Delivery of Patient Centred Care
- Data Modelling -

Cardiff University, School of Computer Science and Informatics
CM3203 – One Semester Individual Project
Initial Plan

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Project Description

NHS Wales, the Cwm Taf Health Authority, is a child agency of the National Health Service in the United Kingdom. As healthcare services are vital features of our society today, it is important to be able to utilise their large inflow of data effectively. The importance of focusing on such issues is due to the growing population and the need to provide medical care more effectively. Previously NHS Wales would use patient 'age' data as their only way of categorisation; currently they have expanded to categorise patients based on previous health conditions and current on-going conditions.

From current concerns raised by the Cwm Taf Health Authority, it is clear that there is an overstretch of resources for all its patient care and due to this problem, they want to find smarter ways to utilise their limited resources. Patients tend to find themselves waiting for weeks or months to get appointments, scans, and other medical treatments. This is the problem that will be guiding my Individual Project, where I will focus on the particular scope of patients either with diabetes or with the potential to obtain diabetes (pre-diabetics). This is a very complex area as there are multiple types of diabetes patients can have, at different stages and from different causes.

The problem is important to solve because in order for NHS Wales to optimise the current process, it needs to map out the current process, and investigate the relationships between different components and factors of patients of our focus. It also needs to provide a representation of where the problem/bottlenecks occur and with that identify the policy actions to be taken. Fewer bottlenecks mean that resources will be used more efficiently. It is a crucial problem because with the growing population, NHS Wales needs to address its patients and the optimal care as quickly as possible.

NHS Wales is expected to find this problem identification model very beneficial because from the data model(s) and simulation, they will be able to identify where the solution to the current problem lies. They will then be able to redistribute their resources to bring about optimal outcomes for patients, meaning addressing patient needs faster in their timeline.

If the problem is not solved, the continuing growing population would result in growing overstretch of limited resources, leading to less efficient patient care and more negative health outcomes. If the process of patient care is not efficient, it might lead to patients waiting longer to be treated causing worsening health conditions (on any scale of severity).

For the project specifications, the data will be provided from NHS Wales, the Cwm Taf Health Authority, which will be imported into the necessary format to use when modelling. The technical advisor for the project will be Catherine Teehan, who is also the point of contact with NHS Wales.

Project Aims & Objectives

The aim of this project is to build model(s) and simulation to help pinpoint the problem zones & bottlenecks in the current process. This aim would have an impact of a long-term goal to optimise the limited resources of NHS Wales. By the end of the project I aim to help NHS Wales optimise the stated long-term goal with the data model within the scope of diabetes. In the near future, NHS Wales could use the same approach and solution to address other categories of patients with other medical conditions.

In order to identify the objectives for this project, I will focus on my short-term goals that are needed to achieve my main aim. Here are the objectives of focus:

- ⇒ Find appropriate approaches to address the problem from background research on existing diabetes patient pathways and related data modelling research.
- ⇒ Choose appropriate methodology to investigate the current problem solution, and effectively understanding & communicating the current bottlenecks and areas of improvement.
- ⇒ Ensure there are unbiased perceptions and assumptions of structuring the problem, providing evidence of correlation.
- ⇒ Focus on different categories of diabetes patients, allowing the expansion of agent-based data modelling.
- ⇒ Build model(s) to visualise current bottlenecks and areas of improvement in order to aid NHS Wales to understand areas of need for change for more focused patient centred care (specifically for different categories of diabetes patients).
- ⇒ Build simulation to allow NHS Wales to manipulate different patient categories to visually see the effect of current processes, and then providing the options to see effects of policy actions.
- ⇒ Review and discuss the product outcome with the NHS Wales point of contact, and evaluate potential future continuation.

Work Plan

Review meetings with the supervisor and technical support are confirmed to run on weekly basis, starting on Tuesday February 4th 2020 at 2pm.
The two upcoming confirmed sessions are February 4th 2020 and February 11th 2020.
The meetings are weekly progress checks; if parties are unavailable I will either postpone the meeting to a more convenient date/time or give an update of progress via email.

Below is the week on week time plan of the project, specifying what deliverables, report documentation tasks and milestones are to be achieved:

Week	Dates	Deliverables	Documentation	Milestone
Pre start	29 Oct – 10 Jan	Potential supervisor meeting to discuss proposed project.	Initial Project Description.	✓ PATS proposal Hand-In
1	27 Jan – 31 Jan	Kick-off supervisor & technical support meeting, clarifying general requirements. Begin background research on Data Modelling & System Dynamics.	Write up of Initial Plan (project description, aims/objectives and time plan).	✓ System Dynamics crash course completed. ✓ Initial Plan Hand-In.
2	3 Feb – 7 Feb	Background reading on related projects. Brainstorm map on Diabetes related patient pathways (investigation into problem situation).	Write up of background research on System Dynamics with Policy Action.	✓ Ethics Form submitted, if required.
3	10 Feb – 14 Feb	Begin System Dynamics (influence diagram), keeping in mind it must be theoretically quantifiable.	Write up to creating Influence diagrams, to identify what/where the problems/bottle necks are.	✓ Background research completed.
4	17 Feb – 21 Feb	Identify where Policy Actions (bottlenecks/loops) are required addressing. Create list of relationship with bottlenecks and ensure Unit Consistency.	Write up table of justifications for each factor (relationship) in the diagram that is decided to quantify.	✓ Unit Consistency completed.

5	24 Feb – 28 Feb	Continue to identify where Policy Actions (bottlenecks/loops) are required addressing. Send request to NHS Wales with data categories that are required.	Review existing software tools for data modelling, and make choice.	✓ System Dynamics with Identification of Policy Actions completed.
6	2 Mar – 6 Mar	Receive data from NHS Wales. Set up main factors in data model(s) in chosen tool software and plug in data.	Add zip file of data into the project folder and reference parts in the Appendix.	✓ Data received.
7	9 Mar – 13 Mar	Use Java language to implement relationships for 1 agent (patient category).	Write up Approach of using selected Data Modelling software tool.	✓ Data model with 1 agent completed.
8	16 Mar – 20 Mar	Add another agent (patient category) to the agent-based modelling.	Explain the additional scope of another agent in Implementation.	✓ Data models with 2 agents completed.
9	23 Mar – 27 Mar	Create simulation (process modelling) based on completed data models.	Write up on Simulation Approach and Implementation.	✓ Simulation of data models completed.
10-12 (Easter break)	30 Mar – 17 Apr	Final refinements to data models & simulation, if required, no major changes.	Write up Evaluation based on Pure Procedure of Justice, Conclusion, Reflection and Future Work.	✓ First Draft – Final Report completed, using documentation taken throughout the project.
13	20 Apr – 24 Apr	Supervisor Review of First Draft. Review of product with NHS Wales contact.	Adjustments based on feedback.	
14	27 Apr – 1 May	Final check of correctness of data models and running of simulation.		
15	4 May – 7 May	After submission, prepare for Project Viva.	Final proof-read of report, checking formatting.	✓ Final Report Hand-In by 5th of May.

Risk Plan

Risk	Impact on project (1-Low – 5-High)	Probability of Occurrence (1-Low – 5-High)	Mitigation Response
Dependency of receiving data from NHS Wales	4	1	Work Plan contains one-week buffer from requesting data to receiving it allowing enough time to get in contact and potential meeting visit to NHS, however by remaining a close contact with them the probability of occurrence is low.
Illness/personal circumstances	2	1	Variant to severity of situation, response manageable as work plan includes an extra buffer to allow small delays (couple of days).
Insufficient data received from NHS	2	1	Request a larger multitude of categories of data to be provided.
Insufficient amount of time to learn methodologies, approaches and data modelling software tool.	4	2	Work Plan to ensure I am on track with week-to-week tasks. Background research to understand the field of Data Modelling better. Technical Advisor (Catherine Teehan) from the university to help coach me in Data Modelling. Self-motivation and desire to achieve a great Individual Project will ensure learning progression.
Work loss	5	1	Regular backups on Google Drive of all documents, to ensure I have the latest version available.