A Case Study into the development of a Business Intelligence System Mapping data against the Well-being of Future Generations (Wales) Act

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1. The Act

"*The Well-being of Future Generstions (Wales) Act is about improving the social, economic, environmental and cultural well-being of Wales*" [1]. All public bodies will need to report on how they are performing against the 7 Goals (fig 01), 5 Ways of Working (fig 02) and the 46 Population Indicators (PI) of the act; from the 01/04/2017 [2].

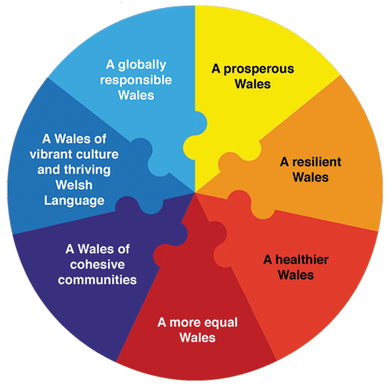


fig 01 Seven Goals [3]



fig 02 Ways of Working [3]

2.1.Aim

The development of a web based Business Intelligence System (BIS) for collecting and visualising higher education data. Using University of Wales Trinity Saint David (UWTSD) sustainability data measured against the Well-being of Future Generation (Wales) Act as a case study.

2.2.Objectives

•Investigate and evaluate web based business intelligence system's

•Gather requirements based on feedback from iterative rapid prototyping validating the design leading to the development of an initial pilot test.

•Develop a proof of concept application based on the requirement gathered and feedback on the initial pilot test. Utilising unit tests, usability testing and feedback from demos to validate the application meets the requirements.

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3. Design and Implementation

One of the key findings from the research is that dashboards are the common trend for BIS systems to display data. "*Today, everybody wants a dashboard*" S. Few [4, p. 3]. It was also concluded that usability and user interface design are paramount to the success of any BIS [5][6]. As stated by Mahemoff and Johnston , [7] analysing prototypes and fixing defects does not guarantee usability.

As a result of this it was decided that an iterative process of rapid prototyping would be used to elicit requirements. The prototypes were reviewed and analysed by stakeholders and iterations made from their comments. fig 03 shows one of the early prototype designs.



fig 03 First Prototype

From the results of demos, interviews and user observations analysing the prototypes the Software Requirement Specification (SRS) was written. The BIS was then developed to meet the requirements using data visualisation techniques and user interface design patterns.Fig 04 shows the final dashboard design.



fig 04 Final Design

4. Results

The results from the demo of the final proof of concept application in the UWTSD sustainability meeting showed positive reaction from all members and it was concluded that the system would improve on the current system.

Following the demo interviews and observations were performed as well as usability tests using an eye tracking device. The test included giving a user typical information that would be entered into the system. The user was then observed performing the task while also tracking their eye movements. Eye tracking is an effective method for evaluating Human Computer Interaction (HCI) [8] and is an important tool in usability evaluation [9]. The users were then given a questionnaire containing tried and tested and industry standard usability evaluation scales; the System Usability Scale (SUS) and the User Experience Questionnaire (UEQ) [10][11][12].

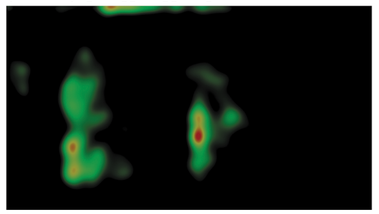


fig 05 Attention Map



fig 06 Gaze Path

Fig 05 shows the attention map from the eye tracking of all users this indicated that users viewed the application using the F pattern which suggests that users were able to process the data quickly [13]. However, the Gaze path shown in fig 06 indicate that the user found the PI input confusing this premise was also backed up from the observations and qualitative data collected from the questionnaire. This conflicts with the results from the SUS (fig 07) and UEQ (fig 08) evaluation which show that users found the system both efficient and easy. This indicates that observations and eye tracking are a better method for evaluating usability than the industry standard scales. However, the standard deviation of the UEQ results does indicate that a larger sample size would produce more accurate results.

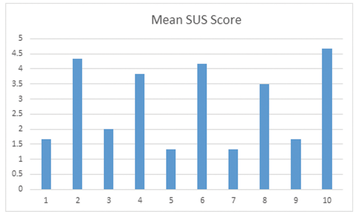


fig 07 SUS Results

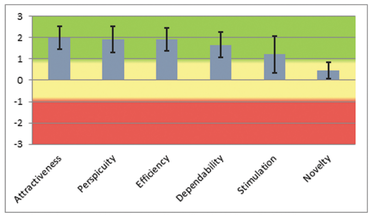


fig 08 UEQ Results