⁂ WP4 Appraisal Standard dashboard

This document contains an introduction of the Appraisal Standard (AS) dashboard designed and implemented within work package 4 (WP4) of EU-funded ASSEHS ("Activation of Stratification Strategies and Results of the interventions on frail patients of Healthcare Services") project. The project as a whole aims at investigating the use of stratification strategies within different European health services to assess the outcome of their deployment and to identify the resulting impact on the health care service with a special focus on the care delivered to frail elderly patients. The main task of WP4 is the development of a consolidated standard for appraising stratification techniques facilitating critical and comprehensive comparisons among different risk stratification (RS) models. This tool is expected to provide meaningful insights to policy makers and health care managers towards a broader integration of RS tools in European health care systems.

The project started in January 2014 and will end in June 2016. Within WP4, the first half of the project was devoted to carry out a Scoping review [1] which led to the design of the AS. The latter has been already described extensively in a previous Deliverable and it comprises those features that help to univocally describe a RS model and the scenario where it has been deployed and tested. Therefore, not only the performance (e.g. discriminative power, predictive capacity, etc.) of the models are considered but also the implementation requirements (e.g. data and health information systems' specifications), as well as the predictors (e.g. clinical, socio-demographic, pharmacy data, etc.) used to derive the risk score. Moreover, the AS considers also the information regarding the study, which introduced and tested the model, as long as the population's characteristics upon which the model was applied. Therefore, different dimensions have been identified to drive the appraising of a RS model. The AS will support exhaustive reports on existing as well as future stratification techniques for complete and transparent documenting. Undoubtedly, this tool will ease the comparison among different stratification methods and facilitate their broad deployment.

On one hand the Scoping review facilitated the generation of the AS framework (i.e. the data model comprising all the dimensions and properties to univocally and comprehensively describe a RS model). On the other hand it allowed collecting those information related to validations of stratification tools in different populations that have been published either in publically available reports or in peer-reviewed journal article. This activity led to the generation of a database reporting the description of any RS encountered in the Scoping review as well as an outline of the scenario in which those tools were evaluated in accordance to the AS framework.

The WP4 AS dashboard (https://ddemassari.shinyapps.io/dashboard_V2) is a web-based dashboard which allows the user to retrieve the data collected during WP4 Scoping review. The dashboard has been designed using shinydashboard (RStudio, Inc. 2014) and contains different tabs each of which allows the user to refine the selection of the information from the database according to specific criteria. During ASSEHS project, WP4 organized a workshop to introduce the AS framework to ASSHES' consortium and the members of the Stakeholder Advisory Board (SAB) as well as to collect those potential questions around RS which the Scoping review might help to address. Each tab is dedicated to one or a combination of questions/issues as defined during the workshop. The rest of this document is mean to provide a quick user manual for the dashboard with each chapter focusing on a single tab (the current version of the tool comprises 6 tabs).

Welcome

This tab provides some general information on ASSEHS project and WP4 as well as an overview (on the right-hand side) of the data stored in the database and available to the user.

Predicted outcome

In this section of the dashboard the user can investigate the database's content w.r.t. to a specific outcome (e.g. unplanned (re)admission to hospital, death, utilization of healthcare resources, etc.) predicted by the RS. Prospective scenario:

- A healthcare manager who would like to improve the distribution of healthcare resources within his healthcare system and he is willing to know which models have been already designed and tested in this context.
- A RS developer who wants to benchmark his tool against the model appraised by WP4 Scoping review.

In the upper left part of the tab a drop-down menu (in the "Predicted outcome" box) is available to the user to select a specific outcome. The three info box on the upper part of the tab report the number of RS models stored in the database predicting the selected outcome, the number of different countries where those models were evaluated and the number of performance's assessments stored in the database for the selected models. The list of models predicting the selected outcome is listed in the "Risk Stratification models" box. The user can decide either to focus on a particular model or to maintain the group overview ("all") by selecting one of the options in the radio-button menu in the "Risk Stratification models" box. The selection in the radio-button menu modifies the information displayed in the panel on the central-right side which comprises three different screens:

- "Map" - it highlights (in blue) the countries where the selected model(s) were evaluated.
- "Summary" - it reports a summary of the performances of each model per evaluation metric with which they were assessed in the documentation included in the Scoping review.
- "Performances" - all the performances' entries of the database for the selected model(s) are reported along with additional information (e.g. citation of the source document, calibration setting, etc.).

The lower part of the tab provides another graphical overview of the performances of all the models filtered by predicted outcome. Via the radio-button menu in "Evaluation metric" box the user can select a specific evaluation metric among those employed in the assessment of the selected models. The average performance along with a range spanning from minimum to maximum value stored for each model in the database is displayed on the central-right panel ("Evaluation metric"). As the same model might have been tested in different scenarios in each study, the user must always review the single performance's entries (as reported in the "Models" tab) as well as the details of the setting (as reported in the "Study" tab) in order to contextualize the information provided.

Predictors

This tab focuses on the predictor variables used by the various RS models.

Prospective scenario:

- A healthcare manager would like to know which models rely on the type of information (e.g. diagnosis, pharmacy data, etc.) available in his healthcare ICT system; additionally, he would like to know which other variables a model might need as input in order to evaluate the effort needed to collect that data, too.
- A RS developer who wants to investigate the predictors' categories used by other models.

In the left-hand side it's placed the "Predictors categories" box where the user can select a subgroup of categories. The studies comprising the use of, at least, those categories are selected and the main information (e.g. name, measured risk, etc.) of the models evaluated in those studies are displayed in the central-right panel in the screen called "Models". A second screen (i.e. "Additional predictors' categories") reports the name of the selected models, the additional predictors' categories used, the measured risk, the evaluation metric used for the performance's assessment and a summary of the performance.

Healthcare System

Böhm and colleagues [2] classified 30 OECD healthcare systems into five categories considering three dimensions (i.e. regulation, financing and service provision) and three types of actor (i.e. state, societal and private actors). In this tab the models are grouped according to the country where they were evaluated.

Prospective scenario:

- A healthcare manager who wants to know the models whose performance was evaluated in a country with a healthcare system similar to the one where he would like to deploy a RS.

The user can select one of the five categories in the drop-down menu in "Healthcare System category" box. The countries belonging to the selected category are displayed under the drop-down menu and they are also highlighted (in blue) in the world map in the central-right panel (screen "Map"). A second screen ("Model") lists the models evaluated in those countries, a citation of the document where a description of the evaluation can be found, the year of publication/editing of the document and the country where the study was conducted.

Models

In this part of the dashboard, the user can focus on a specific model which he might have selected in one of the previous tabs.

Prospective scenario:

- A healthcare manager or RS developer who would like to deepen his knowledge about a specific RS model (e.g. selected in a previous tab).

The user can choose a model through the drop-down menu in the upper left-hand side in the "Models" box. The selection modifies the info displayed in the panel positioned below, which comprises 5 different screens:

- "General information" – a brief description of the model is provided in this section as well as, main technique used, outcome type, Vendor (if any), etc.
- "Study" – a list of the document where one can find a performance's assessment of the selected model.
- "Performances" – all the performance's entries in the database for the selected models are displayed along with additional information to fully comprehend the setting of the evaluation (e.g. tuning of the parameters, measured risk, risk time frame, etc.).
- "Summary" – it lists a summary of the performances per evaluation metric, measured risk, risk time frame and type of parameters' tuning.
- "Data input and sources" – the user can read the predictors' categories used in each study and the data source of each category.

Studies

The last section of the dashboard is dedicated to an overview of the documents (e.g. scientific articles, reports, etc.) collected during the Scoping review.

- A healthcare manager or RS developer who wants to know more about the setting of a particular study.

The "Studies" box contains a drop-down menu where the user can select a document to review. The panel positioned below comprises 7 different screens and report the available data for the selected document:

- "Document information" – the information useful to retrieve the document are listed here.
- "Objectives" – a description of the objectives of the study/experiment is provided.
- "Setting" – an outline of the setting is provided.
- "Data" – it contains an overview of the data used in the study/experiment.
- "Design of the study" – the design of the study/experiment is described.
- "Outcome" – it reports data on the outcome, main measured risk, main risk time frame, etc.
- "Additional information" – it reports the healthcare system where the study/experiment was performed as well as any available information on ethical and/or data security issues.

References

[1] J. Mora, D. De Massari, S. Pauws, J. O. den Buijs, M. David, L. Prieto, J. Contel, T. Martí, J. Bousquet, and E. de Manuel, "Selection of the method to appraise and compare health systems using risk stratification: the ASSEHS approach.," *Aging Clin. Exp. Res.*, Oct. 2015.

[2] K. Böhm, A. Schmid, R. Götze, C. Landwehr, and H. Rothgang, "Five types of OECD healthcare systems: Empirical results of a deductive classification," *Health Policy (New. York).*, vol. 113, no. 3, pp. 258–269, 2013.