MEMORANDUM E (20) 100 (C)

FROM: **ROBIN SWANN**
MINISTER OF HEALTH

DATE: **18 MAY 2020**

TO: **EXECUTIVE**

FINAL EXECUTIVE PAPER: ASSESSMENT OF OPTIONS FOR COVID-19 DIGITAL CONTACT TRACING

Introduction

1. At the heart of the next stage of the fight against Covid-19 will be testing people who have symptoms consistent with Covid-19 and tracing their contacts. To provide the strategic framework for this approach, I have developed 'Test, Trace, Isolate, Support' - a strategy designed to break the chain of transmission of the virus by identifying people with Covid-19, tracing people who may have become infected by being in close contact with them and supporting those people to self-isolate so that if they have the disease they are less likely to transmit it to others. A copy of this document is attached.

2. A core component of the work moving forward, contact tracing, is a longstanding public health intervention that is used to prevent the further spread of disease by asking the close contacts of an infected citizen (referred to in public health terms as a 'case') to self-isolate. This means that if a contact then develops symptoms of the disease, there is much less risk of it being transmitted to others. Self-isolation can be a challenge, and one that people may have to face on numerous occasions, therefore mechanisms to support people to do this will be vital and a key aspect of this next phase. It is important to understand that 'Test, Trace, Isolate, Support' will be most effective if levels of infection are lower than they are at present, and stay low. Therefore, the success of 'Test, Trace, Isolate, Support' relies on every person

in Northern Ireland understanding what to do if they develop symptoms, and being prepared to follow the public health advice.

3. In line with the rest of the UK, the PHA in Northern Ireland were conducting contact tracing for all cases of COVID-19 until the UK moved from the containment phase to the delay phase on the 12th March 2020. The focus then shifted from individual contact tracing to wider measures, including advising all of the public what to do if they had symptoms, prevention of spread, and social distancing. The Contact Tracing process was re-established on 27th April in preparation for the shift to the next phase.

4. A further unique complexity we face is to ensure that systems and structures put in place to tackle Covid-19 in Northern Ireland link seamlessly with those in the Republic of Ireland, to prevent viral transit from travel across the border, particularly to support those who live in cross-border areas.

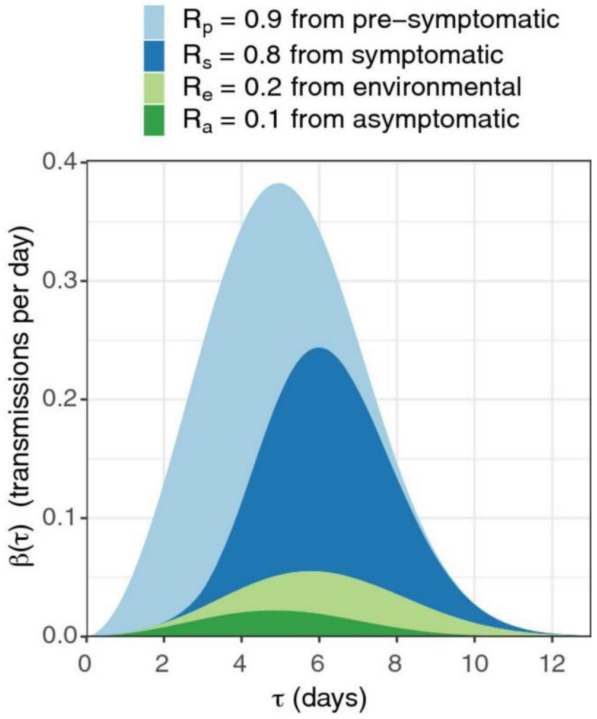
Speed of identification

5. Mechanisms that allow for the early detection of individuals at risk of infection amongst the population are of huge importance. Chart 1 below illustrates that a number of new infections are caused by individuals who are pre-symptomatic, thus relying on the identification of symptoms as a trigger for testing and contact tracing can be too late.

6. This highlights that one of the key factors in our work to maintain the epidemic at a manageable level will be the speed with which infected citizens can be identified, receive rapid advice and, if necessary, self-isolate - quickly breaking the transmission chain and accelerating the detection and tackling of outbreaks.

Chart 1: Illustration of the proportion of infections that occur from pre-symptomatic members of the public

Note: the R level in the illustration (2.0) is not the current R value for Northern Ireland, but is for illustrative purposes only



Source - DOI: 10.1126/science.abb6936

Proximity based Digital contact tracing

7. One mechanism that supports rapid identification of individuals at risk of infection is a contact tracing smartphone application. Once installed, such an app uses Bluetooth Low Energy to log the distance between a user's smartphone and other phones nearby, and the duration of the exposure. The anonymous log of these exposure events is stored securely on each user's device. If a user becomes unwell with symptoms of Covid-19, they can use the app to inform health authorities. Advice can be given via the app and the user can be directed to request a virology test. Subject to risk analysis, either at the point the user indicated their symptoms or when a positive test result is received, the app will trigger an anonymous alert to those other app users with whom the user shared exposure events over a pre-

determined timeframe prior to the onset of symptoms. Those users in turn can be given advice to self-isolate and either be alert to the onset of symptoms, or at an appropriate interval seek a virology test.

Proximity based contact tracing options

8. There are two models used in developing proximity based contact tracing apps:

Model	In use	In development
Centralised	Singapore	UK, France, Japan
De-Centralised	Not yet	RoI, Germany, Canada

9. Both approaches use the same Bluetooth Low Energy system to record the exposure events on the user's smartphone. A summary of each approach is as follows:

    - In the ***centralised model*** when a user reports symptoms and agrees to trigger the 'cascade' of advice to other users the proximity history is scanned and the unique, but anonymous, identifiers for each device are sent to a central server. The devices that are registered to other app users are notified of the risk of infection. The data that flows through the central server includes the number of devices that are at risk, which is useful for management of outbreaks and for epidemiological purposes.

    - In the ***de-centralised model*** the same process occurs, but only the unique and anonymous identifier for the potentially 'infected' device is sent to the central server. The devices belonging to other users of the app then periodically retrieve a list of 'infected' devices and the risk assessment and notification process then takes place on the device. In this model less data is shared with the central server.

10. The central model has been developed by technology experts and requires some workaround techniques to ensure the Bluetooth functions continue to record

exposure events correctly when the app is not active on a user's device. This may have an impact on things like battery life on the phone, and consequently a knock-on impact on adoption.

11. The de-centralised model has recently been made possible by the two main smartphone software companies (Apple and Google) agreeing to work together to define a common interface to their Bluetooth systems.

12. It is recognised that there have been human rights concerns raised around the privacy of a proximity app, however our priority at this crucial stage is to protect the right to life, guaranteed by Article 2 of the European Convention on Human Rights (EHCR). Data protection, processing and storage form part of our considerations.

13. There may be additional Section 75 equality concerns regarding use of an app by, for example, elderly groups. Again, the priority at present is to enable contact tracing to reduce impact of Covid-19. Use of the App is voluntary and is viewed as the best way to monitor Covid-19 as we approach the recovery stage. The situation, including equality and human rights considerations will continue to be monitored and reviewed.

Northern Ireland options for Digital contact tracing

14. Unlike other jurisdictions in the UK, the NI Health and Social Care System shares a common land border with another European nation, and the North-South transit of the virus on the island of Ireland is a unique consideration in planning the pandemic Recovery Strategy.

15. The English NHS (through their Digital Strategy organisation, NHSx) has developed a proximity app called 'NHS Covid-19' which has been in development for over 2 months, pre-dates the announcement by Apple and Google, and uses the centralised model. Privacy lobbyists have challenged the continued use of a centralised model, suggesting that it is open to future misuse to collect personal

information about users. NHSx are taking an open and transparent stance with their documentation and the source code to alleviate these concerns, and are pressing on with their plan to release the NHS Covid-19 app in week commencing 18th May, following a pilot in the Isle of White. The release will see the application made available to everyone in the UK, with no ability to restrict downloads to only individuals in England. The NHSx team are monitoring progress with de-centralised models, and working with Apple and Google to assess all possible options. Given they are further ahead than any nation using the de-centralised approach they are maintaining momentum in parallel.

16. The Republic of Ireland (RoI) Department of Health were also initially developing a centralised application, but have recently opted to shift to a de-centralised approach that leverages the Apple and Google Application Protocol Interface (API). We understand that this decision was taken due to three factors:

    1. recent pressure from privacy lobbyists;
    2. concerns about the workaround techniques to maintain Bluetooth functionality when the application was running in the background; and
    3. other large European nations (e.g. Germany) opting to switch models.

17. The RoI app is called 'Covid Tracker' and is currently in development, with a dependency on Apple and Google to release the new versions of their iOS and Android operating systems for the general public to update their devices. Developer versions of the operating systems, and example software, has been released and the RoI team are preparing a pilot for early June with a view to a wider national roll-out in mid-June.

18. For a digital proximity tracing app to be optimally effective in Northern Ireland it needs to allow Covid-19 exposure events captured in Northern Ireland, the Republic of Ireland and the mainland UK to be 'actionable'. This will require integration between the UK centralised and RoI de-centralised models. This has

not been done anywhere globally[1] - and there is a chance that it may become apparent that the difference in the way the device identifiers are stored means that this is not technically possible.

19. A less effective alternative to seeking to integrate the different digital proximity apps would be for citizens who travel in and out of Northern Ireland to download and use multiple apps. To illustrate how this would work, in the event Northern Ireland were to choose to build a de-centralised app that integrates only with RoI, citizens travelling to mainland UK (e.g. for work) would use the NHS Covid-19 app to receive alerts that they are at risk from exposure occurring while in GB. They would follow advice to self-isolate (potentially receiving this advice when back home in Northern Ireland) and if they develop symptoms would use the Northern Ireland app to notify proximity contacts in Northern Ireland, in parallel to use of the NHS Covid-19 app to notify contacts in GB.

20. The options for implementing a Digital proximity tracing app in Northern Ireland are:

    1. Do nothing – opt to not support Digital contact tracing as part of the Northern Ireland Recovery strategy, instead relying on scaling of the existing contact tracing model, triggered by positive virology test results, to identify and respond to individual infections and outbreaks.

    2. Deploy the NHS Covid-19 app and explore development of a new technique to integrate with RoI Covid Tracker app.

    3. Build a dedicated Northern Ireland Digital contact tracing app, leveraging the Apple and Google API, use the integration tool-kit to share exposure

[1] Integration between de-centralised models has been explored by the European Union and a tool-kit has been made available for nations wishing to share exposure events across borders.

events with the RoI Covid Tracker app, and explore development of a new technique to integrate with the NHS Covid-19 app.

4. Work with colleagues in the RoI to explore whether their Covid Tracker app could be deployed across the island of Ireland, and explore development of a new technique to integrate with the NHS Covid-19 app.

5. Blend options 2 and 3, where the NHS Covid-19 app is initially recommended for use by the public in Northern Ireland as pilot (recognising that it will be available sooner than any of the other options), with subsequent building of a dedicated Northern Ireland Digital contact tracing app (as per option 3).

Assessment factors

21. This paper considers 6 factors to compare the options outlined above:

    1. Ability to Secure North South Connectivity
    2. Ability to Secure East West Connectivity;
    3. Likely timelines for delivery;
    4. Complexity and risk of delivery;
    5. Likely cost for delivery;
    6. Likelihood of user adoption in Northern Ireland.

22. To assist colleagues, in the table below I have sought to score each option out of 5 against each criteria (with 5 being the best score – i.e. ability to secure connectivity, shorter delivery timeline, low complexity, low cost, and better user adoption). Clearly, this evaluation does not lend itself to a pure numerical ranking, and hence it would be wrong to simply total the raw scores. Similarly, the importance of each criteria is a subjective matter, upon which colleagues may have their own views. From my perspective, I would offer the following comments:

Connectivity

clearly, connectivity with other jurisdictions will be an important issue, particularly given movements around the border and, as we move forward, growing movements between NI and GB. That said, any delays in achieving this need to balanced against the importance of have a functioning app for the population of NI available as soon as possible.

Timeliness

I feel this is a very important factor. By way of illustration of expected timelines:

Option 2 – go live date for NI tracking and connectivity E/W - mid/late May; likely date for connectivity to the South - early July, if possible at all.

Option 3 – likely go live date for NI tracking, and connectivity N/S – mid to late June, with connectivity E/W early July, if possible at all.

Option 4 – likely go live date for NI tracking, and connectivity N/S – mid June; likely date for connectivity E/W – early to mid-July, if possible at all.

Option 5 - likely go live date for NI tracking and connectivity E/W - mid/late May; likely date for new app delivering connectivity N/S – mid June, with re-implementation of connectivity E/W mid-July, if possible at all.

The above dates must be viewed in the context of what is happening with our near neighbours – we will face strong criticism if we do not have a live app when others do. The UK app will begin roll out on 18 May, and in the South it is anticipated they will begin roll out in mid-June.

Complexity — I view this as an important, but not decisive, issue in terms of being confident we will have a functioning app.

Cost — this is clearly a relevant consideration, however given the amounts involved, and the likely benefits of have a functioning, connected app with good user uptake, I do not see it as a decisive issue.

User adoption — I see this is hugely important. No matter how good any app is, unless there is strong user adoption, it will be of very limited value.

Option	Description	Evaluation Criteria					
		N-S	E-W	Timeliness	Complexity	Cost	User Adoption
1	Do Nothing	1	1	5	5	5	1
2	NHS Covid 19	2	5	5	4	4	2
3	Build NI App	4	2	2	2	2	4
4	RoI Covid Tracker	5	1	3	3	3	3
5	Blended – 2 then 3	2 then 4	5 then 2	1	1	1	3

Annex A contains some further notes on each option and its assessment.

Summary

23. I do not believe "do nothing" is a credible position, and thus there are four options open to us (Option 2- 5), each with potential pros and cons. Ultimately, this is a subjective judgement, but I feel it is of huge importance that we arrive at an agreed position and then work together to encourage maximum uptake of the app across NI. The success of any approach critically depends on such uptake.

Recommendation

24. I recommend that the Executive:

i. notes the options available to us and the analysis of them; and

ii. agrees on which option we should adopt going forward.

I am copying this paper to the Attorney General and Departmental Solicitor, and to First Legislative Counsel.

ROBIN SWANN MLA

MINISTER OF HEALTH

Annex A

Further Information on Assessment Criteria Scores for Each Option

Option 1 - Do Nothing - relies exclusively on the existing contact tracing approach, which identifies contacts of infected individuals after a positive test result has been obtained. The opportunity to accelerate identification of at risk individuals in the community is not explored. The risk of large numbers of false positives, with individuals being asked to self-isolate unnecessarily is avoided.

Option 2 - Adoption of the NHS Covid-19 app in Northern Ireland – does not have the ability initially to address North-South virus transit but, of all the options, is the fastest to implement, least risky and cheapest (development work to integrate with Northern Ireland services in the order of £200k-300k). It offers the opportunity to get an application live at the earliest opportunity and then move on to exploring integration with the RoI app (although note that this integration has not yet been established, so this may be challenging or, indeed, not possible at all). It may have other challenges in relation to user adoption across communities in Northern Ireland, and in relation to privacy concerns. These factors may require further consideration.

Option 3 - Building a dedicated app for Northern Ireland - scores highly in North-South connectivity, due to the similarity in the de-centralised architecture of such an approach and the RoI Covid Tracker app. There may be challenges in getting it integrated with the NHS app

due to the need to transfer exposure events between centralised and non-centralised architectures. The costs are higher, given the development activity required (very rough initial estimates put the budget figure in the range of £1m-2m). The timeline is problematic due to the fact that the NHS Covid-19 app will go-live in the rest of the UK in mid-May, and under this option Northern Ireland would not recommend to members of the public to download and use the app, instead advising people to wait for availability of the dedicated Northern Ireland app. Complexity and cost are all increased due to the need to build a new solution in Northern Ireland. User adoption is positive, due to the indigenous nature of the solution.

Option 4 - Adopting the RoI Covid Tracker app – clearly scores well in N/S connectivity. That said, we do not, at this stage, have confirmation from colleagues in the South that delivery of E/W connectivity is either technically possible and/or acceptable to executive stakeholders in the Republic. It scores mid-range ion all other criteria.

Option 5 - a blended approach of options 2 and 3 - leverages the NHS app in the short term, in order to move more quickly towards earlier identification of at risk citizens, with subsequent work to develop a dedicated Northern Ireland app based on the RoI centralised architecture. This option is reasonably effective in both East West and North South connectivity (sharing exposure events with UK Mainland jurisdictions in the first instance, and exploring the building of a strategic mechanism to transfer events in the longer term; and recognising the ultimate goal is to build a dedicated Northern Ireland app based on the de-centralised architecture). The option loses out on the complexity, timelines and cost

factors – given there would be two solutions to integrate and deploy (the rough estimates would require the sum of costs for options 2 and 3 – landing at £1.2m-£2.4m). There is potential for confusion for the public communications strategy, with two distinct aps over a period of 2 months. In the longer term adoption could be strong due to the indigenous nature.