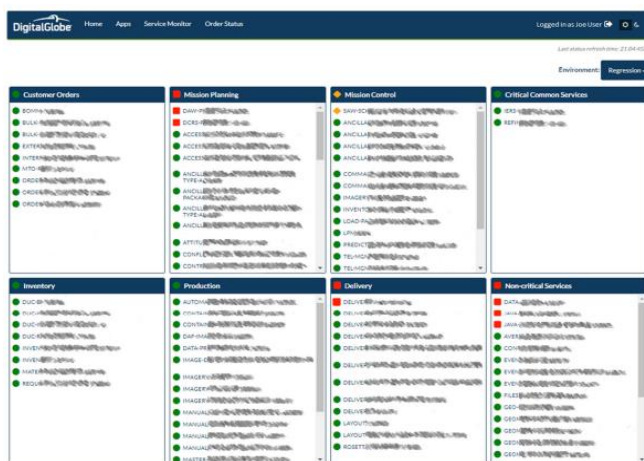


Figure 5: GigitalGlobal Task Monitor System (Source: Gacy et al., 2018)

Considering the single dashboard in the healthcare setting, the task of QualDash was elaborated with nine front-line analysts in one-to-one meetings over nine months. The population consisted of front-line analysts who were audit coordinators and clinicians who for clinical audit data for reporting, presentations, and clinical governance. Consultant cardiologists, a consultant pediatrician, and two audit

coordinators were included in all of our meetings. Two of the consultants also carry the designation of 'audit lead'. In these sessions, it was proposed the idea of QualDash which was an isolated section of the continued dashboard screen, which stores all kinds of information.

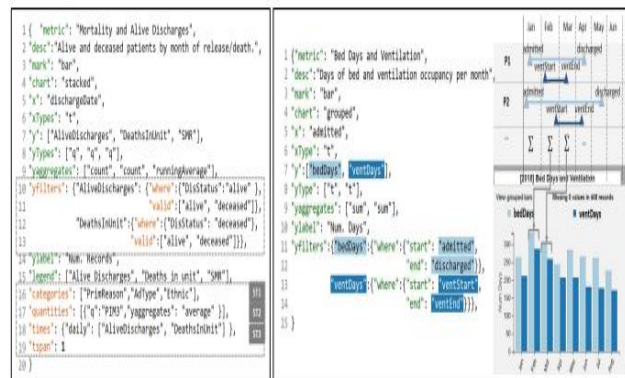


Figure 6: QualDash Design (Source: Elshehaly et al., 2020) [6]

5. Solution and Implementation

Relating to a particular index associated with a single pane dashboard that was regarded as QualDash. This is where the researcher presented our variety of QualCard mock-ups and analyzed the aspects that will suffice the barest level of configuring them. As the researcher tried to find out more about the field, typical specifications, and what types of values could be grouped with Vega-lite data axes, it was helpful to discuss queries using the analysts' hands-on experience with the data. Similarly, implementing the SPOG has resulted in better performance for DigitalGlobe, which has made the dashboard easy to convince.

6. Results

Nine frontline analysts from one healthcare organization participated in the study to understand how a single-pane dashboard could help with their clinical audit and quality improvement tasks. The analysts included audit coordinators and clinicians who collected, analyzed, and reported on clinical audit data. Two senior consultants who led quality initiatives were also involved.

Over nine one-on-one monthly meetings spanning nine months, the idea of developing a configurable dashboard called QualDash was proposed. Mock-ups of customizable dashboard "cards" called QualCard were presented to the analysts to get feedback on the essential components and configurations needed. Discussions focused on understanding their typical audit specifications and what data values could be visualized together.

The analysts reported that existing rigid dashboards were difficult to modify for their diverse tasks due to the large number of metrics, mdels, and user access levels involved. They felt QualDash's use of template QualCards through a JSON specification structure had the potential to make customizing views much easier. Key aspects discussed for the QualCards included metric types, population attributes,

periods, and visualization techniques to support their task sequences.

At the end of the study, the analysts expressed strong interest in QualDash to help address the dashboard utilization challenges they faced. They saw benefits in how the modular QualCards could capture specific task workflows yet still reside within a common dashboard workspace. Generating customized QualCards programmatically from templates was viewed as a better solution than static dashboard pages.

The analysts also provided feedback on additional QualCard features needed, such as mapping visualizations for geospatial referral data that was not currently supported. Transitions between related QualCards linked to particular metric analyses were also identified as a potential future enhancement.

This qualitative study showed the benefits of a flexible, template-driven single-pane dashboard held for complex healthcare quality analysis. Important considerations for implementation included diverse tasks, large amounts of data, and multiple user access levels. Feedback from this early study formed a foundation for continually evolving QualDash through cooperative design to address the changing needs of clinical decision-makers and policy analysts amidst the unfolding COVID-19 pandemic.

Overall, the frontline staff saw QualDash as having great value for their quality reporting, presentation, and governance needs. The results provided insight into tailoring future dashboard designs based on real clinical contexts and user groups. Continued co-design is planned to further develop QualDash based on expanding requirements as new COVID-19-related analytic tasks emerge.

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7. Conclusion

This study explored the use of one-pane dashboards for performance monitoring across different sectors. In the digital mapping industry, DigitalGlobe implemented a single-pane login server to provide shared visibility into their cloud-based ground system. This helped operators more quickly identify and address issues.

In healthcare, the QualDash framework was introduced as a flexible dashboard generator for clinical quality reporting. Discussions with analysts revealed challenges with rigid dashboards given diverse analytic tasks. QualDash used customizable template cards called QualCards to configure dashboard views through a JSON specification. Educational institutions commonly deploy learning management systems like Blackboard or Moodle as a unified access point and analytics tool. Research has aimed to automatically mine student data from these single-pane systems to provide real-time visibility for teachers and promote self-awareness in learners.

Across domains, one-pane dashboards streamlined performance oversight of distributed systems and large, complex IT environments.

Further work should explore longitudinally how such solutions impact key outcomes from diverse stakeholder perspectives over time.

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