Integrating Outlier Analysis and Data Quality User Notification into Core DHIS2 Analytics Applications

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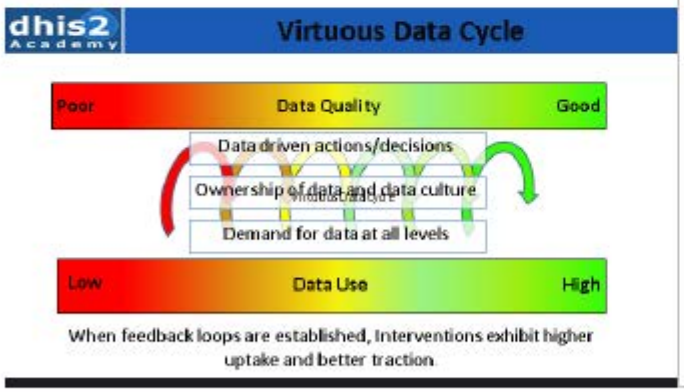
Executive Summary

University of Oslo (UiO) requests support for the continued development of improved data quality analysis features. Specifically, through a widely successful proof-of-concept outlier analysis and automatic user notifications to data quality issues has been identified as a necessary features to incorporate into all standard analytics tools in DHIS2: charts, pivot tables, maps, scorecards, and dashboards.

UiO proposes an eleven-month agile development timeline what will be in initially informed by several detailed investigatory field visits to fully appreciate end-user needs followed by an interactive approach to software development, beta-testing testing, and bug fixing before final release. Finally instructional videos will be produced and documentation developed to inform users on how these functionalities can be used.

Background

It is well understood that high utilization of routine analytics, dashboards, standard reports, etc., is highly dependent on a correspondingly high data quality, i.e. correctness, completeness, current, and consistency. As highlighted in the virtuous data cycle (right), we appreciate that data quality and data use are intimately interconnect in such that the more data is used the better the data quality and vice versa (Braa et all, 2012).



In DHIS2 there exists many data viewing and analytics options including, charts, maps, scorecards, pivot tables, dashboards, and standard reports. These allow users to view, share, and interrogate their data from many perspectives enabling the data to be contextualized, prioritized, and ultimately acted upon (Mandinach et all, 2009). Likewise, DHIS2 enables many data quality checks such as validation checks during and after data capture. However, within the past year, with support from WHO, UiO has built a new WHO Data Quality Application which allows users to perform more through data quality analysis: completeness, consistency over time, consistency across organizational units, and outlier analysis. As seen below these analyses are presented to the user as a dashboard and represents the first time in which DHIS2 has been able to represent data quality checks in a graphical format. Over the past year we have also incorporated this new application in to the DHIS2 Level 1 Data Use Academy, and the application is now in use in nearly a dozen countries.

Below: WHO Data Quality App Dashboard for Completeness. **Left:** WHO Data Quality APP Dashboard for Outlier Analysis

From the growing number of implementation of this app, it has become apparent that the outlier analysis functionalities are the most beneficial to the end user as they perform routine data quality checks. As seen in the screenshot above, the outlier analysis enables the user to quickly and intuitively identify server data entry errors that plague many national HMIS.

Consortium Team

This project will be lead by the UiO DHIS2 management team. Software development will be performed by core UiO DHIS2 developers. Field assessment and use-case investigations will be conducted in-country. These countries have not yet be specified. Beta-testing will be performed by the Health Information Systems Program (HISP) partner organizations.

Project Description

The issues that remains, as the virtuous data cycle illustrates, is that fundamentally routine data quality checks should not be presented in the DHIS2 user interface separately from routine data analytics. Currently in DHIS2, users must navigate between their routine analytics, often dashboards, into the WHO Data Quality App or validation rule analysis. This physical separation ultimately hinders both data utilization for decision making as well as data quality. University of Oslo requests funding to develop data quality analytics that are able to be displayed in the stock DHIS2 dashboards. Specifically, we would like to enable outlier analysis to be performed on any chart, map, table, or scorecard directly from the standard DHIS2 dashboard. Additionally, we would like to ensure users are notified when any dashboard item contains either outliers or validation rule violations. We believe that merging routine analytics with routine data quality checks user of DHIS2 performing data quality checks will become much more accessible, intuitive, and drive increased data utilization.

Deliverable Matrix – Agile Development Model

Data quality tool usage assessment and mock-up development	3-5 Country visits to ascertain the degree of utilization and performativity of data quality tools in DHIS2, both WHO data quality app and validation rules. This trip will result in the development of mock-	Month 1 - 3

	ups of how data quality checks can be incorporated into DHIS2 dashboard items.	
Mock-up feedback and modifications	The mock-up will be widely distributed to receive feedback from any interested party. Feedback from ministries of health will be prioritized, followed by donors, and implementing partners. Mock-ups will undergo three rounds of feedback and modifications.	Month 3 - 5
System development	Based upon the feedback from the mock-ups and field visits the UiO development team will develop the functionalities into the DHIS2 core.	Month 5 - 8
Beta-testing and bug fixing	UiO will utilize the HISP network for beta testing. This period will last two weeks followed by a short period for bug fixing.	Month 9
Public Launch	Launch of the new functionalities will occur with the next available regularly scheduled release.	Month 10
Video Tutorial	UiO will prepare a brief informational video in English, French, and Portuguese explaining the use of these new functionalities. This videos will be posted in the DHIS2 facebook, community of practice, and newsletter.	Month 11

Citations

Braa, J., Heywood, A., & Sahay, S. (2012). Improving quality and use of data through data-use workshops: Zanzibar, United Republic of Tanzania. Bulletin of the World Health Organization,90 (5), 379-385. doi:10.2471/blt.11.99580

Mandinach, E., Honey, M., & Light, D. (2006, April 9). A Theoretical Framework for Data-Driven Decision Making . Speech presented at AERA Annual Meeting, San Francisco.

Supporting Documents: outlier_concept_note.docx.pdf