CAN A BUSINESS INTELLIGENCE TOOL SUPPORT THE COVID-19 VACCINATION PROGRAMME?

Author: Katie Rees (1903413) BSc Computing (Data & Information Systems) Supervisor: Dr Nicola Whitehead

1.Introduction

The Welsh Immunisation System (WIS) is the digital response to the Covid-19 pandemic. It schedules vaccine appointments en masse, captures vaccine results and records the distribution of vaccines across Wales.
Distrubution information is currently exported daily into a spreadsheet and sent to pharmicists to support their decision-making. This project aims to identify whether their is a better solution.

2. Aim & Objectives

The aim of the project is to identify whether a power BI dashboard could support the decision making of the Covid-19 vaccination programme.

- To design and develop an extensive power BI dashboard that conforms to best practice.
- To critically compare the time-difference between the current and proposed solution.
- To thoroughly evaluate user experience and usability by collecting and analysing user feedback.

3. Research & Methodology

The literature review analysed previous research within business intelligence (BI). It discussed relevant areas of BI such as the history, the benefits and challenges as well as thorough analysis of data visualisation (DV) specifically within a healthcare setting.

- BI can encourage faster and more informed decision-making [1].
- Data quality is paramount in ensuring benefits of BI are utilised [2].
- DV allows users to understand large datasets and is an essential tool due to the ever growing reliance on data [3].
- "Analytics will fundamentally shape the future of medicine and care delivery." [4].

A positivist approach was taken to the research with both deductive and inductive reasoning.

For development, an agile methodology was adopted.

4. Design & Implementation

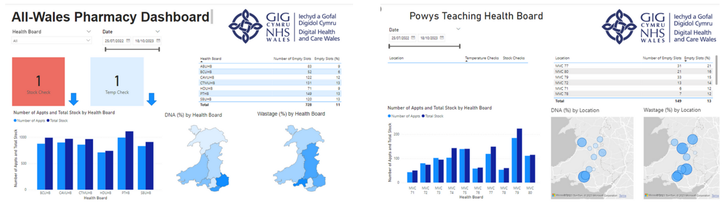
Requirements for the Power BI dashboard were gathered using a MoSCoW framework.

User personas were gathered to support the building of the first prototype, ensuring the design met the needs and pains of end-users.

Usability testing was performed to ensure design of prototype was appropriate before the dashboard creation began.

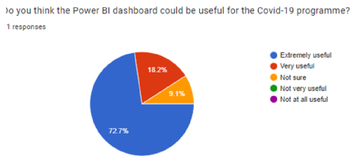
User stories were created using the requirements gathered and design choices within the dashboard were based on best practices identified during the literature review.

Test cases were created, which identified two major bugs that required an immediate fix.



5. Results

A user survey was distributed which identified **72.5%** participants believed the Power BI dashboard would be 'extremely useful' within the Covid-19 vaccination programme, with the remaining **26.4%** selecting 'very useful' or 'not sure'.



Another telling statistic is **81.8%** of participants voted to use the dashboard over the current solution, and **18.2%** wanted a mixture of both.

90% of participants voted heat maps as one of the visuals they liked the most suggesting that these should be utilised in future releases.

The time measurement test identified users could save almost **20 minutes,** which is a **73%** saving using the proposed dashboard over the current solution. A huge result for teams who are already time stretched.

6. Conclusion

Overall the aim of the project was met, and it identified that a power BI dashboard can support the Covid-19 programme. A combination of the research identifying suitable design choices, along with System Usability Scale (SUS) feedback, meant a robust and appropriate dashboard could be achieved.

Small sample size and participant bias was a consistent limitation due to lack of interaction from the appropriate users and therefore this has been considered throughout the research due to the potential of skewing results.

7. Recommendations

If the dashboard were to go live, then research into Power BI user groups would be recommended to ensure governance requirements are met.

Further consideration should go into the accuracy of the decision-making.

A recommendation for further research would be to consider whether a dashboard would be as useful for the wider immunisation framework such as child immunisations.

References

[1] S. Weng, M. Yang, T. Koo and P. Hsiao, “Modelling the prediction of business intelligence system effectiveness,” SpringerPlus, vol. 5, no. 1, p. 737, 2016.
[2] R. Mavi and C. Standing, “Cause and effect analysis of business intelligence (BI) benefits with fuzzy DEMATEL,” Knowledge Management Research & Practice, vol. 16, no. 2, pp. 245-257, 2018.
[3] M. Gatto, “Making Research Useful: Current Challenges and Good Practices in Data Visualisation,” Reuters Institute for the Stude of Journalism, 2015.
[4] M. J. Ward, K. A. Marsolo and C. M. Froehle, “Applications of Business Analytics in Healthcare,” Business Horizons, vol. 57, no. 5, pp. 571-582, 2014.

Prifysgol Cymru
Y Drindod Dewi Sant
University of Wales
Trinity Saint David