ii) Identify the aspect or facet of the situation and its needs and requirements that you plan to target to advance capacity in

iv) Identify and other requisite knowledge and/or skills necessary to realise your solution/approach v) Agree on the solution, or subset thereof, that you can credibly implement in 10-14 days

i)

In Ireland the current protocol for determining whether a covid-19 test is necessary for an individual has them contact their general practitioner over the phone for an evaluation. Their doctor then asks them a number of questions such as what symptoms they are experiencing, who they have been in contact with and areas they have visited and so on. If the doctor then determines whether a test is necessary they must then arrange a test through the HSE for their patient. The patient is then sent a text message by the HSE informing time and location of their test and a reference number required to be tested. [1]

This process results in a lot of extra pressure being placed on GP services as they must handle assess many patients and refer them onto the HSE for testing. This extra stress and workload for GPs can only go to shorten the amount of time they have to see other patients who might have more pressing health concerns of a different nature. The average GP visit time only lasted 14.1 minutes prior to the Covid-19 pandemic and doctors spending their time organizing tests can only go to lower this time period. [2] In addition to this people who do have covid-19 are unable to visit their doctor in person during a time period where they may be looking for medical advice.

Another service under a huge amount of pressure at the most is the HSE as they must individually call anyone who has been tested to inform them of the result. This process is highly inefficient and not completely reliable. Not everyone is receiving their results as the emphasis is being placed on calling people who have tested positive and tracing the people they have been in contact with. For example, a family member of mine had to be tested a week ago. They were initially informed that the test result was negative, but then immediately received a follow up call to inform them that their result was still outstanding. When they called the HSE to check up on their result after another two days without contact they were told to assume that it is negative if they were not informed otherwise within 10 days of testing. This is a highly stressful situation to put people in as they are left in limbo for ten days wondering whether they have been infected with a deadly disease, and shows that the current system is not capable of coping with the demands placed upon it.

This whole process except for the actual testing of the patients can easily be carried out automatically. There is a list of common symptoms which has been published by the WHO, meaning that the preliminary exam can be carried out via a survey, and people who test negative for Covid-19 should not require individual phone calls in order to inform them of this, as that just uses up valuable human resources.

Keeping people advised as to the spread of Covid-19and informing them accurately of the danger in their local area is also important as it is easy to get led astray by misinformation or to take matters too lightly.

ii)

In addition to the networking requirements of our solution requisite knowledge of the disease and the symptoms it causes is necessary to create a viable survey with which to assess potential cases. In addition to this the heatmap which we are generating based off the number of positive cases required prerequisite knowledge of data science and statistical methods. In order to obtain the information for the survey the information from this study on cases in the Wuhan region of China was used to determine which symptoms to weight more heavily than others. [3] Obviously coordination with the HSE would be required for this to be implemented in reality.

v)

Our solution combines a number of elements to help during this global crisis. At the core of the solution is a client-server program which receives a connection from clients, opens a new thread and sends the client a survey. The survey consists of a number of questions pertaining to the physical health of the client, and a few additional questions asking them about recent travel history and people they have been in contact with recently. The questions are have yes or no style answers, and the response of the client results in a 1 or a 0 respectively. The answer to each question is multiplied by a weighting, which was figured out using the above study. If the sum of the weighted answers goes above a certain threshold then the client is told to seek a test. If it is below the threshold it is suggested that they are not likely to have Covid-19, but that they should self-isolate for 14-days regardless and contact their GP if they do not start to feel better after a couple of days.

If the client receives a positive test result they have the option to speak to a doctor through the application. This allows the doctor to arrange the test for the patient as per the HSE guidelines. The doctor connects to the server through a different client program and is not required to take the test. They can simply send and receive messages to and from the patient through the server.

The final aspect of this project is a heatmap of positive cases in the country. In order to accurately display this, clients would have to log back onto the server and share their test result. The positive results are matched to the locations of the users and used to generate a heatmap of confirmed cases in the country. This could then be used by individuals to inform their decisions around venturing outside the house to get shopping or other essential activities. Currently the heatmap is generated using population density statistics for Ireland and randomly assigning whether a test was positive. If it were to be implemented properly however the number of positive tests compared to the number of tests suggested by the survey could be used to improve the questions being asked and the weightings used so as to further decrease the number of unnecessary tests being carried out and putting a strain on the HSE.

# References

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