Health Report

National Immunisation Solution – approval of the business case and drawdown from contingency funding

Date due to MO:	9 October 2020	**Action required by:**	15 October 2020
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To:	Chris Hipkins, Minister of Health Hon Grant Robertson, Minister of Finance		
Copy to:	Hon Julie Anne Genter, Associate Minister of Health		

Contact for telephone discussion

Name	Position	Telephone
Deborah Woodley	Deputy Director-General, Population Health and Prevention	s 9(2)(a) [redacted]
Shayne Hunter	Deputy Director-General, Data and Digital	
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Action for Private Secretaries

Provide this report to the Office of the Minister of Finance **Date dispatched to MO:**

Return the signed report to the Ministry of Health

National Immunisation Solution – approval of the business case and drawdown from contingency funding

Purpose of report

1. This paper seeks approval from the Minister of Health and Minister of Finance:

   a. of the attached National Immunisation Solution (NIS) business case "Improve equity of outcomes through better delivery of immunisations for all population groups: with priority for a COVID-19 response capability"

   b. to the drawdown of contingency funding for the implementation of the business case.

Background

2. The National Immunisation Register (NIR) has been in place nationwide since 2005. Its initial purpose was to collect comprehensive information about childhood immunisation rates and support the MeNZB (meningococcal B) immunisation programme. Consequently, we now have a clear record of childhood immunisation for children born since 2005, although we do not have comprehensive information about adult vaccinations.

3. There are multiple challenges with the NIR including, but not limited to:

   a. It is not easily configurable, user friendly, intuitive or easy to change. Keeping the solution up to date and aligned to service needs has become increasingly expensive with the triennial immunisation schedule changes now s 9(2)(b) [redacted]

   b. It is not available in some health care settings and vaccinators are not always able to use the system when and where they are engaging with the public – access is limited to those users who use a practice management system or are connected to the Connected Health Network

   c. It struggles with capacity issues with system outages occurring during high load periods for example during the influenza season

   d. Inflexible reporting tools and processes means information is not able to be tailored to the specific needs of planners and additional analysis regularly occurs outside the system

   e. It is not suitable in its current state or modifiable to meet the broader needs we have for measles and influenza vaccine management.

4. In response to the challenges during the 2019 measles outbreak, Cabinet agreed that a business case to replace the NIR be developed as a priority (this was publicly announced early in 2020).

Urgent need for a National Immunisation Solution

5. To successfully deliver any COVID-19 vaccine, the National Immunisation Programme must have capability to deliver significant numbers of vaccinations to New Zealanders in a short timeframe (i.e. weeks to months). Potentially, thousands of vaccinators across the country will be accessing and recording immunisation data at a high rate from all parts of New Zealand simultaneously.

6. The current NIR is not able to support the delivery of a COVID 19 vaccine. Furthermore, it is unable to support people accessing their immunisation status, something they will find very useful if we move to predeparture COVID-19 testing or confirmation of immunisation status.

Benefits of the proposed National Immunisation Solution

7. A new National Immunisation Solution is proposed in the attached business case. It will:

   a. enable the collection of immunisation information in a potential mass COVID-19 immunisation programme, regardless of care setting

   b. enable effective prioritisation and resource allocation in a potential targeted COVID-19 immunisation programme

   c. expand to a full National Immunisation Solution by early 2022 and support the continued delivery of the National Immunisation Programme and any changes to the National Immunisation Schedule into the future.

8. As its preferred option, the business case proposes to replace the existing NIR with a solution using the same technology as successfully deployed for the National Screening Solution, National Contact Tracing Service and Border management.

9. The project will:

   a. deliver as its first priority a COVID-19 minimum viable product[1] (MVP) to support the rollout of a COVID-19 vaccine, which will be available by 31 January 2021, we will however work to have a MVP available earlier.

   b. enable direct-to-consumer communication through channels such as text and consumer apps to support promotion and engagement with a COVID-19 vaccine and immunisation campaigns at a personal level, and to enable access to their immunisation status

   c. replace the incumbent National Immunisation Register (NIR) with a new, fit for purpose National Immunisation Solution (NIS) which can meet the current and future needs of New Zealand's wider immunisation programme.

[1] A minimum viable product (MVP) is the most pared down version of a product that can be released. Three Key Characteristics of a Minimum Viable Product:

- It has enough value that people are willing to use it.
- It demonstrates enough future benefit to retain early adopters.
- It provides a feedback loop to guide future development.

10. The business case also considered the options of maintaining the status quo and replacing the incumbent platform with a like for like a solution that could support the Childhood Immunisation Programme into the future. Neither of these options were considered to meet the COVID-19 response needs or improve the equitable delivery of the immunisation programme.

Project plan and governance

11. The development of the NIS is planned to run over multiple iterative stages using contemporary agile approaches. The Ministry of Health is confident that the project team will be able to meet delivery timelines as they did with the National Contact Tracing Solution (NCTS) and the NCTS Border Solution, using the same platforms. In addition to the core platforms there will be additional components required to support the specialised needs of a COVID-19 vaccine. The Ministry will engage the market for these components using partners experienced with our platform of choice.

12. The NIS has been recently reclassified from medium to high risk by Central Agencies. Capital projects that are identified as high risk through Central Agency assessment of a Risk Profile Assessment are expected to proceed through the Gateway assurance process. The NIS has been deemed high risk because of environmental factors. That is its criticality to the delivery of the COVID-19 Vaccine Strategy and the short timeframes for the delivery of the MVP rather than the nature of the project itself.

13. However, given the urgency of the project and that the Gateway assurance process could potentially impact on achievability of timeframes, officials from the Treasury and the Ministry of Health have agreed that project assurance is addressed by way of an Assurance Plan that outlines the specific assurance activities for the purpose of the delivery of the MVP. The process for developing the Assurance Plan is included in the business case.

14. The Ministry has established joint governance to oversee and ensure coordination over the three programmes of COVID-19 vaccine purchasing, COVID-19 immunisation programme delivery and the development of the NIS.

Funding available

15. Contingency funding has been approved by Cabinet for replacement of the NIR, totalling $38 million over 4 years, and ongoing funding of $5.6 million per annum:

    a. On 20 April 2020, Cabinet approved $55 million contingency to provide for the COVID-19 contact tracing proposal [CAB-20-MIN-0175 refers]. Out of the $55 million sought, $15 million was intended for a design and build process to support the national delivery of a COVID-19 vaccine when it becomes available.

       The Cabinet minute did not specifically identify the NIS as being a potential recipient of this funding, although this intent was noted in the supporting Cabinet paper (paragraph 49 refers). Cabinet confirmed your authorisation to draw down these funds on 5 October 2020 when it considered the next tranche of funding for the Health response for COVID-19.

    b. On 6 July 2020 Cabinet approved an additional $23 million contingency to replace the NIR subject to joint approval of a single stage business case by the Minister of Finance and Minister of Health [CAB-20-MIN-0328.25 refers].

16. s 9(2)(b)(ii) [redacted]

Table 1: Funding available for National Immunisation Solution

s 9(2)(b)(ii) [redacted]

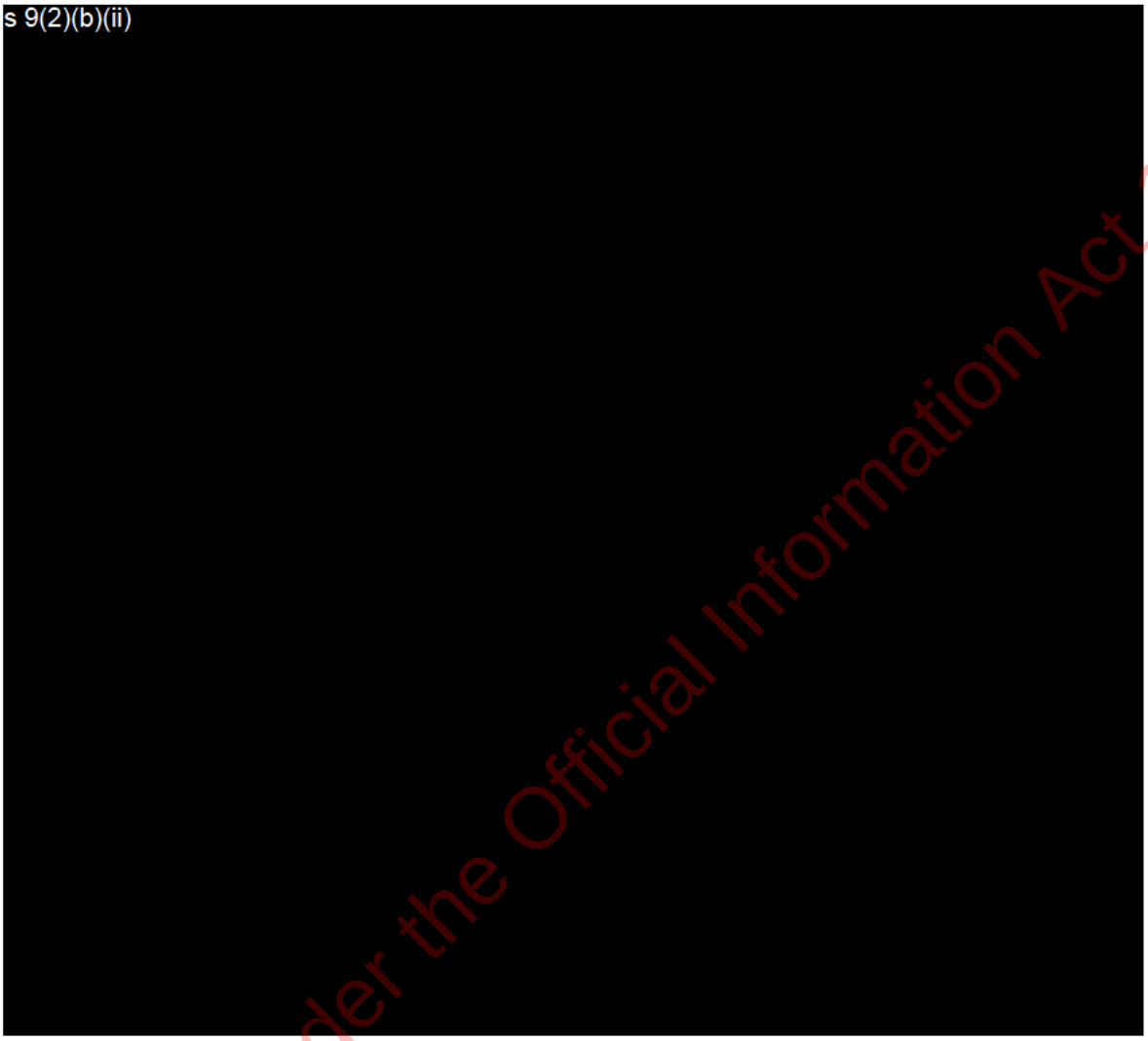
Costs

17. The indicative project costs based on the current scopes and requirements are estimated to fully utilise the funding available in contingency as shown, but the phasing over the initial two years is different with less funding required in 2020/21 and a corresponding higher amount required in 2021/22.

18. The total costs by project element are shown in Table 2 below, and the split into the capital and operating components in Table 3 below.

19. The draft business case is costed on the basis of the currently identified requirements and a relatively low contingency allowance of 6 percent. This contingency is expected to be sufficient if there are no changes to the scope of the project given the proven platform and experienced implementation team.

20. However, should further project deliverables be identified as the requirements of the COVID-19 Vaccine Strategy evolve, then further funding may be required and will be sought in Budget 2021.



Equity

21. The preferred option of replacing and improving the NIR with a NIS will support the equitable delivery of a COVID-19 immunisation programme, by allowing greater flexibility for the vaccinator workforce and providing information about who has been immunised. It is anticipated that this will serve as a key enabler for supporting the whole National Immunisation Programme, by enabling service improvements and better targeting to reverse the current trend of increasingly inequitable immunisation rates.

Next steps

22. Following approval of the business case, the Ministry will complete engagement with the market to confirm the preferred technology platforms and engage the right mix of service partners to progress the implementation of the preferred option, beginning with the design and development of a COVID-19 minimum viable product.

23. The Ministry will work with Treasury and GCDO to develop an assurance plan for the project plan. This will include real time assurance of the development of the NIS given the tight timeframes for delivery of a COVID-19 MVP. In addition, as part of project implementation a stakeholder engagement and change management plan will be completed.

24. The Ministry will provide an update on progress with developing the NIS in the November 2020 Cabinet report back on progress to develop the COVID-19 Immunisation Programme, including a prioritisation framework [CAB-20-MIN-0382 of 10 August refers]. Furthermore, officials will provide a progress update on the project to the Vaccine Ministers Group (Prime Minister, Minister of Finance, Minister of Health, Minister of Research Science and Innovation) following the General Election, with a specific focus on the scope and progress of the COVID-19 MVP.

25. The Ministry of Health has consulted with Treasury, Governments Chief Digital Office and the Ministry of Business, Innovation and Employment on the business case.

Recommendations

The Ministry recommends that you:	Minister of Health	Minister of Finance
a) **note** that the rationale for replacing the National Immunisation Register is well established, centred on its limitations to capture appropriate information to support the National Immunisation Programme and that the system will no longer be supported as at 31 March 2022		
b) **note** that on 20 April 2020 Cabinet approved $55 million contingency to provide for the COVID-19 contact tracing proposal [CAB-20-MIN-0175 refers]		
c) **note** that on 5 October Cabinet authorised the Ministers of Finance and Health to draw down $15 million of the contact tracing tagged contingency in recommendation b) for the NIS, subject to your approval of the business case [CAB-20-MIN-0460 refers]		
d) **note** that on 6 July 2020 Cabinet approved the establishment of an additional tagged contingency for the National Immunisation Solution, totalling $23 million over a 4-year period and authorised the Ministers of Finance and Health (joint Ministers) jointly to draw down the 'National Immunisation Solution' tagged contingency, subject to their approval of a business case [CAB-20-MIN-0328.25 refers]		
e) **approve** the attached business case for the National Immunisation Solution, subject to a stakeholder engagement and change management plan will being completed as part of project implementation	**Yes/No**	**Yes/No**
f) **agree** that officials will provide a progress update on the project to the Vaccine Ministers Group (Prime Minister, Minister of Finance, Minister of Health, Minister of Research Science and Innovation) following the General Election, with a specific focus on the scope and progress of the COVID-19 minimum viable platform	**Yes/No**	**Yes/No**
g) **agree** that full contingency funding described in recommendations b) c) and d) of $38 million over 4 years can be drawn down	**Yes/No**	**Yes/No**

h) **approve** the following changes to appropriations to provide for the decisions in recommendations g) above, with a corresponding impact on the operating balance and net core Crown debt: Yes/No Yes/No

s 9(2)(b)(ii)

[redacted]

i) **agree** that the proposed changes to appropriations for 2020/21 above be included in the 2020/21 Supplementary Estimates and that, in the interim, the increases be met from Imprest Supply Yes/No Yes/No

j **note** that the National Immunisation Solution programme has been classified as high risk by Central Agencies and that in response to this classification the Ministry is working closely with Central agencies and will develop and implement an ongoing assurance and monitoring plan

k) **note** that the Ministry of Health will report to cabinet on progress with developing the NIS for COVID-19 via the report back on progress to develop the COVID-19 Immunisation Programme, including a prioritisation framework [CAB-20-MIN-0382 of 10 August refers].

Deborah Woodley
Deputy Director-General
Population Health and Prevention
Date:

Shayne Hunter
Deputy Director-General
Data and Digital
Date:

Hon Grant Robertson
Minister of Finance
Date:

Chris Hipkins
Minister of Health
Date: 13/10/2020

Appendix 1 – Business case

NIR Replacement
Business case FINAL

Ministry of Health

Achieve equity of outcomes through better delivery of immunisations for all population groups:

- *Replace, Upgrade and Future-Proof the National Immunisation Register with scalable, integrated technology*
- *With priority for a COVID-19 response capability*

Single Stage Business Case (SSBC)

September 2020

Prepared by:	Kerry Boyle
Prepared for:	Grant Pollard
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Version	Issue Date	Changes
0.1	19 Aug 2020	Initial draft
0.2	21 Aug 2020	Changes based on review from Grant Pollard (MOH) and Sarah Emerson (MOH)
0.3	27 August	Feedback from Darren Douglas (MOH) and Peter Marks (MOH)
0.4	1 Sept 2020	Feedback from Jo Styles (MOH) and Helen Anderson (Treasury)
0.5	4 Sept 2020	Feedback from Russell Browning (DIA)
0.6	7 Sept 2020	Feedback from Gareth Charles (Procurement)
0.7	9 Sept 2020	Feedback from Michael Dreyer and Nicole Vipond
0.8	11 Sept 2020	Feedback from Desiree Heather and Governance Group
0.9	14 Sept 2020	Feedback from Helen Anderson (Treasury), Haiou Wang (MoH), Zareen Azam and Lillias Henderson (MoH)
	23 Sept 2020	Feedback from Deborah Woodley (SRO) and Sarah Emerson (MoH)
	25 Sept 2020	Updated OPEX/CAPEX costs
	29 Sept 2020	Updates to Strategic Case after feedback from Deborah Woodley (SRO) and Immunisation Team

Document Review

Role	Name	Review Status
Project Manager		
Business Owner	Grant Pollard	Reviewing
Manager Immunisation Team	Kath Blair	Reviewing

Document Sign-off

Role	Name	Sign-off Date
Senior Responsible Owner/ Project Executive	Deborah Woodley	
Senior Responsible Owner/ Project Executive	Shayne Hunter	

Contents

Executive Summary

Purpose of business case

This Single Stage Business Case[1] seeks formal approval to invest $s 9(2)(b)(ii) [redacted], with project cost of s 9(2)(b)(ii) [redacted] to deliver the technology required to support the national immunisation programme.

The project will, using Agile methodology:

- Initially deliver a COVID-19 minimum viable product[2],[3] (MVP) by 31 January 2021 to support the rollout of a COVID-19 vaccine or vaccines
- Iteratively build on the COVID-19 MVP to replace the incumbent National Immunisation Register (NIR) with a new, fit for purpose National Immunisation Solution (NIS) which can meet the current and future needs of New Zealand's immunisation programme.

Assumption: Developing COVID-19 capability is first priority because in terms of COVID-19, response time is of the essence and there is a commonly understood and compelling need to go fast.

This proposal is NOT for a two-stage project. The proposal is for a one-stage project that uses Agile methodology with a COVID-19 MVP being the focus of initial Agile sprints. Once the MVP is established then the remaining sprints will complete the functionality required for all immunisation types.

[1] The Treasury Risk Profile Analysis indicated this project was a high risk and advice was to develop a Single Stage Business Case with a real-time assurance process to be implemented as part of project implementation.

[2] A minimum viable product (MVP) is the most pared down version of a product that can still be released and be considered useful by users. Three Key Characteristics of a Minimum Viable Product:

- It has enough value that people are willing to use it.
- It demonstrates enough future benefit to retain early adopters.
- It provides a feedback loop to guide future development.

[3] See Appendix 2 for NIS requirements including COVID-19 MVP

Introduction

Immunisation is an essential component of any public health system and generates significant benefits at individual, governmental and economic levels[4]. Access to clean water is the only public health intervention that generally ranks more highly in reducing the burden of infectious diseases.

The NIR has been in place nationwide since 2005. Its original purpose was to collect comprehensive information about childhood immunisation rates, as well as support the MeNZB[5] immunisation programme. As a consequence, we now have a clear record of childhood immunisation for children born since 2005, however we do not have comprehensive information about immunisation for people aged 15 years and over. From a population health perspective this means that it is difficult to understand overall immunisation coverage or to plan targeted interventions.

In addition, there have been multiple issues with the system for example:

- It is not easily configurable, user friendly, intuitive or easy to change. Keeping the solution up to date and aligned to service needs has become increasingly expensive with the triennial immunisation schedule changes now costing in excess of s 9(2)(b)(ii)
- It is not available in some health care settings and vaccinators are not always able to use the system when and where they are engaging with the public – access is limited to those users who use a practice management system or are connected to the Connected Health Network
- It struggles with capacity issues with system outages occurring during high load periods for example during the influenza season
- Inflexible reporting tools and processes means information is not able to be tailored to the specific needs of planners and additional analysis regularly occurs outside the system.

A further compounding issue is that the Ministry has been advised by the current vendor, Orion, that it will not support the NIR from 31 March 2022 onwards.

These issues and inefficiencies mean that we do not have the information system and tools to support a population health approach to improving immunisation coverage across New Zealand. This is particularly important because currently New Zealand has an increasing gap in immunisation coverage between Māori and other population groups. Improved access to better quality information and more robust tools will support a cross-sector effort to reverse this current trend.

The Measles Outbreak in 2019 highlighted the above issues with the NIR: it was unable to provide timely and complete information on vaccination status during the outbreak which limited in part, the effectiveness of the health sector's response. As a consequence, the Government agreed funding of s 9(2)(b)(ii) to develop and progress this business case for a replacement NIR. The importance of replacing the NIR was reinforced by the findings of the independent review into the Measles Outbreaks released in September 2020.

The issues with the NIR were further reinforced during the most recent influenza campaign. A large amount of tidy up was required on a regular basis to understand coverage by ethnicity and because not all vaccinators have access or use the NIR it is not possible to report on actual coverage.

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[4] European Centre for Disease Prevention and Control. *Designing and implementing an immunisation information system*. Stockholm: ECDC; 2018.

[5] https://www.health.govt.nz/our-work/preventative-health-wellness/immunisation/immunisation-programme-decisions/meningococcal-b-immunisation-programme-and-menzbtm-vaccine

The COVID-19 pandemic has now created an even greater urgency to replace the NIR: it will not be able to support, and would therefore hinder, a COVID-19 immunisation programme. As soon as a COVID-19 vaccine is available the health system must have the capability to support delivery of the vaccine to New Zealanders in a short time frame (ie, weeks to months). This includes an immunisation solution that can record all COVID-19 vaccinations given; support a programme delivery approach (for example recall of people if more than one dose is required) and be able to support thousands of vaccinators across the country who will need to access and record immunisation data from all parts of New Zealand potentially simultaneously.

In recognition of the need to replace the NIR, Cabinet approved funding on 20 April 2020 for a design and build process to replace the NIR in support of the national delivery of a COVID-19 vaccine when it becomes available. Of the $55 million contingency agreed for a range of COVID-19 contact tracing and response initiatives (CAB-20_Min-0175) $15 million was earmarked for the NIR replacement.

Further additional funding of $23 million from the COVID-19 Response and Recovery Fund was agreed on 6 July 2020 for a full replacement of the NIR on 6 July 2020 (CAB-20-MIN-0328.25 refers). This contingency funding was announced by the Associate Minister of Health on 31 July 2020 and was approved subject to joint approval of a single stage business case by the Minister of Finance and Minister of Health.

Table 1: Contingency finance approved dependent on approved business case.

s 9(2)(b)(ii)

Strategic Case

The current vendors (Orion Health[6]) of the National Immunisation Register (NIR) have notified the Ministry they will no longer provide support after 31 March 2022. The NIR is also past its useful life and because of design limitations is regularly not capable of meeting the demands placed on it[7]. The result is:

- Incomplete and poorly integrated immunisation information has resulted in inequitable and reduced population immunisation coverage, with no clear visibility of population immunity
- Constraints of design, capacity and old technology negatively impacts the delivery of immunisation programmes and opportunistic vaccination services.

COVID-19: as per problem 2, in particular, the current NIR could not effectively support a COVID-19 immunisation programme, especially where adults are concerned, which is the main demographic at risk from COVID-19.

Investment Objectives

Three investment objectives[8] have been identified for this investment proposal. By March 31, 2022[9]:

1. Ensure all vaccinators have anytime/anywhere access to immunisation health records and update capability[10].
    i. This includes ***priority*** to develop COVID-19 immunisation functionality, ***with urgency***, that can cope with emerging requirements to be available by 31 January 2021.
2. Ensure an individual's whole-of-life immunisation data is stored centrally, and can be integrated with all other government datasets relevant to that individual[11].
    i. This data needs to be available to providers of healthcare and consumers with a focus on improving customer experience.
3. Improve capacity to monitor, analyse and report on population immunisation status and identify where there is inequity.

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[6] https://orionhealth.com/nz/

[7] See Appendix 1 for Investment Logic Map and examples of where the current NIR has failed to meet the need of the immunisation service.

[8] See Appendix 2 for Business and Functional requirements. These requirements will be used by vendors to develop their bid responses and provide quotes.

[9] The intention is to have an interim COVID-19 capability by 31 January 2021.

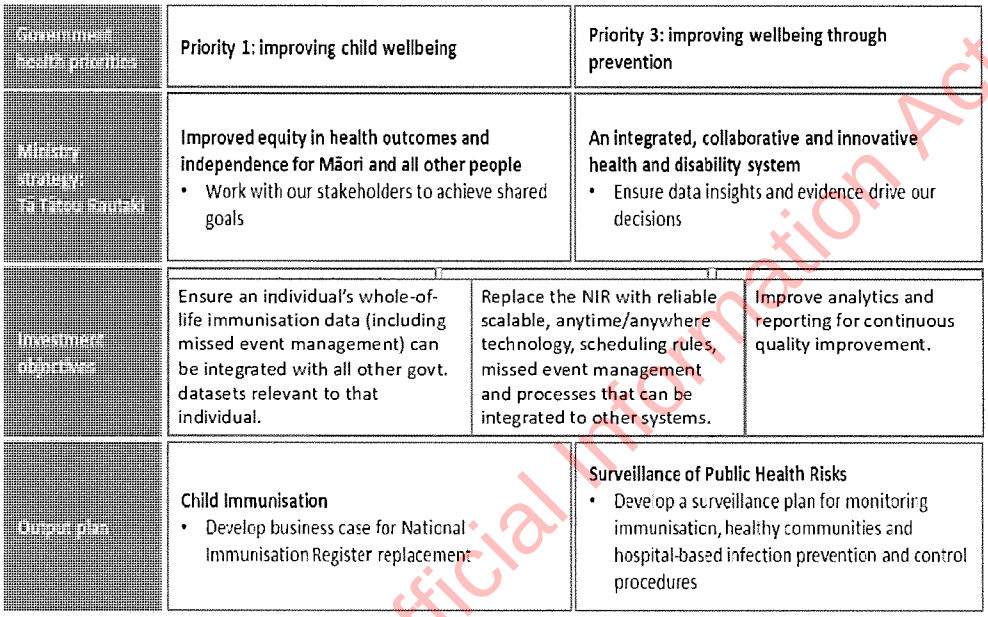
[10] Includes scheduling rules, missed event management and integration to other systems

[11] Some of these datasets and the reasoning for them are described in the section "Future-proofed: Integrate to other systems (internal and external to MoH)". Other datasets will also be relevant over time. The replacement solution must be capable of integrating as the requirement is identified and assessed as viable after privacy/data security implications are evaluated.

Replacing the NIR supports the strategic priorities of:

- Improve health outcomes for population groups, with a focus on Māori, older people and children
- Improve access to, and the efficiency of, health services for New Zealanders with a focus on primary care
- Improve understanding of system performance.

Figure 1: Strategic alignment



Alignment with the National Health Information Platform nHIP

The National Health Information Platform (nHIP) programme will iteratively deliver key enablers across the sector to align technical architecture and the Digital Health Strategic Framework. For example, access management, security monitoring and access to data through standard interfaces.

The National Immunisation Solution (NIS) will be aligned to the nHIP architecture and leverage existing capability so that, for example, immunisation data can be integrated into a person's health record and made accessible to both health sector and commercial consumer digital services.

Expected outcome

If the investment objectives are successfully achieved, then:

- Vaccinators can work where and when they are needed, including rural and remote settings with innovative service delivery models and regardless of their profession. They can check the immunisation status of patients and administer or schedule vaccinations, and know if vaccines are available. Vaccinators can be notified when a scheduled event is missed. The vaccinator can feel confident they are seeing a patients entire immunisation history

- Each vaccination will be easy to record in the NIS, taking less time, and accuracy will be guaranteed through technology that assists the vaccinator with efficient ability to track and manage the distribution of vaccines
- Individuals in the New Zealand public will be able to view their immunisation status, they can receive invitations and reminders to get immunised, and will have the ability to record adverse reactions
- Local and national immunisation service planners will have access to complete and recent data. Analytical tools will help them identify which groups are not getting immunised, which will allow for more targeted strategies and interventions. In the case of disease outbreaks, unvaccinated people will be able to be quickly and easily identified for targeted campaigns
- As new data requirements and new vaccine programmes are made available and the immunisation schedule changes, the solution can be easily modified without serious impacts to the current functions and datasets.

Expected Benefits[12]

By replacing, upgrading and future-proofing the NIR capability, the following benefits[13] are expected:

1. Improved immunity of NZ individuals and communities
2. Reduced immunisation inequities across different groups in the NZ population
3. Improved responsiveness of the national immunisation programme.

Economic Case

A wide range of options[14] were identified and short-listed as part of a facilitated workshop process. The following short-listed options were selected for more detailed economic analysis in this business case:

- Option one: Status quo
- Option two: Replace the solution to stabilise only (ie, like for like replacement).
- Option three **(preferred way forward):** Replace, improve and future-proof the NIR by developing a replacement National Immunisation Solution (NIS). Prioritise a COVID-19 MVP[15] and then iterate the delivery of the full NIS functionality, building from the foundation established by the COVID-19 MVP.

[12] See Appendices 1 and 3 for details on the benefits profiles, including key performance indicators and measures.

[13] Key Performance Indicators and measures have been identified in Appendices 1 and 3

[14] See Appendix 5 for long list of options considered

[15] A minimum viable product (MVP) is the most pared down version of a product that can still be released.

s 9(2)(b)(ii)

Commercial Case

Procurement

The procurement team will consider four approaches for acquiring the technology:

1. Option 1 - Selection of a successor solution through an open competitive process
2. Option 2[16] - Upgrade the solution to a successor solution with NIR Incumbents, Orion Health **(Exemption Required)**. (Option no longer available)
3. Option 3 - Replace the Solution by building on the Pre-Existing NSS. **(Exemption required)**.
4. Option 4 - Replace the Solution by building on a new instance of Salesforce utilising and leveraging NSS architectural components. **(Exemption Required).**

[16] Orion Health has since confirmed they cannot meet the requirements, and are therefore no longer an option

It is assumed that Option 1 would prevent the Ministry from delivering to the required time-frame for a number of reasons, notably:

- Typical timings for a procurement of this scale would take 4-6 months
- Should a new target architecture present itself the Ministry would need to work with the provider to design, build, test, certify and accredit the solution. Should a new solution set be selected the Ministry would also need to establish confidence and knowledge in the solution.

Option 2 is no longer available as Orion health have confirmed they cannot meet the requirements.

Exemptions from Procurement Rules

1. Given the time-imperative requirement, it is most probable that an exemption from the Procurement Rules will be required. It is anticipated that this will be under the emergency procurement as stated in the Procurement Rules.
2. In line with the Procurement Rules, the Ministry is required to compete all contracts for goods and services over $100k in value.
3. Several exemptions exist that allow the Ministry to directly source an agreement, in this case:

   RULE 14.9.(a) ***Emergency:*** *A genuine emergency as defined by MBIE's Quick Guide to Emergency Procurement. Urgent situations that are created by an agency, such as lack of advance planning, do not constitute an emergency.*

Approaches 3 and 4 also require an options analysis. Due to time constraints this analysis has not been completed but will be an early part of the project post business case approval.

A full procurement plan will be developed and appended to this business case once it is approved.

Expected approach for delivering the preferred option (assuming option 3 or 4 is the chosen procurement approach).
The preferred option will be delivered using an Agile-based methodology:

- By 31 January 2021, build, using Agile[17,18] development a COVID-19 MVP. The COVID-19 MVP does not need to interface with multiple Patient Management Systems and will only integrate with MUST HAVE[19] other systems such as the National Health Index (NHI) and any other necessary systems. Then iterate the delivery of the full NIS functionality, building from foundation established by the COVID-19 MVP. Existing technology will be reused and adapted where possible. Clinical data will be stored in a clinical repository

[17] The Ministry Data and Digital team have displayed a culture and history of successful Agile projects delivered in a short time. This has been recently demonstrated by the deployment of the NCTS for Contact Tracing and Border Management.

[18] Agile Software Development is a lightweight software engineering framework that promotes iterative development throughout the life-cycle of the project, close collaboration between the development team and business side, constant communication, and tightly-knit teams. Also known as Agile development.

[19] It is possible that functionality for minimum viable product will include:
- Tracking vaccine distribution to know what has gone where and been used up (as compared to detail inventory and logistics).
- Allocation across the population – ability to segment and prioritise, then target groups
- Integration with the National COVID-19 Tracking System

- By March 2022 iteratively build on the COVID-19 MVP to complete development of the NIR replacement, ie, the NIS, including the full COVID-19 capability required, reusing components where possible.

Note: This is a one-stage project using Agile. The initial sprints will deliver the MUST HAVE functions for a COVID-19 MVP and establish the overall architecture. The remaining sprints will complete the project.

Agile[20]

The COVID-19 vaccine and immunisation strategy has not yet been fully developed and is changing as more information about the disease and possible vaccines comes to light. Therefore, the requirements are expected to change and grow over time. Therefore, the Agile approach to development is considered the most appropriate project management methodology.

Project Team

The Ministry intends to use a cross-functional project team that is a mix of both of in-house and vendor resources. The Ministry will establish a panel of vendors that can provide expertise, capability and capacity as and when required.

Delivery (assuming option 3 or 4 is the chosen approach)
The Ministry team that would design and build the COVID-19 MVP and the full National Immunisation Solution are confident they have the ability to deliver (especially when augmented by vendor skillsets). This confidence comes from the Data and Digitals teams recent success building in short time frames both the National Contact Tracing Solution (NCTS) used across all Public Health Units and District Health Boards and the NCTS Border Solution that manages the COVID-19 border health process from port of arrival, facility check-in, daily health checks, day 3 and 12 test requirements to release from a Managed Isolation or Quarantine facility.

For the initial COVID-19 MVP functionality the recommendation from the in-house team is to follow the same approach taken for the NCTS by leveraging the Population Health Platform established by the National Screening Solution (NSS).

The original procurement of the NSS[21] noted that:

> *"subject to further business case approval and subsequent funding, this solution, and subsequent contract, may extend to other population register-dependent programmes."*

In addition, the development of the NCTS and the NCTS Border solutions during the COVID-19 response has shown that the Population Health Platform established via the NSS can be readily extended and configured to support complex population health solutions.

The conclusion is that using Salesforce and leveraging the Population Health Platform is viable for the COVID-19 MVP and this will be confirmed (or otherwise) as viable for the more permanent solution early on in the project post business case approval.

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[20] https://www.apm.org.uk/resources/find-a-resource/agile-project-management/

[21] Ministry of Health, 2017, *GETS | Ministry of Health - National Screening Solution – ROI*, https://www.gets.govt.nz/MOH/ExternalTenderDetails.htm?id=18630444, (accessed 9 March, 2020)

The required services[22] from the vendor/s are:

1. Assist with design and build of NIS, with COVID-19 MVP as priority
2. Assist with design, build, integration and migration of data
3. Ongoing support and change.

Delivery risk

Developing COVID-19 immunisation capability as a priority may impact the timelines of developing the full replacement solution. Timing for the full National Immunisation Solution will be closely monitored and the level of assistance required may increase to meet the March 2022 date.

Financial Case

The financial analysis model has been constructed based on existing Ministry delivery experience, and engagement with specific vendors.

s 9(2)(b)(ii)

[redacted]

Management Case

The Risk Profile Analysis submitted to Treasury resulted in the proposal being assigned a **HIGH** risk.

Note: A high risk project usually requires a gateway review process to be undertaken. Treasury have agreed this process is not practical in the context of the time constraint faced by the Ministry to deliver a COVID-19 MVP by 31 January 2021. It has been agreed with Treasury that the Ministry will present this proposal with the intention of starting work on the COVID-19 MVP as soon as possible, and in parallel complete the detailed planning for the full NIS project. This planning will, with Treasury's assistance, draw on the gateway reviewer pool of expertise to refine the proposal further.

Once the planning has been complete the Ministry will undertake a full Independent Quality Assurance and report the recommendations back to Treasury.

[22] Two other programmes, BreastScreen Aotearoa Extension (BSA) and National Cervical Screen Programme (NCSP) also had business cases submitted as part of the 2020 Budget cycle, and are also likely to reuse the existing NSS platform. The Ministry intended to complete an appropriately sized market exercise across the successful programmes to drive efficiencies in its procurement process and competition in the subsequent market response. These other business cases were not successful for FY 2020. Therefore the NIR replacement technology will be developed as a standalone project.

The Ministry

- The Senior Responsible Officer (SRO) for this Project is Deborah Woodley, Deputy Director-General, Population Health and Prevention.
- The Business Owner is Grant Pollard, Group Manager, Child and Community Health.

Project management

The relevant project governance group and programme board arrangements are proposed as follows:

- Overall responsibility and accountability for the project will rest with the Ministry's Project Manager and Senior Responsible Officer (SRO) respectively
- Change management within the Ministry and across the sector will be managed by the Ministry project team and the Ministry Immunisation team. The core project team will also include change management expertise
- The technical delivery of the project will be handled by the project team and selected vendor/s with oversight from the Ministry's Data and Digital team.

The Project Management methodology will be Agile.

Figure 2: Project governance and assurance structure

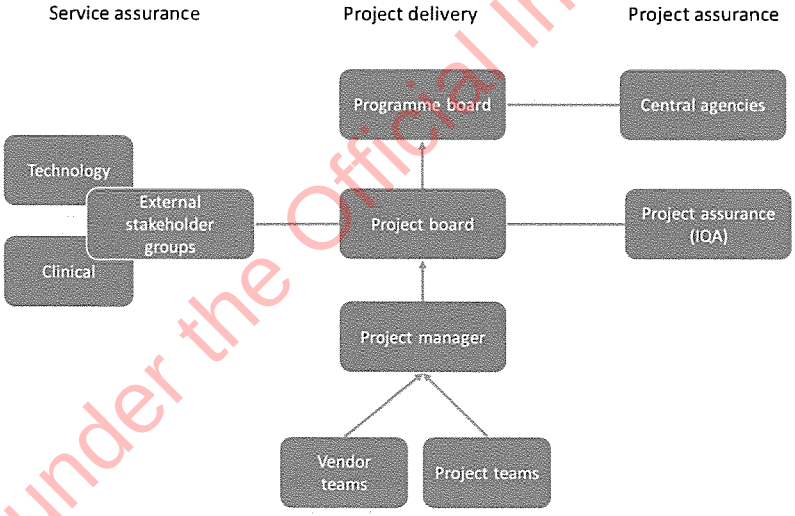
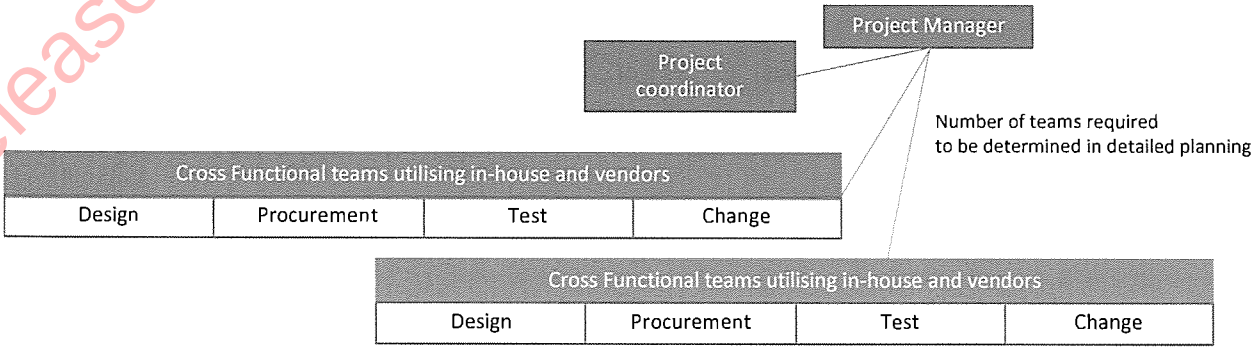


Figure 3: Project delivery structure



Assurance

The Risk Profile Analysis submitted to Treasury resulted in the proposal being assigned a **HIGH** risk.

A high-risk project usually requires a gateway review process to be undertaken. Treasury have agreed this process is not practical in the context of the time constraint faced by the Ministry to deliver a COVID-19 MVP by 31 January 2021. It has been agreed with Treasury that the Ministry will present this proposal with the intention of starting work on the COVID-19 MVP as soon as possible, and in parallel complete the detailed assurance planning for the full NIS project.

Timing delivery of the COVID-19 MVP

The COVID-19 MVP will have a delivery date of 31 January 2021. Kelvin Watson, who is on the governance board is also heading the COVID-19 Taskforce at the Ministry, that will plan and purchase any COVID-19 vaccines. This means the project will have a direct line of sight to any upcoming availability of a vaccine/s and be able to step up the delivery pace if required.

Assurance Plan and the FPIM framework

An assurance plan will be developed post-business case approval. When the Assurance Planning is established it will reference the framework established by the Health Finance, Procurement and Information Management System[23] programme of work (FPIM) and adopt an integrated assurance approach as follows:

Day to day project management processes and controls based on Agile methodology, including quality control of project deliverables.

Internal governance and oversight, including clear and signed off terms of reference for all governance groups:

- Programme Board
- Project Board
- COVID-19 Implementation Advisory Board.

External review:

- Treasury reviews (with GCDO) - at least two
- Independent quality assurance reviews, including:
  - Detailed Independent Quality Assurance review post detailed planning
  - Sprint level independent technical reviews
  - Programme health checks.

Additional assurance activities will include:

- The GCDO have agreed to provide support with development of fit-for-purpose Agile Assurance planning and a Privacy Impact Assessment that will be integrated into the Project Plan
- The project team will engage with the SRO and business owner at the end of each Agile sprint to confirm and refine the value from each iteration
- The project will provide regular updates to Ministers, joint agencies and the COVID-19 Vaccine Taskforce on progress and the value being created by significant iterations. For example, key

[23] http://www.nzhealthpartnerships.co.nz/wp-content/uploads/2016/02/FPIM-Business-Case.pdf

development points in the COVID-19 MVP, the completed COVID-19 MVP, major developments for the full NIS

- A post implementation review will be planned for April 2022 to determine whether the project met investment objectives, any interim or initial benefits and capture lessons learned
- Any changes to costs or risks will be immediately notified to Treasury.

Change management

Effective change management is critical for the successful implementation of the new National Immunisation Solution (NIS), to ensure readiness for go-live and monitoring in the immediate post go-live period. This would ensure that any risks are identified and managed in advance of the changes being implemented, and that any issues that develop are successfully resolved.

The Project Manager would have overall responsibility for managing the proposed changes, including ensuring effective stakeholder communication and engagement is undertaken. A change manager and change advisor have also been costed into the delivery stages of this project.

Criteria will also be established to identify when risks or issues need to be escalated to the governance level.

Benefits management

The SRO will take responsibility for reporting on the benefits post-implementation. Reviews of the benefits will take place periodically to assess the on-going relevance of the benefits, capture any emergent benefits or dis-benefits, assess the rate of realisation and introduce corrective actions where necessary, re-baseline the realisation schedule if required, ensure responsibilities are being carried out as expected, and assess the format and effectiveness of benefits reporting.

Risk management

The Ministry's standard risks and issues management methodologies will be adapted to be used with the Agile methodology during the implementation period. This will assure stakeholders and monitoring agencies that the Ministry implementation team is proactively identifying and mitigating risks.

Next Steps

This Single Stage business case seeks formal approval from the joint Ministers of Finance and Health to approach the market for quotes on services, select a vendor or vendors, and to progress the implementation of the preferred option. This will include:

1. Design and develop with urgency a COVID-19 minimum viable product
2. Replace existing data repository and ensure that future capacity requirements are met
3. Replace the web-based portal for vaccinators and administrators and ensure the new NIS can be accessed anywhere/anytime by appropriate authorised users
4. Ensure New Zealand citizens/residents can view their immunisation status
5. Add missed event management capability
6. Integration to all relevant existing services, systems and datasets
7. Data migration and cleansing from the current NIR and other relevant sources to the replacement solution.

Note: Due to delivery deadlines that will not move and limited timeframes to complete this business case not all the usual expected activities were accomplished. Therefore, the outputs listed below have not been completed.

The intention is to complete them post-business case approval as part of the project initiation planning and amend this business case. Although it is not anticipated, the Ministry understands this may impact the level of risk and costs identified once the work below has been done. If significant changes occur to the level of risk and cost then the Ministry will immediately establish a dialogue with Treasury to resolve the issue.

At this stage a quantitative risk analysis (QRA) has not been conducted and is not planned.

Areas yet to be completed:

	Comment
Procurement Plan	A procurement approach has been discussed and generally agreed with NZ Procurement and GCDO. A plan is currently being prepared by Gareth Charles, Ministry Procurement Specialist. This will be developing criteria for assessing the procurement options.
Stakeholder Engagement Plan	The Ministry has identified the key stakeholders at an organisational level and is in the process of identifying individuals to engage with on this project. Initial engagement has indicated strong support for this project in the sector.
Change Management Plan	Change management is seen as a very important part of the project and will be ongoing due to the Agile approach to delivery. As such a Change Manager will be part of the core team. This role will be established early on post business case and that role will develop a Change Management Plan as a first priority.
Benefits Management Realisation Plan	A benefits realisation plan will be developed as part of the project initiation. Benefits and KPIs have already been identified and assessed as reasonable by two independent reviewers. Initial measures have been identified but baselines and targets have not yet been established. This will likely be an iterative process as measures must be monitored on an immunisation type for each KPI/measure (eg, measles versus diphtheria).

Strategic case

Purpose of business case

This Single Stage Business Case[24] seeks formal approval to invest $65.455 million over 8.5 years, with project cost of $24.854 million over 18 months, to deliver the technology required to support the national immunisation programme.

The project will, using Agile methodology:

- Initially deliver a COVID-19 minimum viable product[25,26] (MVP) by 31 January 2021 to support the rollout of a COVID-19 vaccine
- Iteratively build on the COVID-19 MVP to replace the incumbent National Immunisation Register (NIR) with a new, fit for purpose National Immunisation Solution (NIS) which can meet the current and future needs of New Zealand's wider immunisation service.

Assumption: Developing COVID-19 capability is first priority.
This assumption is made because in terms of COVID-19 response capability time is of the essence and there is a commonly understood and compelling need to go fast.

This proposal is NOT for a two-stage project. The proposal is for a **one-stage project that uses Agile** methodology with a COVID-19 MVP the focus of initial Agile sprints. Once the MVP is established then the remaining sprints will complete the functionality required for all immunisation types.

[24] The Treasury Risk Profile Analysis indicated this project was a high risk and advice was to develop a Single Stage Business Case with a real-time assurance process to be implemented as part of the project implementation.

[25] A minimum viable product (MVP) is the most pared down version of a product that can still be released and be considered useful by users. Three Key Characteristics of a Minimum Viable Product:

- It has enough value that people are willing to use it.
- It demonstrates enough future benefit to retain early adopters.
- It provides a feedback loop to guide future development.

[26] See Appendix 2 for NIS requirements including COVID-19 MVP

Introduction

Immunisation is an essential component of any public health system and generates significant benefits at individual, governmental and economic levels[27]. Access to clean water is the only public health intervention that generally ranks more highly in reducing the burden of infectious diseases.

The NIR has been in place nationwide since 2005. Its original purpose was to collect comprehensive information about childhood immunisation rates, as well as support the MeNZB[28] immunisation programme. As a consequence, we now have a clear record of childhood immunisation for children born since 2005, however we do not have comprehensive information about immunisation for people aged 15 years and over. From a population health perspective this means that it is difficult to understand overall immunisation coverage or to plan targeted interventions.

In addition, there have been multiple issues with the system for example:

- It is not easily configurable, user friendly, intuitive or easy to change. Keeping the solution up to date and aligned to service needs has become increasingly expensive with the triennial immunisation schedule changes now costing in excess of $1.4 million per change
- It is not available in some health care settings and vaccinators are not always able to use the system when and where they are engaging with the public – access is limited to those users who use a practice management system or are connected to the Connected Health Network
- It struggles with capacity issues with system outages occurring during high load periods for example during the influenza season
- Inflexible reporting tools and processes means information is not able to be tailored to the specific needs of planners and additional analysis regularly occurs outside the system.

A further compounding issue is that the Ministry has been advised by the current vendor, Orion, that it will not support the NIR from 31 March 2022 onwards.

These issues and inefficiencies mean that we do not have the information system and tools to support a population health approach to improving immunisation coverage across New Zealand. This is particularly important because currently New Zealand has an increasing gap in immunisation coverage between Māori and other population groups. Improved access to better quality information and more robust tools will support a cross-sector effort to reverse this current trend.

The Measles Outbreak in 2019 highlighted the above issues with the NIR: it was unable to provide timely and complete information on vaccination status during the outbreak which limited in part, the effectiveness of the health sector's response. As a consequence, the Government agreed funding of $1.400 million to develop and progress this business case for a replacement NIR. The importance of replacing the NIR was reinforced by the findings of the independent review into the Measles Outbreaks released in September 2020.

The issues with the NIR were further reinforced during the most recent influenza campaign. A large amount of tidy up was required on a regular basis to understand coverage by ethnicity and because not all vaccinators have access or use the NIR it is not possible to report on actual coverage.

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[27] European Centre for Disease Prevention and Control. *Designing and implementing an immunisation information system*. Stockholm: ECDC; 2018.

[28] https://www.health.govt.nz/our-work/preventative-health-wellness/immunisation/immunisation-programme-decisions/meningococcal-b-immunisation-programme-and-menzbtm-vaccine

The COVID-19 pandemic has now created an even greater urgency to replace the NIR: it will not be able to support, and would therefore hinder, a COVID-19 immunisation programme. As soon as a COVID-19 vaccine is available the health system must have the capability to support delivery of the vaccine to New Zealanders in a short time frame (ie, weeks to months). This includes an immunisation solution that can record all COVID-19 vaccinations given; support a programme delivery approach (for example, recall of people if more than one dose is required) and be able to support thousands of vaccinators across the country will accessing and recording immunisation data from all parts of New Zealand potentially simultaneously.

In recognition of the need to replace the NIR, Cabinet approved funding on 20 April 2020 for a design and build process to replace the NIR in support of the national delivery of a COVID-19 vaccine when it becomes available. Of the $55 million contingency agreed for a range of COVID-19 contact tracing and response initiatives (CAB-20_Min-0175) $15 million was earmarked for the NIR replacement.

Further additional funding of $23 million from the COVID-19 Response and Recovery Fund was agreed on 6 July 2020 for a full replacement of the NIR on 6 July 2020 (CAB-20-MIN-0328.25 refers). This contingency funding was announced by the Associate Minister of Health on 31 July 2020 and was approved subject to joint approval of a single stage business case by the Minister of Finance and Minister of Health.

s 9(2)(b)(ii)

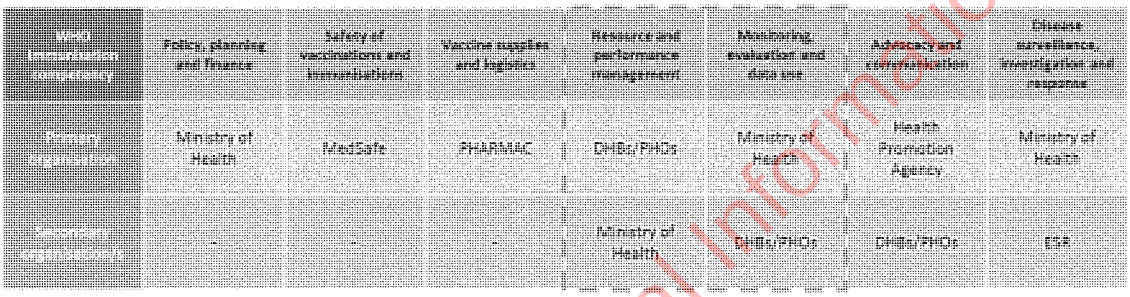
Overview – New Zealand's immunisation system / work programme

New Zealand's immunisation programme is made up of several organisations, each specialising in different ways to contribute to the full immunisation programme. The focus of this business case is limited to replacement of the National Immunisation Register (NIR), and any changes required to upgrade, improve and future-proof this function. This includes the need for interim COVID-19 capability while the full replacement is in development.

The World Health Organisation (WHO) have released a draft competencies framework[29], which outlines seven competencies required for a successful national immunisation system / work programme.

These are shown in the diagram below, with the organisations responsible for their delivery in the New Zealand context. The current NIR supports the two competencies: Resource & Performance Management, and Monitoring Evaluation & Data Use.

Figure 4: WHO Immunisation competencies[30] in the New Zealand context



The responsibility for these two competencies is held at three organisation levels, which ensures immunisations are delivered across the New Zealand population:

- The Ministry of Health (the Ministry) – manages funding and payments to providers and co-ordinates immunisation information at a national level
- District Health Boards (DHBs) – co-ordinate immunisation information and contracts with primary health delivery, school-based vaccination services, pharmacy vaccinations and outreach immunisation services in their region
- Primary Health – Primary Health Organisations (PHOs), Māori health providers, pharmacies and equivalent– deliver primary health services (including immunisations) to their populations.

Amongst these three groups there are many thousands of authorised users that need to access the NIR. They are supported by other organisations with responsibilities across the wider immunisation service, such as PHARMAC, for selection, procurement and distribution of immunisations; ESR for testing and laboratory services; MedSafe, for procedure standards and adverse reaction tracking; IMAC for training and clinical support, and the Health Promotion Agency for national communications strategy and co-ordination. While essential to the wider immunisations service

[29] World Health Organisation, *Standard Competencies Framework for the Immunization Workforce*, December 20, 2018 https://www.who.int/immunization/programmes_systems/workforce/standard_competencies_framework , accessed 17 January, 2020

[30] ibid

delivery, these agencies do not engage with the NIR operationally – although they may use it as a source of data to support their function.

Ministry of Health

For an outline of the Ministry of Health see https://www.health.govt.nz/about-ministry.
Within its payments and information service, the Ministry is responsible for the NIR. The NIR records some immunisations an individual receives (eg, publicly funded vaccinations as per the National Immunisation Schedule), but not all, (eg, some adult and non-funded vaccines such as influenza). This incomplete information is used for individual and population level healthcare and planning and was identified as a key barrier during the 2019 Measles Outbreaks, where visibility of immunisation status would have been of significant benefit to those managing the response.

DHBs

For an outline of District Health Boards (DHBs) see https://www.health.govt.nz/new-zealand-health-system/key-health-sector-organisations-and-people/district-health-boards
DHBs plan, manage, provide and purchase immunisation services from community-based providers for the population of their district. This includes school-based and outreach immunisation services. DHBs use the information in the NIR to ensure coverage levels are maintained within their regions. There are many reasons why immunisation coverage levels vary between DHBs, including[31]:

- The number of children in the DHB, variations in ethnicity, deprivation level, rurality and number of providers
- Different strategies used within DHBs to improve coverage.

All DHBs are working towards achieving the immunisation coverage target of 95 percent of children fully immunised by two years of age, with additional accountability targets at eight months and five years and for the HPV and Influenza Immunisation Programmes. This workload has been complicated by additional immunisations being added to the overall schedule which now includes adults[32] as well as children[33]. The current NIR was not designed to manage these additional immunisation schedules.

PHOs, Māori health providers, pharmacies and equivalent

For an outline of Primary Health Organisations (PHOs) see https://www.health.govt.nz/our-work/primary-health-care/about-primary-health-organisations#:~:text=PHOs%20are%20key%20partners%20to,hospital)%20using%20quality%20improvement%20measures.

For an outline of Māori health providers[34] see https://www.health.govt.nz/our-work/populations/maori-health/maori-health-providers.

[31] https://www.health.govt.nz/our-work/preventative-health-wellness/immunisation/immunisation-coverage/questions-and-answers-immunisation-coverage

[32] https://www.health.govt.nz/our-work/preventative-health-wellness/immunisation/national-immunisation-register/questions-and-answers-recording-adult-vaccines-national-immunisation-register

[33] https://www.health.govt.nz/our-work/preventative-health-wellness/immunisation/new-zealand-immunisation-schedule

[34] To find Māori health providers go to https://www.health.govt.nz/your-health/services-and-support/health-care-services/maori-health-provider-directory

There are 30 primary health care organisations[35] (PHOs) funded via DHBs to deliver professional health care services in the community, usually via general practitioners (GPs), practice nurses, nurse practitioners, pharmacists or other health professionals[36] working within a general practice. This includes immunisation and COVID-19 related services[37].

There are a number of Māori health providers that deliver kaupapa Māori health and disability services to predominantly, although not exclusively, Māori clients. This includes immunisation and COVID-19 related services.

PHO members and Māori health providers update the NIR when immunisations are delivered (provided the immunisation event is within the scope of the current NIR), as well as using that information to provide advice to their enrolled populations.

Pharmacies can deliver publicly funded Influenza and MMR vaccinations and can administer many more vaccinations privately. Pharmacies currently access the NIR through the ImmuniseNow portal which can only be used to record influenza and MMR vaccinations.

Occupational health providers deliver vaccinations through employer-funded health programmes. These providers do not currently have any access to the NIR and therefore, none of these vaccination events are recorded.

Inequity[38] in immunisations in New Zealand

New Zealand experiences persistent disparities in health access, quality of services and outcomes. Māori and Pacific and those in low socioeconomic groups remain the most disadvantaged[39]. The Government has mandated the Ministry of Health to take a bold approach that delivers tangible changes to system behaviour with measurable results in a three to five-year horizon.

> *"In Aotearoa New Zealand, people have differences in health that are not only avoidable but unfair and unjust. Equity recognises different people with different levels of advantage require different approaches and resources to get equitable health outcomes".*
>
> Director-General of Health, Ashley Bloomfield, March 2019

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[35] https://www.health.govt.nz/our-work/primary-health-care/about-primary-health-organisations#:~:text=PHOs%20are%20key%20partners%20to,hospital)%20using%20quality%20improvement%20measures.

[36] This may include pharmacy workers and occupational health experts. While they have no formal accountability for immunisation coverage, do contribute to the immunisation system.

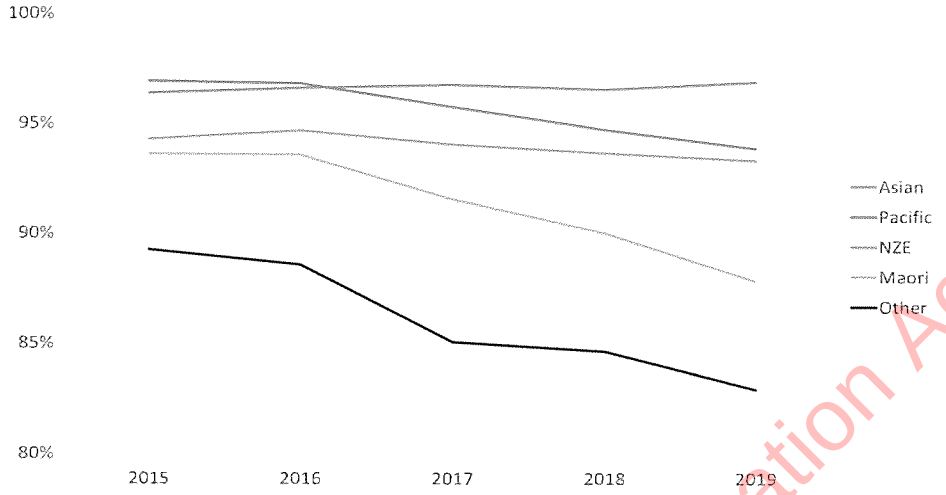
[37] See https://tas.health.nz/dhb-programmes-and-contracts/primary-care-integration-programme/primary-health-organisation-service-agreement-amendment-protocol/#Agreements for a list of PHO services

[38] See link for details on why equity matters: https://www.health.govt.nz/news-media/news-items/understanding-health-equity-why-it-matters

[39] https://www.health.govt.nz/publication/achieving-equity-health-outcomes-highlights-selected-papers

Ministry of Health reporting has shown the gap between Māori and Pacifica, and New Zealand European immunisation for 12-month-old children increasing from 0.7% in December 2015 (NZE 94.3%, Māori 93.6%) to 5.5% in December 2019 (NZE 93.3%, Māori 87.8%)[40].

Figure 5: Percentage of population which is fully immunised at 12 months old, by ethnicity



Supporting data for this Figure 3 is embedded in Appendix 8.

High quality immunisation information, supported by fit-for-purpose technology, is essential in creating programmes to reverse this trend. Some estimates describe a 20 percent uplift in immunisation work programme effectiveness when these systems are used. This cannot be provided with the current NIR solution because it is often not available where and when it is needed, the information is often not complete, and the design limitations cause significant delays for vaccinators that do have access.

Technology requirements to support equitable immunisation

"...the National Immunisation Register does not currently allow DHBs to produce a report identifying influenza by ethnicity" [41]

David Meates, MNZM, (former) Chief Executive Canterbury DHB

For technology to fully support immunisation programmes on a nationwide and for all populations it must effectively and efficiently:

1. Be available to vaccinators and other authorised users whenever and wherever they are working
2. Assist public health planners, analysts and clinicians to identify individuals, communities and demographics where coverage rates are low
3. Allow the public to check their individual immunisation history
4. Allow health providers and other authorised users to check and record immunisation history of patients/members of the public

[40] Ministry of Health, January 2020, *National and DHB immunisation data*, https://www.health.govt.nz/our-work/preventative-health-wellness/immunisation/immunisation-coverage/national-and-dhb-immunisation-data, accessed 10 February, 2020

[41] See Appendix 1 for details of quote from letter dated 13 August 2020.

5. Be a source dataset for reporting on international obligations or agreements.

Future-proofed[42]: Integrate to other systems (internal and external to the Ministry)

It is important that the NIR replacement is future proofed to ensure that it has the ability to integrate information from other systems (both internal and external to the Ministry). The Immunisation team has identified the following systems that should be integrated with the NIS[43]:

- **DHB Patient Administration System:** It would be useful if patients at a hospital can be checked to see if they have been immunised, (eg, for tetanus if someone comes in requiring stitches). It would also help if DHB based vaccinators could update their systems and any immunisation information would automatically be in the replacement NIS
- **Outreach Immunisation services:** It would support whānau-centred service delivery if outreach immunisation services and others providing care in clients' homes could access the NIS while the healthcare professional is onsite. This would support opportunistic vaccination of other family members and save administration time once back in the office. Strengthening these services and supporting other innovative models that's reach vulnerable families is vital to improving immunisation coverage
- **Primary care (GP) Practice Management Systems:** It would be useful if patients in primary care can be checked to see if they have been immunised. It would also help if primary care-based vaccinators could update their systems and any immunisation information would automatically be in the NIS
- **Pharmacy systems:** many pharmacists will record their immunisation activity on their pharmacy systems. It would be helpful if the NIS was automatically updated, because people don't always go the same pharmacy or tell their GP they have been immunised
- **Migration** – it would be valuable if children who have emigrated from New Zealand are notified to the NIS, so that the system is aware of children who will not be requiring a scheduled vaccination event, due to them no longer residing in the country

  If in the future vaccination status is a requirement of Immigration for people entering the country, it may be beneficial for Immigration to be able to record this information on the NIS
- **Mangere Refugee centre** – it is important that refugees are vaccinated as per New Zealand's immunisation schedules when they arrive in New Zealand to ensure they are protected against diseases they may not have been immunised against. Through the refugee centre notifying the NIS of new refugees, refugees can be enrolled on the NIS, which is a step towards engaging with the immunisation services. Immigration New Zealand are implementing Immunisation for all refugees as part of their pre- entry medical with the intention of enrolling them onto the NIS and commencing their immunisation prior to arriving in NZ. Currently this is a very manual process which would be enhanced if they could enter this through a web access (not available in

[42] Due to issues with the siloed and incomplete data in the current NIR it is not and cannot be a single source of truth for all immunisation statistics. A question that will have to be resolved by the project with the broader sector is: will the replacement NIS be the national source of truth **for all** immunisations? This single source of truth function will be required for optimal effectiveness to be achieved and will require integration with multiple other systems. The likely answer to this question is "Yes, but over time". This would mean delays as agreement with owners of other datasets are reached and additional costs for the extra integration activities. The Agile approach that will be used by the team will allow for this question to be addressed without delaying the necessary functional development already identified.

[43] There may be other systems where integration would benefit. Detailed analysis is required by the project before the actual systems that will be integrated are identified and confirmed. This includes a need for a Privacy Impact Assessment. GCDO will assist with a PIA.

current NIR)

- **PHARMAC** - if in the future PHARMAC or their contracted supplier, develops a way to track vaccines down to a provider level, this information would be valuable to be fed into the NIS to ensure the Ministry has visibility over where vaccine stock is located. This would be beneficial in outbreak situations and when there are vaccine shortages such as the influenza vaccine provider shortages experienced this year and the MMR provide shortages experienced in the Measles Outbreak in late 2019
- **Ministry of Education / Schools** – schools are bound by legislation to hold the vaccination history of their pupils, however obtaining this information is currently very difficult and time consuming (both for parents and schools). If authorised users in the schools had access to the information held on the NIS this would save parents, their child's GP and schools time in sourcing vaccination records. It would also ensure schools have up to date vaccination records of their pupils
- **The Ministry's National Screening Unit** – it would be valuable if the vaccination records of patients with cervical cancer could be easily linked to compare whether patients were vaccinated against the strains found in the HPV vaccine for clinical and research purposes
- **Other systems** – The replacement NIS should have the ability to integrate with any other systems such as those used by Occupational Health providers, that might emerge after implementation has occurred. Other examples include: opportunities around travel vaccine records, border agencies and the Ministry of Business Innovation and Employment as Managed Isolated Quarantine, and inventory systems held at the DHB level.

Support from Orion Health will be very limited after 31 March, 2022

The current solution is provided by Orion Health, who have formally advised the Ministry they will withdraw support after 31 March, 2022. Current and previous Ministry experience with this vendor indicates that once support ends, the following issues will arise:

- Support will be provided on a best-endeavours basis only - when the technology next fails, there is no service standard for when it will be brought back online
- Implementing functional enhancements or having defects corrected is very difficult and costly and sometimes cannot be achieved – the current solution does not meet the current need, and there would be no way to increase its capability or stabilise existing functionality[44]
- Changes required to support new or adjusted schedules from PHARMAC will likely be very difficult and costly to achieve or may not be possible at all[45]
- No liability for performance or integrity of the solution.

COVID-19 Pandemic

For details on the COVID-19 pandemic see https://www.health.govt.nz/our-work/diseases-and-conditions/COVID-19-novel-coronavirus[46]. New Zealand must have the capability to deliver an immunisation programme as soon as a vaccine is available. Auckland University vaccinologist and Associate Professor Helen Petousis-Harris said the National Immunisation Register, which was set up

[44] This is already a current issue

[45] This is already a current issue

[46] https://covid19.govt.nz/

in 2005, was "*old and decrepit*" [47] and "*like trying to get your Windows 95 to perform functions you require in 2020*".

> *"It can't manage flu vaccines properly and it can't manage the maternal pregnancy ones properly, so there's no chance it will manage something like this. So that's kind of a big deal."*[48]
>
> Associate Professor, Helen Petousis-Harris, Auckland University

Strategic context – case for change

After 31 March, 2022 the current NIR will have very limited support and will not be capable of effectively supporting the delivery of the national immunisation programme, especially in terms of new programmes or functional requirements (eg, a COVID-19 immunisation programme). The other main drivers which contribute to the need for investing to **replace**, **upgrade** and **future-proof** the technology to support the national immunisation programme are:

1. **Outcomes are not equitable:** Incomplete and poorly integrated immunisation information has resulted in inequitable and reduced population immunisation coverage, with no clear visibility of population immunity
2. **Technology is at end of life and not fit for purpose:** Constraints of design, capacity and old technology negatively impacts the delivery of immunisation programmes and opportunistic vaccination services.

COVID-19: as per problem, 2 in particular, the current NIR could not effectively support a COVID-19 immunisation programme, especially where adults are concerned, which is the main demographic at risk from COVID-19.

For the Investment Logic Map, and examples and evidence of these issues see Appendix 1.

[47] https://www.stuff.co.nz/national/health/coronavirus/122066457/national-vaccination-tracking-system-too-decrepit-for-COVID19-vaccine-rollout
[48] ibid

Investment Objectives

The Investment logic map identified the following investment objectives[49], that due to COVID-19 must be pursued with a sense of urgency[50]:

1. Ensure all vaccinators have anytime/anywhere access to immunisation health records with update capability[51]
   i. This includes ***priority*** to develop COVID-19 immunisation functionality, ***with urgency***, that can cope with emerging requirements to be available by 31 January 2021
2. Ensure an individual's whole-of-life immunisation data is stored centrally, and can be integrated with all other government datasets relevant to that individual[52]
   i. This data needs to be available to providers of healthcare and consumers with a focus on improving customer experience
3. Improve capacity to monitor, analyse and report on population immunisation status and identify where there is inequity.

Table 5: Investment objective one – existing arrangement and business needs

Investment Objective One	**Ensure all vaccinators have anytime/anywhere access to immunisation health records and update capability. By March 2022.** • **Prioritise an interim COVID-19 register to be ready by 31 January 2021.**
Existing Arrangements	The current NIR has significantly delayed authorised users from immunisation activity due to limitations with its design capacity, capability, and availability. • The NIR is not universally accessible to health care providers who carry out immunisations. Providers working in the field, including those working with at risk children or as part of occupational health do not have direct access to the NIR. This contributes to delays in immunisation coverage of the at-risk populations. • Access to the current solution is limited to those users who use a Practice Management System (PMS) or are connected to the Connected Health Network. Each of these options has on-going costs, which prevents many vaccinators adding records into the system. • The NIR is not easily configurable, user friendly, intuitive or easy to change. The vendor's knowledge of the system has deteriorated with changes in personnel and a strategic realignment of the vendor's business. Keeping the solution up to date and aligned to services needs has become increasingly

[49] These investment objectives will need to first focus on a minimum viable product in relation to having capability to support a COVID-19 immunisation programme by the time a vaccine is available.

[50] The international and domestic circumstances of COVID-19 are well understood by the New Zealand public. It is of the essence that the Ministry develop this system quickly.

[51] Includes scheduling rules, missed event management and integration to other systems

[52] Some of these datasets and the reasoning for them are described in the section "Future-proofed: Integrate to other systems (internal and external to MoH)". Other datasets will also be relevant over time. The replacement solution must be capable of integrating as the requirement is identified and assessed as viable after privacy/data security implications are evaluated.

expensive and time consuming, with triennial immunisation schedule changes now costing in excess of $1.4m per change.

Current issues include:

- Not available in some health care settings, for example, mobile workplace vaccinators or pharmacies
- Delays[53] exist with the transfer of immunisation information to the NIR, especially when captured manually/on paper
- Vendor withdrawing support to the solution from 31 March, 2022
- System outages occur more frequently during high load periods. For example, the influenza season, or when large operational reports are being run by users.

Business Needs

URGENT: By 31 January 2021 functionality and capability must exist to support a COVID-19 immunisation programme. See Appendix 2 for a set of requirements.

Make the NIS robust and able to cope with high loads (eg, during the influenza season or delivery of a COVID-19 vaccine). Deliver a reliable, secure system which can:

- Allow access to all authorised users wherever and whenever they are doing immunisation activity
- Adapt efficiently to new functionality requirements, business needs and immunisation programmes throughout the life of the platform, and while the service remains in operation
- New information is processed to the repository in near real time, regardless of source or interface being used
- Widely available, including to those not working in a practice location
- Eradication or minimisation of paper-based immunisation recording
- Able to schedule an individual's immunisation events
- Able to manage missed events from the immunisation schedule
- Can integrate with other relevant systems as and when they are identified
- Ability to schedule campaigns to sections of the population, then track and monitor progress.

[53] These delays can be significant and contribute to the incomplete data available to planners

Table 1: Investment objective two - existing arrangements and business needs

	Ensure an individual's whole-of-life immunisation data (including missed event management) can be integrated with other government datasets relevant to that individual. By March 2022
Investment Objective Two	**i. This data needs to be available to providers of healthcare and consumers with a focus on improving customer experience.**
Existing Arrangements	The current solution is not able to capture or display all immunisation information/data for an individual. This makes it difficult for both providers and consumers to understand immunisation status. Originally designed for childhood immunisations ONLY, the register has been added to over time - it records and schedules information/data for the childhood immunisation Schedule. However, data from most of the standard immunisation programmes is not fully recorded or utilised. Consequently, a whole of life approach to immunisation (as recommended by the WHO) is not supported by the current NIR. The following issues affect suitability of the NIR to be classified as a master source of immunisation: • The original design was focussed on children. Accommodating adult immunisation in the NIR was implemented later, and changing this structure creates significant challenges with maintaining data integrity. • Delays exist with the transfer of immunisation information to the NIR, especially when captured manually/on paper • Issues with incomplete or inaccurate information from other sources (eg, paper based), not reaching the NIR as expected puts data integrity at risk - meaning the NIR cannot be trusted as a definitive source of immunisation information • Inflexibility to adapt to emerging needs of the national immunisation programme • Provides a very poor customer experience for both users and consumers of the data.
Business Needs	Vaccination providers need to be able to use a system to review immunisation status for an individual without delays and enrol individuals or cohorts to appropriate schedules automatically. Individuals must be able to view their own immunisation status, have the ability to receive invitations for immunisation and record adverse reactions. **Datasets** need to be updated and integrated to other datasets. Data must be migrated from the old NIR and ideally from other systems such as Practice Management Systems. If a stand-alone COVID-19 tool is developed that tool must be able to transfer its data to the replacement NIS.

Business needs include:

- Ability to record all vaccination events/details across a patient's life (in line with WHO recommendations)
- Integration with population level reporting tools
- Integration with: National Health Index, National Provider Index, National Enrolment Service, Maternity, B4 School Checks (B4SC), Geo-coding and other systems as they are identified as required
- To gain additional efficiencies, should also integrate with: Pharmaceutical Schedule, NZ Universal List of Medicines (NZULM), NCHIP
- Providers and consumers must be able to quickly and easily access an individual's (assuming they are authorised to do so) complete immunisation history
- Consumer channel that allows the public to interact with the system.

Table 2: Investment objective - three existing arrangements and business needs

Investment Objective Three	**Improve capacity to monitor, analyse and report on population immunisation status. By March 2022.**
Existing Arrangements	The following reporting issues limit the usefulness of the NIR: • Inflexible reporting means information provided does not support the needs of users, leading to additional data analysis regularly occurring in spreadsheets outside the system • Incomplete or delayed reporting either delays or stops planners/analysts and clinicians from identifying groups or individuals that have not been immunised. For example Occupational Health providers do not have access to the NIR so it is not possible to know how many people or who they have vaccinated for flu each year. The Ministry has to use "vaccines distributed" as a proxy for counting the number of flu vaccines provided • Standardised and inflexible reports mean information is not able to be tailored to the specific needs of the users.
Business Needs	The new solution must provide national and population-based information on immunisation coverage. The NIS needs to be able to report on immunisation statistics promptly to authorised users. Provide reporting in a useful and adaptable way: • Authorised user must be able to access individual immunisation history whenever/wherever they work • Appropriate levels of security around access, so that users can see the right level of information for their role • Reasonable controls and measures must be in place to protect confidentiality and integrity of health information; and protect the availability of the system • Reports provide accessible, real-time information on who is getting and who is not getting immunisation (individuals and groups).

Scope and service requirements

The business scope describes the key requirements necessary for the programme to be considered successful.

Scope

In scope

This proposal is focused on improved capability to support the WHO competencies of "Resource and performance management" and "Monitoring, evaluation and data use"[54].

There is a particular focus on improving the reach of immunisations across New Zealand, with a priority to reduce inequity of immunisation outcomes.

Therefore, the purpose of this proposal is to replace, upgrade, improve and future-proof the technology, processes and data directly related to managing, recording, scheduling and reporting on all immunisations of individuals and groups in New Zealand. This includes any training of authorised users that will be required:

- **Upgrade and improve** means the replacement will allow access on an anywhere/anytime basis for authorised users and provide new functionality that will make it easier for them to do their work. The solution will be reliable and robust enough to meet the demands placed upon it
- **Future-proofing** means the replacement technology and datasets can be expanded as required to meet new requirements and immunisation programmes. This includes the ability to integrate with other relevant information systems as they are identified (including other agencies). Future proof also means the solution will have ongoing change capability while the system is in operation
- **All immunisations** means the preferred outcome is for the replacement system to be the single source of truth for all immunisations that an individual may receive. This needs to be confirmed with the sector and if agreed will be a driver for integration with other systems.

For Investment Object Three: Improve capacity to monitor, analyse and report on population immunisation status. The initial priority will be first on having the ability to monitor who has had a COVID-19 vaccine[55]. This will be an important part of the MVP. This will be followed by iteratively developing the ability to identify specific groups missing other immunisations, and then reporting against international obligations. Over time it is expected that other reporting requirements will emerge and these will be developed using the Agile approach as and when they are approved.

Out of scope

This project is not about improving the overall immunisation programme and business model arrangement between the Ministry, DHBs and PHOs. This project will not implement any restructure around the composition of the workforce.

This proposal is not focused on completing activities to directly improve the following WHO immunisations competencies: Policy, Planning and Finance, Safety of Vaccinations and Immunisations, Vaccine Supplies and Logistics, Advocacy and Communications, Disease Surveillance and Response.

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[54] See Figure 4 above.

[55] This will possibly need to include the ability for an individual to display their COVID-19 immunisation status – yet to be confirmed.

However, the improved capability of the two competencies that are in scope are expected to have a flow-on effect and will eventually have a positive effect on those other competencies.

Service Requirements

The service requirements range from minimum (essential to the success of the programme), intermediate (essential and desirable service requirements) and maximum (essential, desirable and aspirational service requirements). Items that are determined to be out of scope are specified for clarity. The potential business scope and key service requirements are summarised below.

Table 3: Potential business scope and key service requirements

Service Requirements		Minimum	Intermediate	Maximum	Out of Scope
Supports a COVID immunisation programme	Functionality and capability to support a COVID immunisation programme by 31 January 2021 including ability to add new functionality.	✓			
Adaptable	Solution can respond to the changing needs of the immunisation programme.	✓			
Authoritative	Solution can provide a single source of truth on immunisation data and can provide information as required.		✓		
Secure	Solution provides the right access to the right people at the right time.	✓			
Extensible	Solution can connect to all necessary Ministry and sector systems.		✓		
Repository	Solution can be the single source of truth for all immunisations.		✓		
Web interface	Solution provides a simple user accessible front-end for different types of authorised users with different permissions.		✓		
Missed event management	Solution can record attempted and successful contacts, escalate immunisation events between agencies, and report to individual case level.		✓		
Web interface - public	Solution provides a simple user accessible front end for the public to access their immunisation data held in the NIS. This will be required for ability to display COVID status.	✓			
Multi-agency integration	Delivering integration to systems not managed by the Ministry of Health. (This can be done via API's[56])				✓

[56] Application programming interface is a software intermediary that allows two applications to talk to each other. Each time you use an app like Facebook, send an instant message, or check the weather on your phone, you're using an API. https://www.mulesoft.com/resources/api/what-is-an-api

The recommended option is **intermediate**. This option balances meeting the immediate needs described by stakeholders, while still giving the best opportunity to meet required timelines for the end of support date for the current solution.

Key benefits and disbenefits

See Appendix 3 for Benefits Profile, with KPI's and measures[57]

Expected outcome
If the Investment objectives are successfully achieved then:

- Vaccinators can work where and when they are needed, including rural and remote settings with innovative service delivery models and regardless of their profession. They can check the immunisation status of patients and administer or schedule vaccinations, and know if vaccines are available. Vaccinators can be notified when a scheduled event is missed. The vaccinator can feel confident they are seeing a patients entire immunisation history
- Each vaccination will be easy to record in the NIS, taking less time, and accuracy will be guaranteed through technology that assists the vaccinator with efficient ability to track and manage the distribution of vaccines
- Individuals in the New Zealand public will be able to view their immunisation status, they can receive invitations and reminders to get immunised, and will have the ability to record adverse reactions
- Local and national immunisation service planners will have access to complete and recent data. Analytical tools will help them identify which groups are not getting immunised, which will allow for more targeted strategies and interventions. In the case of disease outbreaks, unvaccinated people will be able to be quickly and easily identified for targeted campaigns
- As new data requirements and new vaccine programmes are made available and the immunisation schedule changes, the solution can be easily modified without serious impacts to the current functions and datasets.

The proposed investment's primary benefits[58] are:

Table 9: Primary benefits and KPIs

Benefit		Weighting of total (100%)	Key Performance Indicators (KPI's*)
1	Improved immunity of NZ individuals and community	50%	KPI 1: Reduced incidence of vaccine preventable disease KPI 2: Increase in immunisation coverage
2	Reduced immunisation inequity across different groups in the NZ population	30%	KPI 3: Improved levels of Immunisation for at risk groups

[57] Realising these benefits will need to first focus on a minimum viable product in relation to having capability to support a COVID-19 immunisation programme by the end of first quarter 2021.

[58] The same benefits will apply specifically to the interim COVID-19 solution.

			KPI 4: Improved population analytics and forecasting of vaccine requirements
3	Improved responsiveness of the national immunisation programme	20%	KPI 5: Increased capacity in administering immunisations KPI 6: Improved timeliness of responding to changing and growing need

Note: SMART[59] measures have been identified for the KPIs and details can be seen in Appendix 3: Benefits Profile.

Note: The ILM benefits/KPIs were independently assessed as reasonable by:

- Dr Kara Scally-Irvine[60], an expert in monitoring and evaluation. Kara is a Board member of the Aotearoa New Zealand Evaluation Association and member of the Australasian Evaluation Society
- Eldar Salkovic[61], Director at Innox Solutions. Eldar has been appointed by the Victoria Department of Treasury and Finance to manage the accreditation of Investment Management Standard facilitators[62].

This investment will enable the delivery and public health sections of the wider immunisation programme to ensure they are meeting the necessary targets or identify when those targets are not being met. It will also facilitate more targeted and effective interventions to ensure those targets are met. This must be done at a national level, to ensure appropriate coverage is achieved and understood as the population moves around the country and population demographics change.

In some cases, the KPIs will be proxy measures of success because there will be factors external to the project outputs that can impact the measures. However, the project KPIs will identify where further investigation is required, and support development of interventions to improve the KPIs. Therefore, these measures are considered valid, and that the solution will contribute to the benefits.

Monetary Benefits modelling and analysis[63].
Replacing the NIS **will not** have directly attributable monetary benefits. However, Appendix 4 shows modelling of potential avoidable costs. This section is an indication ONLY of how an effective NIS would **contribute** to broader social goods.

Disbenefits
No dis-benefits were identified.

[59] Specific, Measurable, Attributable, Realistic and Time-bound

[60] https://www.linkedin.com/in/dr-kara-scally-irvine-minstd-9bb57046/

[61] https://www.linkedin.com/in/eldar-salkovic-7371a81a4/

[62] https://www.dtf.vic.gov.au/infrastructure-investment/investment-management-standard

[63] See Appendix 4

Key risks, constraints and dependencies

Key project risks

Key risks to the delivery of the NIS have been determined and are summarised below. This list will form the basis of a full project risk register once the business case is approved. An early task of the cross-functional team will be to identify all risks, including confirmation of the likelihood and impact of their occurrence, and the net impact once mitigations have been developed.

Table 11: Risks

Theme	Risk to Benefits Realisation	Likelihood (L M H)	Impact (L M H)	Mitigation / discussion
COVID-19	If the project team does not get started on a COVID-19 MVP immunisation functionality as soon as possible then the ability to deliver a COVID-19 immunisation programme may not be available by the time a vaccine becomes available.	L	H	Initial funding to start the COVID-19 related work should be made available immediately. A project team is being assembled as soon as possible. The project will establish regular reporting of progress to joint agencies and Ministers with a focus on the COVID-19 MVP. The Ministry will have a Plan B, which is to build COVID-19 immunisation capability separate from the full NIS replacement. It is estimated this would take 6 to 8 weeks. This option is a Plan B[64] because it would cost several million dollars to achieve which would become a sunk and lost investment after the COVID-19 MVP was developed.
COVID-19	If the development of capability to support a	L	M	Begin the COVID-19 minimum viable product as

[64] Plan B is considered an **extreme fall back** of **last resort** rather than part of the preferred way forward because:

- Once we start it doesn't make sense to stop and rebuild as we don't know when a Vaccine will show up.
- We don't want to be running two immunisation solutions for long (and certainly don't want three) so we want to keep going until we can turn the old one off.
- There is too much sector integration to do a separate MVP from a future NIS.
- We don't have the time to run two procurements
- The requirements for the MVP do not differ much from the target state other than breadth.
- We want to pilot this for the Flu season and cannot do that with a separate MVP from the final product.

	COVID-19 immunisation programme takes up too much time, resource and or finance then the broader NIR replacement may not be in place by the March 2022 deadline for withdrawal of support by Orion Health.			soon as possible, and regularly assess the impact on developing the broader NIR replacement. Decisions may be required about negotiating further support from Orion or finding more resource/funding for the NIR replacement.
COVID-19	If the COVID-19 minimum viable product (C-MVP) cannot be integrated into the broader NIS replacement (or alternatively, if the COVID-19 MVP cannot be extended to a broader NIS, then the COVID-19 MVP may need to be discarded once the NIR replacement is developed. The additional costs incurred with this approach may impact the benefits realisation.	L	H	Take best steps possible to ensure the COVID-19 MVP can become part of the broader NIR replacement.
Sector change to new technology and processes	If the sector users are not able to adapt to using the new technology and processes, then manual processes may need to be run in parallel.	L	M	Engage early with the sector to ensure that system design is within the capability of the sector. User design should focus on simplicity of use.
Digital availability	If digital connectivity is too limited then the anytime/anywhere requirement may not be met to sufficient levels.	L	M	Ensure the design can cope with lack of digital connectivity (eg, batch uploads). Ensure the design accounts for multiple ways to achieve digital connectivity.
Digital resilience	If the technology is not sufficiently designed to handle the high level of demands that may be placed on it, for example during a COVID-19	L	M	Ensure the capacity and capability requirements are well understood and accounted for by design. This may require building a solution that is much more

	immunisation programme then users may stop using it (in the way it was meant).			robust than it needs to be most of the time but would otherwise fail at times of high usage.
Perceptions about privacy	If the public think other people can see their immunisation history, they might be resistant.	L	L	Ensure that privacy issues are kept front of mind during the design stages and that change includes informing public of privacy controls around their data.
Possibility of Groups or Individuals feeling stigmatised	If specific groups are targeted based on low immunisation rates, then there may be a possibility of that group feeling stigmatised by the special attention.	L	M	Ensure that privacy issues are kept front of mind during the design stages and that implementation includes informing public of privacy controls around their data.
Theme	**Risks to Project Delivery**			**Mitigation / discussion**
Funding	If the COVID-19 strategy significantly changes after project initiation and creates additional cost overheads, then the current budget estimates will need updating and more funds may be required.	M	M	Kelvin Watson is on the governance board and is leading the COVID-19 Response Taskforce. This gives the project direct and timely access to any changes in the strategy and allow for ongoing funding reviews. This approach aligns with the Agile methodology. If funding requirements are going to change significantly then the Ministry team will engage with Treasury as soon as this is recognised.
Funding / Timing	If multiple COVID-19 vaccines (potentially with multiple doses and different management requirements) become available then the COVID-19 MVP may become more complex and take longer to deliver.	M	H	Kelvin Watson is on the governance board and is leading the COVID-19 Response Taskforce. This gives the project direct and timely access to procurement and delivery of vaccines which will allow for ongoing funding and timing reviews. This approach aligns with the Agile methodology. If funding and timing requirements are going to

				change significantly then the Ministry team will engage with Treasury as soon as this is recognised.
Technology	If the incumbent vendor (Orion) does not engage with the project, then the information quality, cost and timelines may be compromised.	L	H	Engage with the vendor early in the planning cycle to ensure expectations and work is understood and known, and resources can be made available.
	If assumptions around the viability of other existing Ministry solutions and integration platforms are disproved, then implementation timelines will not be achieved.	L	M	Continue to engage with projects and system owners, ensuring designs and plans are well understood.
	If there are significant changes to scope, then the costs and timeline will be affected.	M	L	Identify with urgency the scope and requirements for the interim COVID-19 functionality and capability. Continue working closely with the Immunisation team, and COVID-19 Immunisation team, establish sector working groups and engage with them regularly, and continue to engage with related programmes of work to ensure planning assumptions are aligned.
Ministry resource availability	If specialist internal resources are not available (both technology and subject matter experts or other) then the quality of the new solution will be compromised.	L	L	Continue to engage with internal stakeholders, ensure SRO remains engaged with the process and aware of project requirements.
Sector engagement	If sector stakeholders and users are not available or engaged with the project, the quality of the new solution will be compromised.	L	M	Engage widely with external stakeholder groups and ensure appropriate communications are provided. Continue to work with existing stakeholder groups to ensure all relevant

				people are engaged and informed, and have opportunities to participate.
Solution	If Salesforce technology does not emerge as the preferred basis for a solution, then the delivery timelines may not be met.	L	M	This is a low likelihood. Initial independent assessment indicates that a version of the Population Health Platform is a viable choice. Early assessment of the Salesforce technology capabilities and confirmation or otherwise of its usefulness to the project.

Table 12: Constraints

Constraint	Discussion
COVID-19	A COVID-19 minimum viable product must have priority for development. This may constrain the timelines for the full NIS solution.
Resource availability	The ability to roll out the proposed changes safely, without compromising existing services and quality, is constrained by specialist availability. Subject matter experts in this area may be dealing with other public health priorities and these may have higher priority than project delivery work.
Timing	Project delivery may be constrained by external events which could impact project milestones, such as system cut over. This includes existing public health busy periods, such as the flu season.

Table 13: Dependencies

Dependency	Discussion
Technical knowledge	Skills and knowledge on the existing system are not held or controlled by the Ministry. Engagement with vendors knowledgeable with Salesforce (SF) and Amazon Web Services (AWS), PMS providers, and system specialists in the sector is essential to project success. The Ministry will also be growing the internal capability around SF and AWS.
Other projects	The Ministry is managing three critical projects that all have key dependencies on each other. These are: 1. Vaccine(s) purchasing (which is led by the COVID-19 Vaccine Taskforce comprising MBIE, MFAT and the health sector) 2. The immunisation programme to support vaccine(s) implementation and delivery 3. National Immunisation Solution - the new replacement to the NIR.

A Ministry governance group has been established to oversee all three projects and ensure the work is aligned and continues at pace.

Table 14: Assumptions

Category	Assumptions
Service model	• That while the technology refresh will allow improved information use and dissemination between organisations with responsibility for delivering immunisations, there will not be any change to the over-arching immunisation service model.
Information and data	• That, consistent with the current model, there are no policy or legal impediments to holding immunisation records centrally. • That it is possible, within the timeframe and scope of the project, to collect the majority of digital records from their current sources. • That a reasoned approach will be taken to data migration, which will consider the value of the data to be migrated, and the effort required for migration. For example, it is assumed that if individual patient permission is required before data can be migrated, it will not be completed as part of the project.
Technology	• That existing technology patterns and systems (including, but not limited to, the NSS) already procured within the Ministry will continue to prove reusable and fit for purpose. • That specialist resources are available in-market to complete the work within the time required. • An internal Ministry team will be established to support ongoing use and change in the platform.

Investment alignment

In 2019 the Minister of Health identified five health priorities[65]:

1. Improving child wellbeing
2. Improving mental wellbeing
3. Improving wellbeing through prevention
4. Better population health outcomes supported by a strong and equitable public health and disability system
5. Better population health outcomes supported by primary health care.

Based on these priorities, the Ministry developed its 2019/20 Output Plan. The plan included this initiative, and specifically the development of this business case, as signalled in **Priority 1: Improving child wellbeing**.

[65] https://www.health.govt.nz/about-ministry/what-we-do/work-programme-2019-20

Delivery of this initiative will also support **Priority 3: Improving Wellbeing Through Prevention**, as the updated NIS can contribute to the **Surveillance of Public Health Risks** objective of the Output Plan through **Investment Objective 3: Improve analytics and reporting for continuous improvement**

Figure 6: Strategic context and alignment

Government health priorities	Priority 1: improving child wellbeing		Priority 3: improving wellbeing through prevention
Ministry strategy/ Te Pae Hauora	Improved equity in health outcomes and independence for Māori and all other people • Work with our stakeholders to achieve shared goals		An integrated, collaborative and innovative health and disability system • Ensure data insights and evidence drive our decisions
Investment objectives	Ensure an individual's whole-of-life immunisation data (including missed event management) can be integrated with all other govt. datasets relevant to that individual.	Replace the NIR with reliable scalable, anytime/anywhere technology, scheduling rules, missed event management and processes that can be integrated to other systems.	Improve analytics and reporting for continuous quality improvement.
Output plan	Child Immunisation • Develop business case for National Immunisation Register replacement		Surveillance of Public Health Risks • Develop a surveillance plan for monitoring immunisation, healthy communities and hospital-based infection prevention and control procedures

Subsequent to these health priorities being identified:

- Measles Review and NIR records
- Review of supply and distribution of influenza vaccine and NIR records
- COVID-19 pandemic.

The biggest priority of government is to ensure we can respond to outbreaks and prepared for delivery of a vaccine.

Alignment with national Health Information Platform (nHIP)[66]
The nHIP is founded on the notion of interoperability and replaces the idea of developing a single Electronic Health Record.

"It will have the ability to assemble a virtual electronic record on an "as required" basis from multiple trusted sources, and provide access to data and services," Ministry Group Manager Digital Strategy and Investment Darren Douglass previously told eHealthNews.nz.

'This will enable consumer-related information from multiple sources to be available to those who need it, when and where needed, subject to appropriate security and privacy".

The nHIP programme will iteratively deliver key enablers across the sector to align technical architecture and the Digital Health Strategic Framework. For example, access management, security monitoring and access to data through standard interfaces.

[66] https://www.health.govt.nz/system/files/documents/media/data_summite_nhip_overview_191118.pdf

The NIS will be aligned to the nHIP architecture and leverage existing capability so that, for example, immunisation data can be integrated into a person's health record and made accessible to both health sector. In the future nHIP will support the ability for immunisation data to be integrated into a person's health record and made accessible to both health sector and commercial consumer digital services.

Living Standards Framework (LSF)[67]

This proposal also aligns with The Living Standards Framework (LSF) which has been developed by the NZ Treasury to enhance the quality of its advice about lifting broader living standards. This is through improved analysis and measurement of intergenerational wellbeing and the support the LSF provides to the Treasury's core economic and fiscal advice processes.

There are three core elements of the LSF: the current wellbeing domains; the future wellbeing capitals; and risk and resilience.

- **Current wellbeing** is divided into 12 domains (civic engagement and governance, cultural identity, environment, health, housing, income and consumption, jobs and earnings, knowledge and skills, safety, social connections, subjective wellbeing and time use). The domains of current wellbeing reflect wellbeing at a "point in time" and are based on research about what is important for people and their wellbeing. Achieving the benefits in the proposal will see improved wellbeing through improved health.
- **Future wellbeing capitals** are divided into four: natural, financial and physical, human and social. The capitals are the foundations of wellbeing that, together, generate wellbeing now and in the future. Achieving the benefits in the proposal will see improved social outcomes through improved equity of immunisations.
- **Risk and resilience** can be thought of at individual or national levels, but can also be considered at family, whānau and community levels. Risk and resilience relate directly to the capital stocks. The quality and quantity of the capital stocks influence the ability of New Zealand and its people to withstand shocks. Achieving the benefits in the proposal will see improved wellbeing through improved health and therefore greater resilience of individuals and groups to diseases that can be managed better by immunisation. It will also see an Immunisation Programme better able to respond to changing immunisation needs of New Zealand.

[67] https://www.treasury.govt.nz/information-and-services/nz-economy/higher-living-standards/our-living-standards-framework

Key stakeholders

See Appendix 9[68] for letters of support from key stakeholders external to the Ministry key internal and external stakeholders were identified and analysed for their level of influence (the degree to which they could positively or negatively influence the development and implementation of the programme) and level of impact (the degree to which their business activities would be required to change as a result of the programme).

Stakeholders identified include immunisation service providers and staff, PHOs and GPs representatives, nurses and administrative staff, advisory and working groups, professional groups and sector advocates, internal Ministry immunisation and technology staff.
As shown in the service assurance stream of the project governance structure (Figure 5), the project will engage with external stakeholder groups throughout the project, and has specifically called out two areas for engagement, technology and clinical.

Engagements to develop this case
Two initial workshops were held, one with internal stakeholders to ensure the purpose of the NIR and its core functions were appropriately understood. This was presented as a set of use cases which was re-validated during a second, external, stakeholder workshop.
Additional workshops and calls were held to define two new use cases identified in the external stakeholder workshop, which were approved for inclusion by the governance group. These new cases cover the Missed Event Management functionality and contribute heavily to achieving Investment Objective 1.

The use cases form the Scope and Service Requirements section in the Strategic Case.
Through these workshops, we have engaged with stakeholders from:

- Northland DHB
- IMAC
- PHARMAC
- Counties Manukau DHB
- Canterbury DHB
- Auckland and Waitemata DHBs'.
- Pharmaceutical Society
- New Zealand Occupational Nurses Association
- Royal NZ College of GPs

[68] These letters of support will be amended to the business case.

Economic case

Critical success factors

As part of the options analysis assessment criteria, the standard set of critical success factors for the Better Business Cases methodology has been used. These criteria have been augmented with additional factors specific to this proposal. These are shown in the table below.

Table 15: Critical success factors

Critical success factor	General description	Proposal specific factors
Meets COVID-19 Response needs	Will provide the capability to support a COVID-19 immunisation programme by 31 January 2021.	• No additional criteria.
Strategic fit and business needs	How well the option meets the business needs and service requirements, and integrates with other strategies, programmes and projects.	• Solution is aligned with Ministry's architectural direction and technology strategy (ISSP) • Solution is aligned with, and re-uses where possible, other strategic investments (eg, Population Health Platform and NHIP) • Solution will provide anytime/anywhere access to all authorised users • Solution allows immunisation programmes to be modified and changes to be made to the immunisation schedule • Solution will allow for the public to check their individual immunisation status.
Potential value for money	How well the option optimises value for money (ie, the optimal mix of potential benefits, costs and risks).	• Solution mitigates risk of existing technology going out of support • Solution supports the reversal of declining Māori immunisation statistics.
Supplier capability and capacity	How well the option matches the ability of potential suppliers to deliver the required services and is likely to result in a sustainable arrangement that optimises value for money.	• Appropriately skilled suppliers are available in-market to support the solution • Appropriately skilled suppliers are likely to continue to be in market to enable competition for support and future development over the life of the solution.

Potential affordability[69]	How well the option can be met from likely available funding and matches other funding constraints.	• The solution is affordable for the Ministry and the third parties involved • Operational costs are affordable.
Potential achievability[70]	How well the option is likely to be delivered given the organisation's ability to respond to the changes required and matches the level of available skills required for successful delivery.	• Solution can be delivered within known constraints • Ministry has capacity and capability to support delivery • The sector has capacity and capability to support the delivery.

CSF comparative analysis

Each short list option will be assessed against the CSFs and assigned a score for how well it meets the CSF. This allows for a comparative assessment amongst the options. Does not achieve = 0, Low = 1, Medium=2, High=3. The higher the total score the more likely the option is to support the CSFs.

Long list analysis

For details on the long list see Appendix 5.

- [69] The project will use the Agile methodology. This will allow for iterative management of functionality and costs. This provides a level of confidence that cost over-runs will not occur.
- [70] The project will use the Agile methodology. This will allow for iterative management of functionality and costs, which will increase achievability

Short list analysis

The short-listed options were assessed and combined to provide the project options:

Table 16: Short-listed options

Option	Description
Option 1: Status quo	Status quo – leave existing technology in place
Option 2: Replace and maintain	**Replace data repository, web-based portal for vaccinators and re-integrate other existing services; and** • Leverage the Population Health Platform, and use Salesforce as the technology product set if this appropriate after Ministry/Vendor detailed assessment. • with a mixed team – project resources sourced from either the Ministry or a vendor, as is best meets project needs; • using Crown funding – new funding requested through appropriation.
Option 3: Replace, improve and future-proof	**Develop COVID-19 MVP functionality with target of 31 January 2021, with preference to a design and platform that can be extended to cover all immunisation programmes (ie, a complete immunisation solution).** **Replace data repository and the web-based portal for vaccinators and other authorised users including ability for public to check their immunisation status, add missed event management capability, and re-integrate to existing services, improve data analytics and forecasting of vaccine needs: and** • reuse the Population Health Platform established via the NSS and extend and configure to support COVID-19 MVP and full NIS. • with a mixed team – project resources sourced from either the Ministry or a vendor, as is best meets project needs for that specific resource; • using Crown funding – new funding requested through appropriation.

Economic assessment of short-listed options

Option 1: Status Quo

The following is an assessment of how well Option 1 meets the Critical Success Factors
Does not achieve = 0, Low = 1, Medium=2, High=3

CSF	Meets COVID-19 Response needs	Strategic fit and business needs	Potential value for money	Supplier capability and capacity	Potential affordability	Potential achievability	Total
Score	0	0	2	1	2	2	7

Table 6: Economic assessment of option 1

Option 1 – Status quo	Status quo - leave the incumbent system in place, which would go out of support and become unchangeable in March 2022.
Advantages	None
Disadvantages	Under this option: • Capability and functionality to improve immunisation equity or improve services are not available • Whole-of-life immunisation data set cannot be achieved • Post March 2022 there is no internal Ministry capability, or other support options, to fix issues or make changes to the immunisation schedule in the NIR • Risk of negative service impact through system failure is not mitigated, and this risk will become more severe over time - with a significant increase in 2022 when current solution becomes unsupported.
Costs	• Ongoing maintenance cost (will need to be negotiated with a new vendor, likely to increase over time with increasing frequency of system failures). This will be complex as Orion Health owns the code and have customised the system significantly over its 15-year life.
Monetary benefits	No monetary benefits are attributable to this option.
Benefits achieved from ILM	0%
Conclusion	**Not recommended** This option does not provide the additional capabilities required to reverse the growing trend of immunisation inequity. It would also compromise New Zealand's ability to protect itself from future outbreaks of unknown illnesses, as: • Platform risk means immunisation information may not be available when needed • The current system is not able to be updated to capture immunisation information for new vaccine preventable diseases • Does not align with the Ministry or GCDO strategies of preference for replacing legacy platforms with cloud and Software as a Service solutions.

Option 2: Replace and Maintain

The following is an assessment of how well Option 2 meets the Critical Success Factors
Does not achieve = 0, Low = 1, Medium=2, High=3

CSF	Meets COVID-19 Response needs	Strategic fit and business needs	Potential value for money	Supplier capability and capacity	Potential affordability	Potential achievability	Total
Score	0	1	2	2	2	2	9

Table 17: Economic assessment of option 2

Option 2 – Replace and maintain	Replace existing data repository and web-based portal for vaccinators and re-integrate other existing services.
Advantages	• Whole-of-life immunisation data set is enabled • Risk of service impact through system failure is mitigated • Provides a modern platform for future health services to access immunisation data • Enables future benefits and enhancements through a modern platform.
Disadvantages	• Unable to improve immunisation equity or improve services. • If doing a like for like replacement may not be able to use an Agile approach due the technology required, and therefore may require a big bang approach to delivery. This will increase risk significantly and will require a lot more planning upfront. • Will not deliver a COVID-19 MVP by 31 January 2021.
Costs	• Project delivery (including vendor and assurance costs) • Ongoing SaaS licensing • Ongoing user engagement, support and development cost.
Monetary benefits	• NA
Benefits achieved from ILM	50%
Conclusion	**Not recommended** This option would improve data quality (investment objective two) and solution reliability (investment objective three). However, this option does not provide sufficient functionality in the new system to address the growing equity gap in immunisation delivery. Without this additional functionality, service equity and quality improvements described in investment objective one cannot be met.

Option 3: Replace and Improve (prioritise COVID-19 capability)

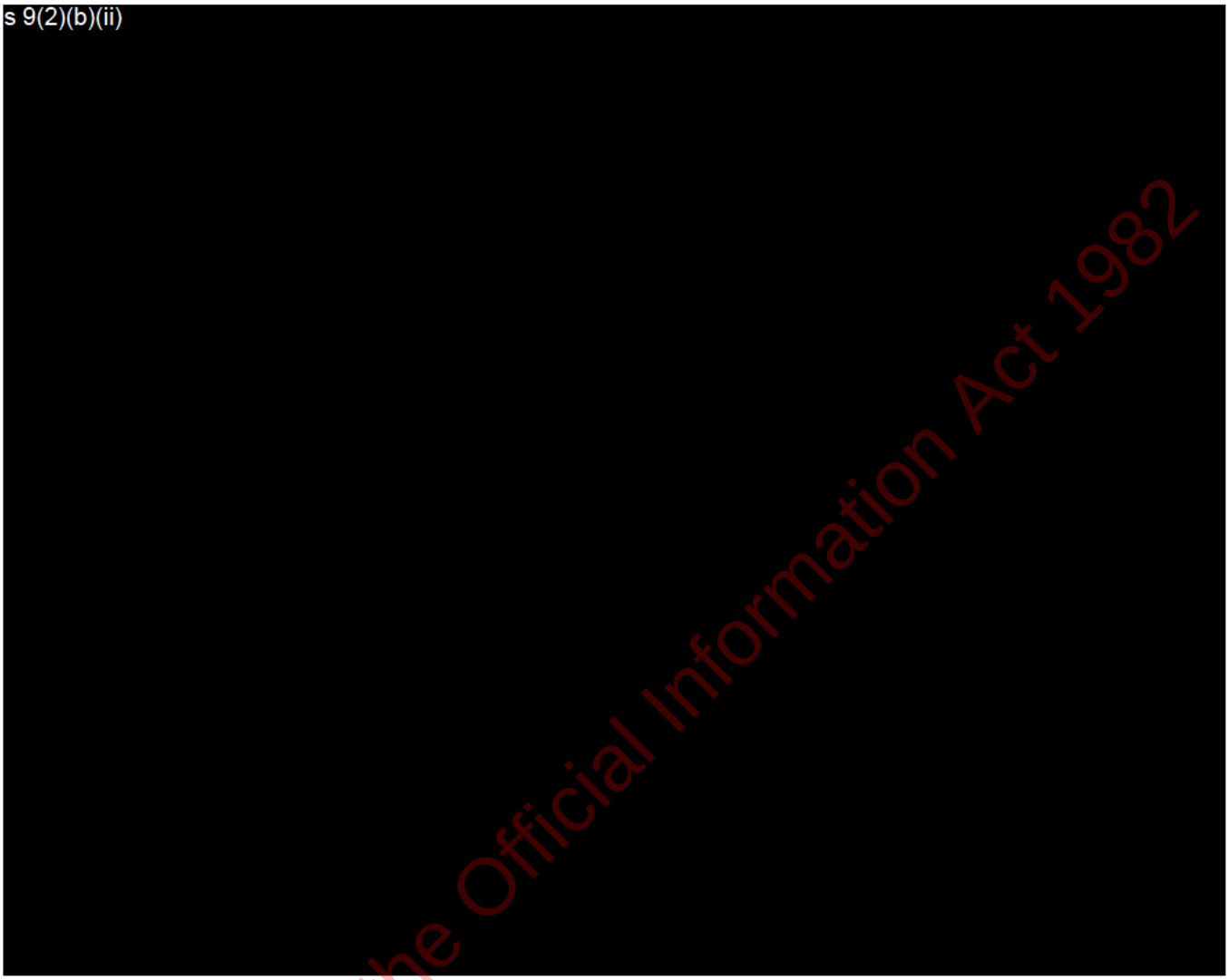
The following is an assessment of how well Option 2 meets the Critical Success Factors
Does not achieve = 0, Low = 1, Medium=2, High=3

CSF	Meets COVID-19 Response needs	Strategic fit and business needs	Potential value for money	Supplier capability and capacity	Potential affordability	Potential achievability	Total
Score	3	3	2	2	3	3	16

Table 18: Economic assessment of option 3

Option 3 - Replace and improve **Prioritise COVID-19 capability**	Place priority on developing capability to support a COVID-19 immunisation programme. Replace existing data repository and the web-based portal for vaccinators, add missed event management capability, and re-integrate to existing services. Able to integrate to relevant systems. Preference to a design and platform that can be extended to cover all immunisation programmes (ie, a complete immunisation solution).
Advantages	• Whole-of-life immunisation data set is enabled • Risk of service impact through system failure is mitigated • Provides a modern platform for future health services to access immunisation data • Enables future benefits and enhancements through a modern platform • Enables service improvements to reverse increasing inequity trend.
Disadvantages	• Most complex of the options • New functionality to be implemented which requires design effort.
Costs	• Project delivery (including vendor and assurance costs) • Ongoing SaaS licensing • Ongoing user engagement, support and development cost.
Monetary benefits	• NA
Benefits achieved from ILM	100%
Conclusion	**Recommended** The increased scope in this option best matches the investment objectives, allowing for new functionality which would improve the immunisation programmes ability to improve health outcomes and equity across the population.

Multi-criteria analysis of short-listed options



The preferred option – Option 3: Replace and Improve

Based on this analysis, the preferred option is Option 3. This will best allow the delivery of proposed benefits and investment objectives, including COVID-19 capability, reversing the downward trend in immunisations equity, and mitigating the risk of the current solution going out of support.

See Appendix 2 for details on the Business and Functional requirements that will be used for procurement purposes.

Assumptions

For the purposes of the benefit-cost analysis the following assumptions have been made:

1. That the Population Health Platform established via the NSS can be readily extended and configured to support complex population health solutions for the COVID-19 MVP functionality and may be viable for the full replacement NIR solution (ie, NIS)
2. The project team will complete a detailed assessment of what is the preferred platform early in the project
3. That existing contractual and licencing arrangements can be expanded to allow the NSS platform to be used (if assessment proves this is viable), and will be at a similar price point to that already procured
4. That the level of risk in continuing to use the current platform after it is out of support is unacceptable.

Inflation assumptions
All costs and benefits are expressed in today's dollar terms.

Estimated costs
Depreciation, capital charges, interest and other financing costs are excluded from analysis shown in this case.

The project delivery and ongoing costs were estimated initially using internal experience of similar projects. Planning assumptions used in these estimates were provided to an independent technology implementer, Davanti Consulting, who supplied a high-level cost for the implementation and ongoing licenses. Their response was within 5 percent of initial estimates.

Davanti's final report is embedded in Appendix 8.

Taxation
All dollar figures are expressed in GST exclusive terms.

Commercial case

COVID-19 response and Agile

The priority for this project will be developing the capability to support a nation-wide COVID-19 immunisation programme for New Zealand. The high-level requirements in Appendix 2 have identified seven broad functional areas with a total of 40 components. The COVID-19 MVP requires 24 of these components.

Functional Area	# COVID-19 MVP Components Required	# All Immunisations Components Required
Programme Operations	S9(2)(b)(ii)	
Consumer Channels		
Sector Channels		
Population and Campaign Mgt.		
Immunisation Service Mgt.		
Immunisation Register		
Immunisation Monitoring and Intelligence		

The intention is to develop a COVID-19 MVP[71] from the first series of Agile sprints. This activity will establish the foundation for the full NIS in terms of architecture and capability. Once the MVP is established the remaining sprints will establish the missing components and the functionality required for all immunisation types.

The technical details of this approach will be finalised with the selected vendor/s and based partly on their assessment of what is the best option to quickly deliver COVID-19 immunisation capability, and on the Ministry assessment of risk. If necessary other business requirements and functionality will be delayed. Any key decisions around delivery, timing and function of COVID-19 related capability will be made by the governance group.

Procurement

The procurement team will consider four approaches for acquiring the technology:

1. Option 1 - Selection of a successor solution through an open competitive process
2. Option 2 - Upgrade the solution to a successor solution with NIR Incumbents, Orion Health **(Exemption Required)**[72]. (Option no longer available)
3. Option 3 - Replace the Solution by building on the Pre-Existing NSS. **(Exemption required).**
4. Option 4 - Replace the Solution by building on a new instance of Salesforce utilising and leveraging NSS architectural components. **(Exemption Required).**

[71] A minimum viable product (MVP) is the most pared down version of a product that can still be released. Three Key Characteristics of a Minimum Viable Product:

- It has enough value that people are willing to use it.
- It demonstrates enough future benefit to retain early adopters.
- It provides a feedback loop to guide future development.

[72] Orion Health has since confirmed they cannot meet the requirements, and are therefore no longer an option

It is assumed that Option 1 would prevent the Ministry from delivering to the required time-frame for a number of reasons, notably:

- Typical timings for a procurement of this scale would take 4-6 months
- Should a new target architecture present itself the Ministry would need to work with the provider to design, build, test, certify and accredit the solution. Should a new solution set be selected the Ministry would also need to establish confidence and knowledge in the solution.

Exemptions from Procurement Rules

Given the time-imperative requirement, it is most probable that an exemption from the Procurement Rules will be required. It is anticipated that this will be under the emergency procurement as stated in the Procurement Rules[73].

Several exemptions exist that allow the Ministry to directly source an agreement, in this case:

- **RULE 14.9.(a)** ***Emergency:*** *A genuine emergency as defined by MBIE's Quick Guide to Emergency Procurement. Urgent situations that are created by an agency, such as lack of advance planning, do not constitute an emergency.*

Given that this solution is a critical dependency for any COVID-19 vaccine deployment, and therefore facilitates the primary exit path from current Government health settings, it is anticipated that rule 14.9.(a) will need to be utilised for any resultant contracts required in order to deliver the solution to the timeframe specified.

Approaches 2, 3 and 4 also require an options analysis. Due to time constraints this analysis has not been completed but will be an early part of the project post business case approval.

A full procurement plan will be developed and appended to this business case once it is approved.

Expected approach for delivering the preferred option (assuming option 3 or 4 is the chosen way forward)

The preferred option will be delivered using a staged approach:

- By 31 January 2021 build, using Agile[74] methodology, a COVID-19 MVP. The COVID-19 MVP does not need to interface with multiple patient management systems and will only integrate with MUST HAVE other systems such as the national health index (NHI). Existing technology will be reused and adapted where possible. Data will be stored in a clinical repository
- By March 2022 iteratively complete (using Agile) development of the NIR replacement, ie, the NIS, including the full COVID-19 capability required, reusing components where possible.

[73] In line with the Procurement Rules, the Ministry is required to compete all contracts for goods and services over $100k in value.

[74] Agile Software Development is a lightweight software engineering framework that promotes iterative development throughout the life-cycle of the project, close collaboration between the development team and business side, constant communication, and tightly-knit teams. Also known as agile development.

Agile and the COVID-19 Immunisation Strategy
The COVID-19 immunisation strategy is being developed by the Ministry and will need to continually evolve. It will also likely be a moving target as more information is made available to the Ministry. This will include changing and increasing information on matters such as vaccine candidates and how they will be administered. For example, number of doses required? There may be multiple vaccines that are available, each with different storage and administration requirements? Will there be targeted immunisations for specific demographics, or will all five million New Zealanders get the vaccine/s? Will there need to be a schedule of immunisations? Will there be certificates of immunisation issued? These and other questions will be raised and addressed over time. This iterative strategy approach means the solution must also be developed iteratively. Therefore, the Agile methodology will be used.

This approach aligns with the government's Strategy for a Digital Public Service that identifies an Agile and adaptive public service as a key outcome[75].

Delivery Team: In-house augmented by Vendor/s
The Ministry intends to use a cross-functional project team that is a mix of both of in-house and vendor resources. The Ministry will establish a panel of vendors that can provide expertise, capability and capacity as and when required.

The Ministry team that would design and build the COVID-19 MVP and the full National Immunisation Solution are confident they have the ability to deliver (especially when augmented by vendor skillsets). This confidence comes from the recent success building in short time frames the National Contact Tracing Solution (NCTS) used across all Public Health Units and the Ministry and the NCTS Border Solution that manages the COVID-19 border health process from port of arrival, facility check-in, daily health checks, day 3 and 12 test requirements and finally release from a Managed Isolation or Quarantine facility.

Testing the iterative products
The team will have regular engagement with the Senior Responsible Officer and Business Owner which will include sessions to show, confirm and refine the value being delivered by each iteration of the product. The schedule for this engagement will be part of the project plan.
The project team will also establish a panel of vaccinators and other authorised users to test and confirm the value of each iteration.

Requirements[76]
At this stage, detailed requirements for the NIR replacement have not been completed and will be part of the project and the Agile approach, but Appendix 2 shows the high-level requirements.

Further analysis post-business case approval will provide a more detailed set of requirements, and assessment of these requirements against technology platform options, each of which will inform procurement activities. The project will develop criteria to help select the best platform option.

However, a high-level comparison of NIR use cases and native Salesforce functionality (document can be found in Appendix 8) indicates that Salesforce can meet the needs of the COVID-19 MVP solution and some of the needs of the full replacement NIR. This would however, likely not include

[75] https://www.digital.govt.nz/digital-government/strategy/strategy-summary/

[76] See Appendix 2 for high level requirements

the immunisation repository itself as Salesforce is not a clinical database. Therefore, a complete solution must be found that may or may not include Salesforce technology.

NSS as potential platform

For the initial COVID-19 MVP functionality the recommendation from the in-house team is to follow the same approach taken for the NCTS by cloning the existing National Screening Solution (NSS) ecosystem to deliver a new NIS on an existing Ministry platform.

The original procurement of the NSS[77] noted that:

> *"subject to further business case approval and subsequent funding, this solution, and subsequent contract, may extend to other population register-dependent programmes."*

The conclusion is that the NSS is viable for the COVID-19 MVP solution but it will need to be confirmed (or otherwise) as viable for the more permanent solution. This validation will happen as early as possible as part of the project.

Services to be Procured

There are several areas where vendor or procurement activities may be necessary. These are vendor selection, product selection, build and migration, and ongoing support. Where practical, existing Ministry agreements or all-of-government panels will be reused.

The required services[78] from vendor/s are:

1. Be part of a panel of experts that can be drawn on by the in-house team on an as and when needed basis
2. Assist with design and build of COVID-19 MVP as priority
3. Assist with design, build, integration and migration of data
4. Ongoing support (or continuation of current NSS support agreement).

Commercial arrangements and negotiation will reflect lessons learned from the Ministry's recent technology delivery projects, and the Government Rules of Procurement.

Procurement strategy and plan

A procurement plan and timing will be developed once the funding for this business case has been approved. High level business and functional requirements will be used as part of this procurement. See Appendix 2 for the high-level requirements.

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[77] Ministry of Health, 2017, *GETS | Ministry of Health - National Screening Solution – ROI*, https://www.gets.govt.nz/MOH/ExternalTenderDetails.htm?id=18630444, (accessed 9 March, 2020)

[78] Two other programmes, BreastScreen Aotearoa Extension (BSA) and National Cervical Screen Programme (NCSP) also had business cases submitted as part of the 2020 Budget cycle, and are also likely to reuse the existing NSS platform. The Ministry intended to complete an appropriately sized market exercise across the successful programmes to drive efficiencies in its procurement process and competition in the subsequent market response. These other business cases were not successful for FY 2020. Therefore the NIR replacement technology will be developed as a standalone product.

Procurement activities:

1. Complete requirements and design for COVID-19 capability (4 weeks)
2. Complete requirements and use cases for NIS (4 weeks)
3. Confirm if the previously delivered Salesforce instance is a fitting solution to replace the NIR, when considering (4 weeks)
    a. functionality
    b. the terms under which it was originally procured
    c. any existing vendor contracts and agreements
    d. include integration design for COVID-19 minimum viable product.
4. If appropriate, complete an exemption memo to be signed off by an appropriate senior manager from the Ministry of Health, and meet all relevant requirements as outlined in Rule 14 of the Government Rules of Procurement (1 week).

Delivery risk

Developing COVID-19 immunisation capability as a priority may impact the timelines of developing the full replacement solution. Timing for the full NIS delivery will be closely monitored and the level of assistance required may increase to meet the March 2022 date.

Formal detailed requirements, including functional and non-functional specifications, will be developed in parallel with a formal procurement plan (subsequent to the completion of the RFI / market engagement process). In line with this process, an evaluation approach would need to be agreed.

Attractiveness to Market

The Ministry believes that there are suppliers in the market who would be interested in being part of the panel of experts. Through the market engagement process, the Ministry would be seeking to maximise its attractiveness to potential suppliers for the RFP process. The Government Procurement Rules (effective 1 October 2019) include a requirement to consider Broader Outcomes, which are secondary benefits which can be derived from a procurement. Rule 17 Increase Access for New Zealand Businesses has ICT as a designated contract for this priority area and therefore agencies must consider how they can create opportunities for New Zealand businesses when they are procuring ICT services.

The new Broader Outcome Rules 16-17 states agencies must consider and incorporate where appropriate. The original procurement for the NSS was open, with the majority of respondents being New Zealand companies. The vendor selected through this procurement process is a New Zealand company. Opportunities for New Zealand companies to compete would be considered for any future procurement undertaken.

Transition

To transition from the incumbent system to the new system, three core activities will need to take place: build, integration and migration. The Ministry does not currently have resources to complete these activities. The panel of vendor/s will assist with filling the necessary roles.

Contract provisions

Ongoing support
The National Screening Solution platform has an ongoing support contract in place, which extends to other uses of that platform. If the existing NSS/Salesforce solution is extended to include the new NIR, this could be the support contract used. Otherwise a new support contract will be required.

National Immunisation Register - current solution

Orion Health holds the current support and maintenance agreement for the NIR solution. In January 2019, Orion formally notified the Ministry that as of 31 March, 2022 that support agreement would end. Orion has completed an organisational strategic review and restructured internally during the period of this contract, and product specific knowledge was not retained as part of this transition.

National Screening Solution

The National Screening Solution was procured from Deloitte as a solution specifically targeting population health, with a focus on screening. As noted already, future uses of the NSS may include register-based population health services.

Deloitte has delivered the solution as part of the NSS project, using a combination of Salesforce, AWS and Mulesoft (including Deloitte's custom Health Connect Rules Engine) components.

The current agreement notes that while other build partners may be used for future development of the solution, Deloitte is the ongoing support provider for the NSS platform.

Financial case

A detailed financial spreadsheet is available from the Senior Responsible Officer.

Overall affordability

s 9(2)(b)(ii) [redacted]

- The COVID-19 MVP is not expected to create additional costs to the project as this functionality is only the first series of iterations in the full NIS that will be developed using the iterative Agile methodology.

Impacts on the financial statements

The financial impacts of the project over the expected period are shown below. These figures cover an 18-month implementation period and a seven-year usable life of the new solution following the new solution's launch, totalling 8 ½ years.

s 9(2)(b)(ii) [redacted]

Total capital and operating costs

The following table details the expected capital and operating costs by year.

s 9(2)(b)(ii) [redacted]

Funding sources

As outlined in the Economic Case, the preferred option is Crown funding by appropriation. The following financial analysis relates to this option.

On 20 April 2020 Cabinet approved $55 million contingency to provide for the COVID-19 contact tracing proposal (CAB-20_Min-0175). Out of the $55 million sought, $15 million was for a design and build process to replace the NIR to enable the national delivery of a COVID-19 vaccine when it becomes available.

Further additional funding of $23 million was sought in the COVID-19 Response and Recovery Fund July Package for a full replacement of the National Immunisation Register (NIR). On 6 July 2020 Cabinet paper: CAB-20-MIN-0328.25 approved contingency to replace the NIR subject to joint approval of a single stage business case by the Minister of Finance and Minister of Health.

Financial model

The financial model has been created using a bottom up approach, considering current industry rates for contractors[79], existing software-as-a-service licence rates, and the scenario costed plans to deliver a new solution with go-live occurring before the current solutions end of support date in March 2022.

This model was validated with internal project staff who have experience with the existing NSS implementation. The planning assumptions and in-scope use cases were provided to an independent technology development company, who gave their estimates on vendor costs – which were within 5 percent of the original predicted vendor costs.

This report is included in Appendix 8.

Financial model key assumptions
The key assumptions in the model are:

1. That the COVID-19 MVP will leverage the Population Health Platform established via the NSS
2. That detailed analysis using criteria yet to be established will determine the selection of platform for the full NIR replacement
3. That the Ministry will prefer to use New Zealand based vendors to deliver the majority change
4. That the project will function as a standalone piece of work within the Ministry
5. That public access to immunisation data will be via APIs which align with the principles of the national Health Information Platform (nHIP)[80]
6. That vaccinators in general practice settings will enter data through a Practice Management System (PMS), which will deliver information to the NIS via APIs
7. That the balance of vaccinators will access immunisation data via a web-based portal utilising the NSS platform
8. That existing agreements and pricing for Salesforce, AWS and Mulesoft licenses will be consistent with future agreements and pricing
9. That existing security provisions built into the NSS are sufficient to protect NIS data if it is selected.

Additional costs expected above the actual build costs of the COVID-19 MVP and National Immunisation Solution.

Overall project costs will go beyond simply the build of the solution. It is expected that there will be additional costs related to:

[79] Sourced from existing Ministry contract where available, and supplemented with data from https://www.talentsalaryguide.com/wellington

[80] https://www.health.govt.nz/system/files/documents/media/data_summite_nhip_overview_191118.pdf

1. National deployment and training of users. This will happen at least twice ie, first with the COVID-19 MVP and then with the full NIS replacement. This second set of costs may be iterative if the NIS is deployed iteratively in line with the Agile development methodology
2. The user portal
3. Sector integration costs for the DHBs, PHOs and other relevant non-government organisations
4. Developing the API layer for data
5. Deployment of a mobile channel for vaccination invites to the public, status updates, adverse reaction follow ups
6. Migration of data from the multiple sector sources and data cleansing
7. Replacement of the Immunise Now capability
8. Re-organisation of sector data administration
9. The ability to track and manage vaccine distribution based on the need of prioritised populations
10. Possibility of multiple schedules for multiple COVID-19 vaccines
11. Additional support during rollout and for first time users
12. Temporary parallel operation of NIR with NIS and decommissioning of the NIR.

Management Case

The Senior Responsible Officer (SRO) for this project will be Deborah Woodley, Deputy Director General, Population Health and Prevention. See Appendix 6 for her letter of support for this project.

The Project Governance will include:

	Role
Shayne Hunter	Deputy Director-General, Data and Digital Services
Caroline McElnay	Deputy Director-General, Public Health
Michael Dreyer	Group Manager, National Digital Services, Data and Digital
Fergus Welsh	Chief Financial Officer
Grant Pollard (Business Owner)	Group Manager, Child and Community Health
Kath Blair	Manager, Immunisation
Kerri Moreau	Acting Manager, Business Partnering and Advice
Jo Styles	Digital Services Manager, Data and Digital
Kelvin Watson	Group Manager, COVID-19 Immunisation, Testing and Supply
Individuals yet to be identified*	The Governance Group will invite one or two members from outside the Ministry. Ideally this will represent the DHBs, PHOs and/or actual vaccinators. This external representation is considered important to the Ministry and if necessary the need for each Ministry member will be carefully considered if the overall group is becoming too large.

*The Ministry has established a COVID-19 Immunisation Implementation Advisory Group. It is likely that external Governance Group members will be drawn from that group. It is also likely that this group will be consulted on an "as and when needed" basis. The members of this groups are selected to ensure a range of sectors and skills contribute towards providing practical advice to support the COVID-19 immunisation programme.

These members are:

Member	**Role/Representation**
Rachel Haggerty	Co-Chair, Chair of DHB Planning and Funding Group Managers Group
Te Puea Winiata	Co-Chair, Chief Executive Turuki Health Care
Hector Matthews	Executive Director Māori and Pacific Health at Canterbury DHB
Dr Helen Petousis-Harris	Vaccine safety and effectiveness
Dr Ricci Harris	Epidemiology, public health physician and research expertise in Māori health
Dr Angela Ballantyne	Bioethicist
Silao Vaisola-Sefo	Pacific health provider
Dr Api Talemaitoga	GP and pacific health expert
Nicky Birch	Māori communications and engagement specialist
Dr Nikki Turner	Vaccinator training expert
Taima Campbell	Nursing representative
Dr Natalie Gauld	Pharmacy representative
Vince Barry	South Island based GP representative
Dr Jan White	GP and Deputy Chair of the PHARMAC Board

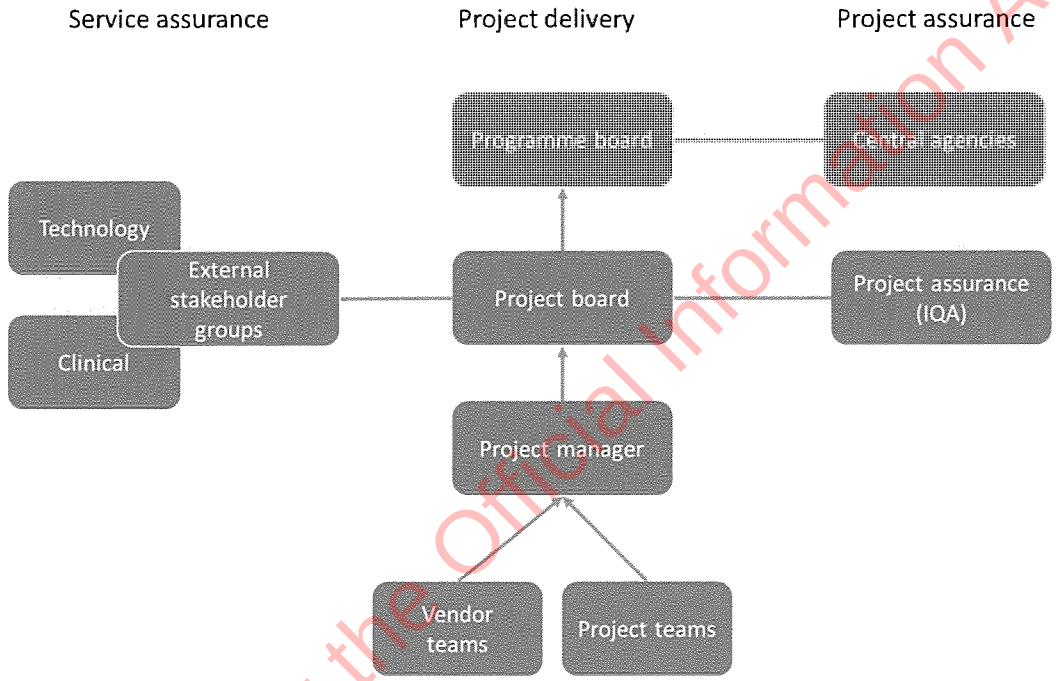
The governance group will meet twice a month, and this will be scheduled as part of project planning. Additional meetings will be called as and when required if key decisions are needed in short timeframes.

Project management planning

The Ministry will follow the Agile project management methodology.

Proposed governance arrangements
The proposed governance structure and the reporting arrangements for the project are shown in the image below:

Figure 7: Project governance structure



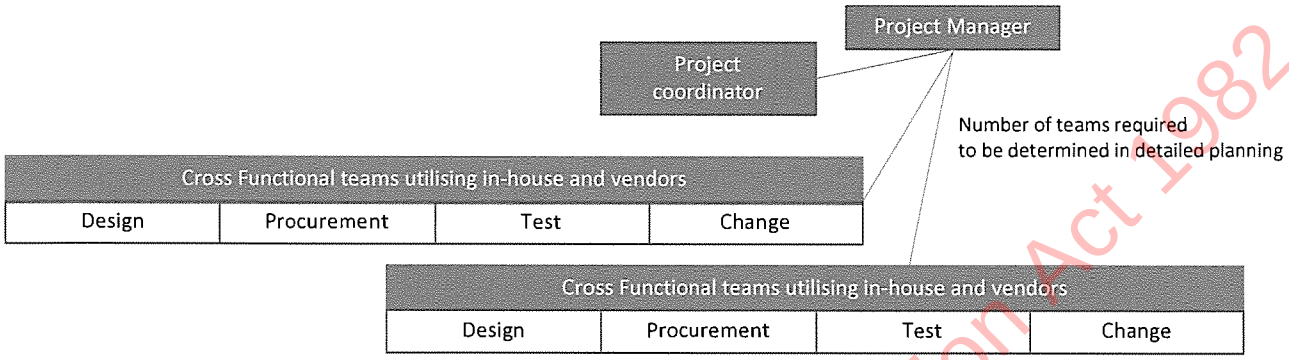
- Regular governance meetings and reporting weekly
- Programme board – will be chaired by the SRO[81] (Deborah Woodley) who is accountable for programme level delivery. The board will be responsible for allocation of resources and liaising with central agencies for quality assurance and cross-government activities as needed
- Project board – will be chaired by the Project SRO, who is accountable for project level deliverables. The board will have oversight of project activities, governance, assurance, and owning the relationship with external stakeholder groups.
- External stakeholder groups;
    - Clinical: for clinical professionals, DHBs, PHOs and other users of the NIS. This will include a panel of users that will assist with testing, confirming and refining the value delivered by each iteration
    - Technology: for PMS vendors and other external technology stakeholders.

[81] See Appendix 6 for letter of support from the SRO.

Project structure

The project team structure has been planned as shown in the diagram below – these will be reviewed once programme-level details are known.

Figure 8: Project delivery structure



Project plan, milestones and delivery

The project is planned to run over multiple iterative stages as per the Agile methodology, with priority placed on developing a COVID-19 minimal viable product, and is estimated to be completed by March 2022. Project phases have been planned as shown in the diagram below – these will be reviewed once programme-level details are known. As described in the Commercial Case the Ministry is confident that the project team will be able to meet delivery timelines as they did with the National Contact Tracing Solution (NCTS) and the NCTS Border Solution. The likelihood of this will be increased due to the intended approach of using a panel of vendors to increase capability and capacity as required.

The phasing below is based on the project being run stand-alone, and does not account for any additional procurement activities or delays that may occur if the project becomes part of a broader programme.

Based on lessons learned from previous projects, the delivery methodology will be aligned to the successful build vendors requirements.

Figure 9: High level project phasing

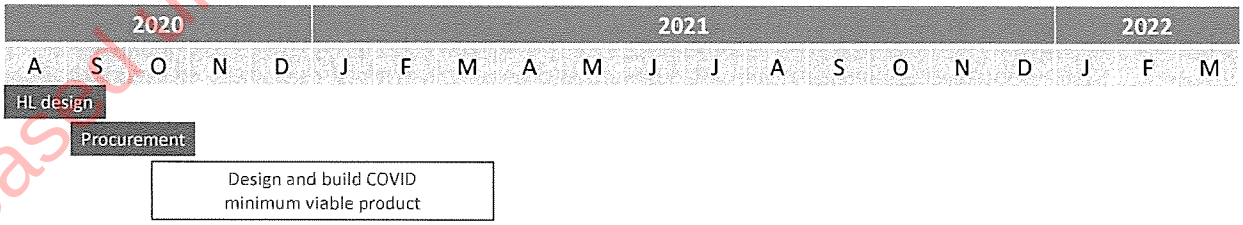


Table 4: Project milestones

Project milestones	Approximate date

Project initiation	October 2020
Vendor/s selected	Oct / Nov 2020
Key decisions on how to proceed with developing COVID-19 minimum viable product	November 2020
COVID minimum viable product (MVP) design and build	January 2021
Investigate pilot use for the flu campaign	March 2021
Detailed design and build completed (if possible, including integration with COVID MVP).	November 2021
Integration, migration and testing completed	November 2021
Go live	December 2021
Support handover completed, project closure	March 2022

Using the Agile methodology and assuming that the project begins by October 2020, the project team is confident these timelines can be met.

Operating the new NIS in parallel with the old NIR
Due to the Agile methodology being employed the project will establish a strategy and plan for operating the new iteratively developed NIS/COVID-19 capability in parallel with the old NIR capability. This may include iteratively decommissioning the NIR as and when possible. The strategy will be confirmed by the project team once the panel has been identified.

Communication and engagement

A stakeholder communications and engagement plan will be developed during the detailed planning for implementation. The plan would be informed by detailed stakeholder analysis and would utilise existing communication channels, as well as specific communication and engagement opportunities, to facilitate sharing of information in preparation for the planned changes.
The approach for stakeholder communication and engagement would be to identify stakeholders[82] and understand their needs, develop an appropriate strategy which would meet these needs, plan and then execute communication and engagement activities.

The principles for communication and engagement are:

- **Accountable and transparent** – focused on improving the quality of engagement, being mindful and confidential
- **Clear purpose, scope and outcomes** – stakeholders are aware of constraints and conditions.
- **Open and collaborative** – open and genuine communication is fostered through a variety of channels
- **Inclusive and balanced** – engagement processes and opportunities allow fair, equitable participation.

[82] Most of the key stakeholders have been identified and initial engagements occurred during an earlier version of this business case.

Communication will be proactive, timely and consistent. The communication objectives are to develop clear, accurate and consistent messages that meet the needs of different stakeholders. These would highlight the changes being implemented and the benefits of the change.

Benefits, risk and change management planning

The benefits expected to be realised are described in Appendix 3.

Short timeframes for this business case development did not allow for a Benefits Management Plan (BMP) to be developed, but the benefits and KPIs have been identified. Initial planning in the project will include a complete BMP. Identification, measurement and tracking of benefits will be undertaken to ensure that the expected outcomes are realised. A benefits register will be developed to support the measurement and reporting of the benefits arising from this investment. The benefits register will be maintained by the Immunisation team and benefits reporting would be as per the timeline agreed with the Ministry (and Central Agencies, as required).
A review of the benefits would take place periodically to assess the on-going relevance of the benefits, capture any emergent benefits, assess the rate of realisation and introduce corrective actions where necessary, re-baseline the realisation schedule if required, ensure responsibilities are being carried out as expected, and assess the format and effectiveness of benefits reporting.

Risk management
The Ministry's standard risks and issues management methodologies would be used during the implementation period. This would assure stakeholders and monitoring agencies that the Ministry implementation team is proactively identifying and mitigating risks.

The Risks and Issues Register would be updated regularly to reflect the current status of all risks and issues. Risks would be assigned an owner and mitigation actions identified, implemented and monitored. Issues would have an escalation plan. Key risks, which have changed significantly, or which need urgent attention, would be reviewed each month by the Governance Group. Risks requiring escalation would be taken to the ELT or directly to the Director-General, as necessary.
The key risks identified for the project are summarised in the strategic case section, Key project risks.

Change management
Effective change management is critical for the successful implementation of the new NIS, to ensure readiness for go-live and monitoring in the immediate post go-live period. This would ensure that any risks are identified and managed in advance of the changes being implemented, and that any issues that develop are successfully resolved.

The Project Manager would have overall responsibility for managing the proposed changes, including ensuring effective stakeholder communication and engagement is undertaken. A change manager and change advisor have also been costed into the delivery stages of this project and will be part of the cross-functional teams.

Engagement with immunisation service partners across the health system is essential at all stages of the project and has also been accounted for in project governance arrangement.

Project Assurance Arrangements

The Risk Profile Analysis submitted to Treasury resulted in the proposal being assigned a **HIGH** risk.

A high-risk project usually requires a gateway review process to be undertaken. Treasury have agreed this process is not practical in the context of the time constraint faced by the Ministry to

deliver a COVID-19 MVP by 31 January 2021. It has been agreed with Treasury that the Ministry will present this proposal with the intention of starting work on the COVID-19 MVP as soon as possible, and in parallel complete the detailed planning for the full NIS project. This planning, will with Treasury assistance, draw on the gateway reviewer pool of expertise to refine the proposal further.

Once the planning has been complete the Ministry will undertake a full Independent Quality Assurance and report back to Treasury.

Agile sprint assurance
Another assurance measure the project will establish is to have independent technical assurance become part of the Agile sprints. The project will draw from the gateway reviewer pool and have an assurance review of each sprint, with a focus on having an independent view of the value to be delivered by the upcoming sprint.

Timing delivery of the COVID-19 MVP
The COVID-19 MVP will have a delivery date of 31 January 2021. Kelvin Watson, who is on the governance board is also heading the COVID-19 Taskforce at the Ministry, that will plan and purchase any COVID-19 vaccines. This means the project will have a direct line of sight to any upcoming availability of a vaccine/s and be able to step up the delivery pace if required.

Assurance Plan and the FPIM framework - will be completed post business case approval
Time constraints for getting this business case approved in time for the COVID-19 MVP have meant an assurance plan will be developed post-business case approval. When the Assurance Planning is established it will reference the framework established by the Health Finance, Procurement and Information Management System83 programme of work (FPIM).

Therefore, the NIS programme will adopt an integrated assurance approach as follows:
Day to day project management processes and controls based on Agile methodology, including quality control of project deliverables.

Internal governance and oversight, including clear and signed off terms of reference for all governance groups:

- Programme Board
- Project Board
- COVID-19 Implementation Advisory Board.

External review:

- Treasury reviews (with GCDO) - at least two
- Independent quality assurance reviews, including:
    - Detailed Independent Quality Assurance review post detailed planning
    - Sprint level independent technical reviews
    - Programme health checks.

Additional assurance activities will include:

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[83] http://www.nzhealthpartnerships.co.nz/wp-content/uploads/2016/02/FPIM-Business-Case.pdf

- The GCDO have agreed to provide support with development of fit-for-purpose Agile Assurance planning and a Privacy Impact Assessment that will be integrated into the Project Plan
- The project team will engage with the SRO and business owner at the end of each Agile sprint to confirm and refine the value from each iteration
- The project will provide regular updates to Ministers, joint agencies and the COVID-19 Vaccine Taskforce on progress and the value being created by significant iterations, for example, key development points in the COVID-19 MVP, the completed COVID-19 MVP, major developments for the full NIS
- A post implementation review will be planned for April 2022 to determine whether the project met investment objectives, any interim or initial benefits and capture lessons learned
- Any changes to costs or risks will be immediately notified to Treasury.

Next steps

The project's next steps following business case approval will include:

- Approach the market for quotes on services, select a vendor or vendors, and to progress the implementation of the preferred option. This will include:
    - Design and develop with urgency a COVID-19 minimum viable product
    - Replace existing data repository and ensure that future capacity requirements are met
    - Replace the web-based portal for vaccinators and administrators and ensure the new NIS can be accessed anywhere/anytime by appropriate authorised users
    - Ensure New Zealand citizens/residents can view their immunisation status
    - Add missed event management capability
    - Integration to all relevant existing services, systems and datasets
    - Data migration from the current NIR and other relevant sources to the replacement solution
    - If required, data migration from the interim COVID-19 solution to the full replacement NIR.

Note: Due to delivery deadlines that will not move and limited timeframes to complete this business case not all the usual expected activities were accomplished. Therefore, the outputs listed below have not been completed.

The intention is to complete them post business case approval as part of the project initiation stage and amend this business case. Although it is not anticipated, the Ministry understands this may impact the level of risk and costs identified once the work below has been done. If significant changes occur to the level of risk and cost, then the Ministry will immediately establish a dialogue with Treasury to resolve the issue.

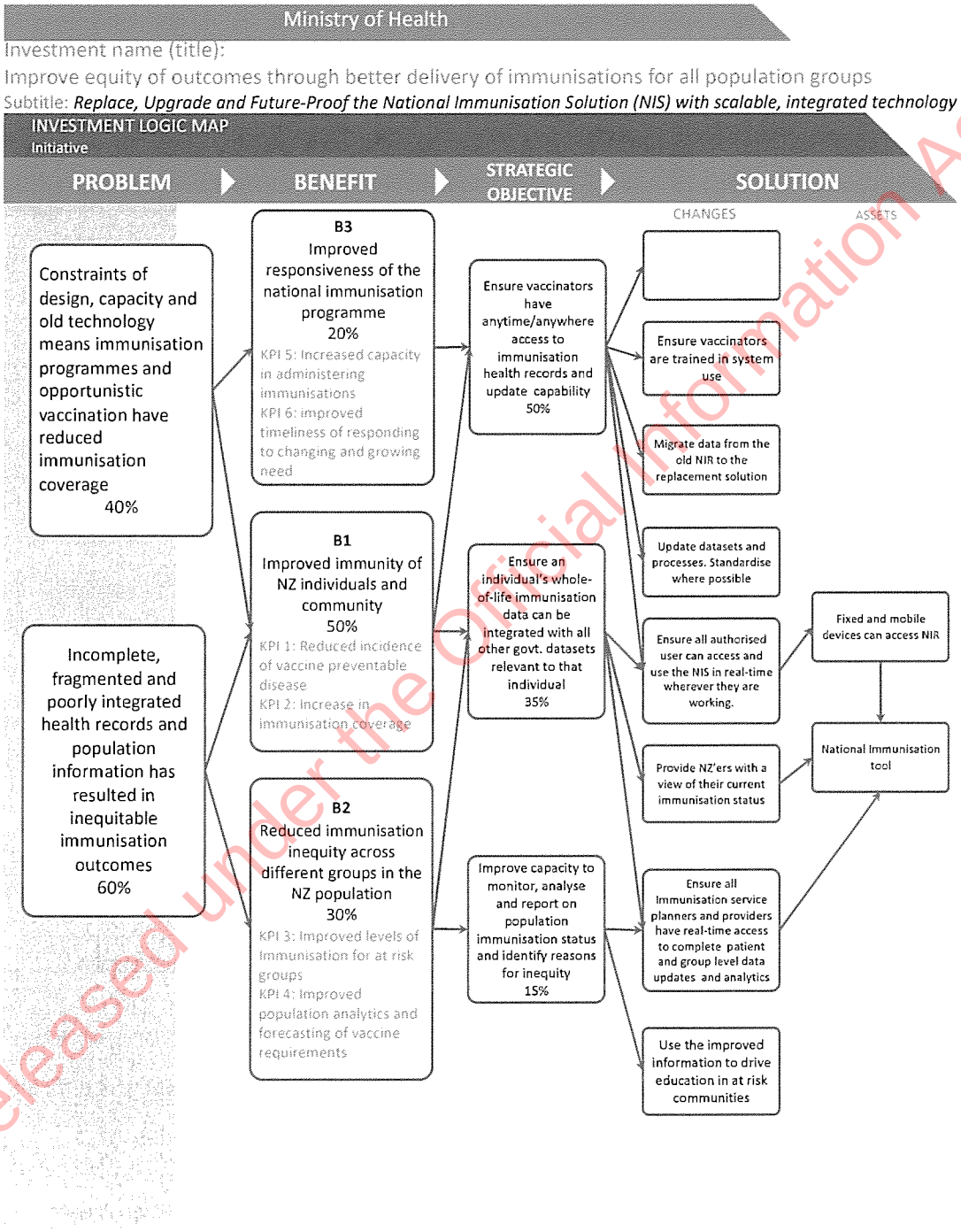
At this stage a quantitative risk analysis (QRA) has not been conducted and is not planned.

Areas yet to be completed:

	Comment
Procurement Plan	A procurement approach has been discussed and generally agreed with NZ Procurement and GCDO. A plan is currently being prepared by Gareth Charles, Ministry Procurement Specialist. This will be developing criteria for assessing the procurement options.
Stakeholder Engagement Plan	The Ministry has identified the key stakeholders at an organisational level and is in the process of identifying individuals to engage with on this project. Initial engagement has indicated strong support for this project in the sector.
Change Management Plan	Change management is seen as a very important part of the project and will be ongoing due to the Agile approach to delivery. As such a Change Manager will be part of the core team. This role will be established early

	on post business case and that role will develop a Change Management Plan as a first priority.
Benefits Management Realisation Plan	A benefits realisation plan will be developed as part of the project initiation. Benefits and KPIs have already been identified and assessed as reasonable by two independent reviewers. Initial measures have been identified but baselines and targets have not yet been established. This will likely be an iterative process as measures must be monitored on an immunisation type for each KPI/measure (eg, measles versus diphtheria).
Quality Assurance Plan	Discussed in previous section: Project Assurance Arrangements.

Appendix 1: Investment Logic Map with examples and evidence of current NIR failure to meet needs of the Immunisation Work Programme



Examples and Evidence in support of the ILM.

Stakeholder feedback
Stakeholders from Ministry of Health, DHBs and PHOs were engaged from December 2019 to February 2020. They identified the following as key issues facing immunisation service delivery due to the current solution:

1. The current solution cannot provide information in a way that enables resolving the equity gap
2. The current solution prevents efficient use of immunisation data and requires users to do data matching and workarounds in spreadsheets outside the system. Causing significant delays and reducing the amount of clinical work that vaccinators can achieve
3. The current solution is not able to scale to meet demand, with some users waiting more than 24 hours for information requests to be fulfilled
4. If the solution is not replaced before it becomes unsupported, there will be severe impacts to immunisation service delivery.

List of Stakeholders
Various stakeholders were engaged from:

- Northern DHB
- IMAC
- PHARMAC
- Counties Manukau DHB
- Canterbury DHB
- Auckland and Waitemata DHBs'
- Pharmaceutical Society
- Health Outcomes
- New Zealand Occupational Nurses Association
- Royal NZ College of GPs.

Evidence of NIR Failure from the Ministry's incidence tracking tool provided by Computer Associates Service Desk

In the period January 2020 – August 2020 there were a total of 60 faults logged by the sector in relation to the NIR. These have included:

- 8 instances of NIR being unavailable to users
- 5 instances where performance had degraded to the point where using the NIR was difficult
- 16 instances of data not being updated either correctly or in a timely fashion for users.

These issues make the NIR very difficult and time consuming to use in the sector, and also create challenges around getting the correct data captured or records updated in a timely manner. Whilst data is not lost in the event the system is down or slow to update, this causes a lot of frustration as people are not always able to retrieve or update information relating to their patients at the time they need to.

An example of this is that database queries (ie, status queries) are often run with large data parameters to ensure all records are captured for a patient, but due to the limitations of the older system components this can result in a degradation of performance for all users and sometimes even an outage.

Letter from Canterbury DHB Chief Executive
The following is a letter from Canterbury DHB from the Chief Executive that highlights the inequitable outcomes occurring partly as a result of a NIR not fit for purpose.

See Overpage.

Canterbury
District Health Board
Te Poari Hauora ō Waitaha

CHIEF EXECUTIVE'S OFFICE

Tel: (03) 364 4110
E-Mail:chiefexecutive@cdhb.health.nz

13 August 2020

Dr Ashley Bloomfield
Director-General of Health

via email ashley.bloomfield@health.govt.nz

Dear Ashley

Influenza Vaccination Coverage for Maori

I am responding to your letter emailed by Marleen van Herk on 14 July 2020, regarding our influenza efforts and the performance results coming through for Canterbury.

Thank you for the acknowledgement of the effort put in by our team and our primary care partners during the past year it has, as you say, been a challenging time.

Current coverage issues
Achieving equitable outcomes is important to us and I am concerned about the performance data showing Canterbury's influenza rates as being one of the lowest for Maori over 65.

As you will know, the data used to monitor the influenza coverage is based on the number of vaccines delivered (captured in the National Immunisation Register (NIR)) compared to population projections. For Canterbury's Maori population these baseline population projections appear to be very different from actual PHO enrolments. Identifying the true gap is an important key to targeting resources and improving immunisation rates.

- The population projection for Maori over 65 years is 3,720 compared to 2,516 Maori being enrolled in Canterbury PHOs. This is a difference of around 1,200 people or 30% which has a considerable impact on performance results.
- Using PHO level coverage, Canterbury PHOs appear to have vaccinated over 72% of their Maori population over 65, which is above the national average of 66%.

I understand that the National Immunisation Register does not currently allow DHBs to produce a report identifying influenza by ethnicity. The only report that can be pulled from the NIR which gives event level influenza data is a vaccine list report, which includes all immunisations given within a specified timeframe. To identify influenza, a large amount of tidy up is required and to identify ethnicity each DHB needs to undertake a data match with NHI.

The team here in Canterbury is undertaking this process weekly to enable us to monitor coverage by ethnicity and better identify where we need to target effort and resources. This is a significant piece of work that could be better delivered nationally, enabling all DHBs to target their efforts and supporting us to reconcile the performance data.

CEO 21838

Canterbury DHB
PO Box 1600, Christchurch, New Zealand 8140

The table below shows how the different denominators have an impact on DHB coverage. Our work, using the DHB NHI level ethnicity match, would suggest there is also a variance between vaccines given by ethnicity. We are keen to work with the Ministry on this to ensure accurate data is available.

Targeting improved Maori coverage
To provide reassurance with regards to our commitment and direction the team has introduced the following initiatives which we believe will support improved rates.

Working directly with practices with a high percentage of Maori enrolled, crossed checking all their over 65-year-old influenza vaccinations and providing feedback on the following to ensure that all influenza vaccinations are loaded correctly on to the NIR:

- Those who haven't messaged to the NIR
- Those who had been vaccinated at pharmacy
- Those who NHI have coded as Maori, but not coded as Maori within general practice
- Those who the practice has indicated they are Maori but are not on the NIR as Maori.

Working with local provider, Te Puawaitanga Trust, using funding from the Ministry, to support the Kaupapa Maori Flu Programme including:

- Support to General Practice to identify and refer patients overdue for influenza vaccination to Te Puawaitanga Trust for follow up. The Trust will call people and encourage them to be vaccinated and offer an at home vaccination as an option.
- Support for pop clinics on Marae, Kaumatua lunches or other social groups options to encourage and offer vaccinations.
- Support for Te Puawaitanga Trust to identify Maori who are not enrolled in general practice and facilitate their enrolment.
- Working with PHOs to confirm ethnicity of those already enrolled, to eliminate some of the data issues and enable us to better target those missing out on vaccinations.

I agree it is important to ensure we are reaching those who will most benefit from immunisations and I have asked our Immunisation Lead to contact Kath Blair to capture any opportunities to increase our rates and see what can be done to eliminate some of the data issues.

Yours sincerely

David Meates, MNZM
Chief Executive

Copy to: kath.Blair@health.govt.nz

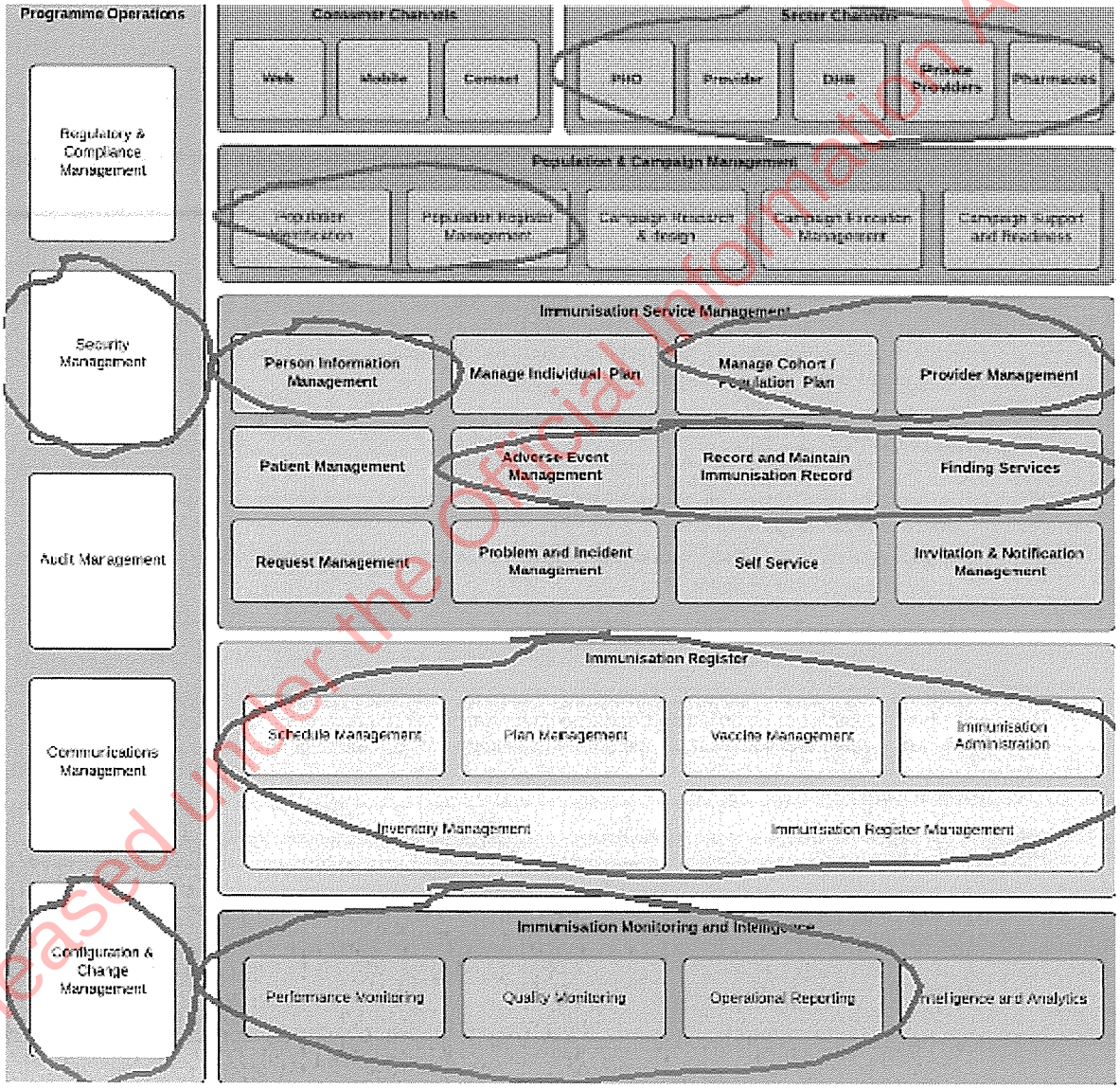
CEO 21838

Appendix 2: Business and Functional Requirements for the Replacement National Immunisation Solution

Immunisation Capability Requirements Overview is kept as a separate document.

To view this document please make a request to the Business Owner: Grant Pollard, Group Manager, Child and Community Health.

The figure below indicates the areas of functionality required for the NIS. The red circles indicates the functional areas required for the COVID-19 MVP.



Appendix 3: Benefits Profile

Targets and baselines will be established for each vaccine type as part of the project.

Benefit 1: Improved immunity of NZ individuals and communities (50%)

KPI 1:	Reduced incidence of vaccine preventable disease	
Measure 1:	**For each vaccine type: the incidence of related disease recorded in the general population/specific groups**	
	Baseline	Value (dd/mm/yyyy). To be determined for each vaccine type
	Target	Value (dd/mm/yyyy). To be determined for each vaccine type
	Interim target	(value, date mm/yyyy)? To be determined for each vaccine type
	Source	Ministry datasets? May also include DHB dats
Reporting	Forum	NIR governance group
	Start date	When will the reporting start (dd/mm/yyyy)? Once system has established BAU
	Frequency	How frequently will it be reported? to be determined for each vaccine type
	End date	When will reporting finish (dd/mm/yyyy)? At end of system life
Responsibility for reporting	Name	Grant Pollard
	Position	Group Manager, Population Health and Prevention
	Organisation	Ministry of Health

KPI 2:	Increase in immunisation coverage	
Measure 1:	**For each vaccine type: the rate of immunisation uptake by individuals**	
	Baseline	Value (dd/mm/yyyy). To be determined for each vaccine type
	Target	Value (dd/mm/yyyy). To be determined for each vaccine type
	Interim target	(value, date mm/yyyy)? To be determined for each vaccine type
	Source	Ministry datasets? May also include DHB data
Measure 2:	**For each vaccine type: the rate of immunisation uptake by demographic groups**	
	Baseline	Value (dd/mm/yyyy). To be determined for each vaccine type
	Target	Value (dd/mm/yyyy). To be determined for each vaccine type
	Interim target	(value, date mm/yyyy)? To be determined for each vaccine type
	Source	Ministry datasets
Reporting	Forum	Reported to NIR governance group
	Start date	When will the reporting start (dd/mm/yyyy)? As soon as first immunisation type is replaced
	Frequency	Annually, or determined by each vaccine type
	End date	At end of system life
Responsibility for reporting	Name	Grant Pollard
	Position	Group Manager, Population Health and Prevention
	Organisation	Ministry of Health

Benefit 2: Reduce immunisation inequity across different groups in the NZ population (30%)

KPI 3:	Improved levels of immunisation for at risk groups	
Measure 1:	**For each vaccine type/demographic/location: At risk groups will improve immunisation levels**	
	Baseline	Value (dd/mm/yyyy). To be determined for each vaccine type
	Target	Value (dd/mm/yyyy). To be determined for each vaccine type
	Interim target	(value, date mm/yyyy)? To be determined for each vaccine type
	Source	Ministry datasets? May also include DHB datasets
Reporting	Forum	NIR governance group
	Start date	When will the reporting start (dd/mm/yyyy)? Will begin once first vaccine type has been rolled out
	Frequency	How frequently will it be reported? to be determined for each vaccine type
	End date	When will reporting finish (dd/mm/yyyy)? At end of system life
Responsibility for reporting	Name	Grant Pollard
	Position	Group Manager, Population Health and Prevention
	Organisation	Ministry of Health

KPI 4:	Improved analytics and forecasting of vaccine requirements	
Measure 1:	**MoH will have better access to real time information and analytics**	
	Baseline	Value (dd/mm/yyyy). To be determined for each vaccine type
	Target	Value (dd/mm/yyyy). To be determined for each vaccine type
	Interim target	(value, date mm/yyyy)? To be determined for each vaccine type
	Source	Survey of MoH analysts + technical assessment
Reporting	Forum	Reported to NIR governance group
	Start date	When will the reporting start (dd/mm/yyyy)? As soon as first immunisation type is replaced
	Frequency	Annually, or determined by each vaccine type
	End date	At end of system life
Responsibility for reporting	Name	Grant Pollard
	Position	Group Manager, Population Health and Prevention
	Organisation	Ministry of Health

Benefit 3: Improved ability for vaccinators to respond to growing and changing immunisation demands for all populations and locations (20%)

KPI 5:	Increased capacity in administering immunisations	
Measure 1:	***Less time spent updating the NIR compared with time spent giving vaccines - perceived***	
	Baseline	Value (dd/mm/yyyy)
	Target	Value (dd/mm/yyyy)
	Interim target	Immunisation types may not be implemented at the same time. Therefore, each immunisation type will be measured as it is rolled out. Value (dd/mm/yyyy)
	Source	*Satisfaction survey of immunisers that includes testing perceived times to access and upload immunisation of data per patient.*
Measure 2:	***Less time spent updating the NIR compared with time spent giving vaccines – measured via system audit***	
	Baseline	Value (dd/mm/yyyy)
	Target	Value (dd/mm/yyyy)
	Interim target	Immunisation types may not be implemented at the same time. Therefore each immunisation type will be measured as it is rolled out. Value (dd/mm/yyyy)
	Source	*NIR audit: Actual measured times for accessing and uploading immunisation data per patient/group. Baseline from old NIR compared with new NIR.*
Measure 3:	***Reduced number of service desk enquiries from users seeking support***	
	Baseline	Value (dd/mm/yyyy)
	Target	Value (dd/mm/yyyy)
	Interim target	
	Source	
	Source	*NIR Service desk logs*
Reporting	Forum	Reported to NIR governance group
	Start date	When will the reporting start (dd/mm/yyyy)? As soon as first immunisation type is replaced
	Frequency	How frequently will it be reported (any improvements to be reported at each governance meeting.
	End date	Final report on improvements 2 years after full BAU is achieved. (Ongoing surveys may be required)
Responsibility for reporting	Name	Grant Pollard
	Position	Group Manager, Population Health and Prevention
	Organisation	Ministry of Health

Appendix 4: Modelling potential costs of a measles-like illness where most New Zealanders are not vaccinated.

Modelling premise: if the NIR is not replaced and a significant illness occurs that could have been mitigated by an immunisation programme that had not been effective due to the failing NIR there is a monetary cost to New Zealand that could have been avoided. To demonstrate this potential avoidable cost the approach taken was to define and model the impact of a measles-like outbreak, using published data from the 2014 measles outbreak[84],[85] These results have been grouped into the Wellbeing Domains as part of the Living Standards Framework (LSF) and are listed in the Appendices.

The following benefits are indicative of the reduction in negative impact, when compared with the counterfactual (in which no investment made), noting that in that counterfactual, it is expected:

- The current solution will become untenable, either through lack of availability or inability to respond to required change, if it is not replaced before it becomes unsupported in March 2022
- In the event of an outbreak after March 2022, records currently held in the solution may not be accessible
- In the event of an outbreak after March 2022, there will be no national register to support a public health response.

[84] Hayman DTS et al. Cost-benefit analyses of supplementary measles immunisation in the highly immunized population of New Zealand. Vaccine (2017), http://dx.doi.org/10.1016/j.vaccine.2017.07.077

[85] See Appendix 4 for more details of potential avoidable costs

Table 10: Monetary benefits – avoided costs. Indication of NIR supports broader issues

Domain	Description
Health Primary	**Avoided public health response costs through outbreak prevention** If a significant outbreak were to occur and New Zealand did not have a functioning NIR, the health sectors ability to run a controlled, efficient, public health response would be compromised. This would mean the cost of the response would be increased significantly and less people would be immunised. By investing in the NIR and ensuring it is fit for purpose, the impact of a potential outbreak is mitigated. **Avoided hospital costs through outbreak prevention** Following from the impact above, the number of hospital admissions in the event of an outbreak would also be significantly increased. By investing in the NIR and ensuring it is fit for purpose, the impact of a potential outbreak is mitigated. Total modelled public health costs avoided: **$943.0m** Total modelled hospitalisation costs avoided: **$170.5m**
Jobs and earnings Secondary	**Avoids lost wages and earnings through outbreak prevention** By avoiding an outbreak, lost wages and earnings due to that illness are also avoided. Total modelled lost wages avoided: **$489.5m**

The benefits modelled below are based on an outbreak of a new, measles-like illness for which the majority of New Zealanders were not vaccinated. This presents the 'worst case' scenario if the NIR was not replaced. Modelling is based on assumptions from analysis of the 2014 measles outbreak[86]; with figures adjusted for December 2019.

Domains	Impact(s) description	Who are affected?	Magnitude of impact	How big?	Realised	Evidence quality
Health Primary	Prevented hospital visits	Government – District Health Boards	17% of cases require hospitalisation, totalling 85,000 additional hospitalisations per year Each hospitalisation costs $2,006	$170m p.a. during outbreak	From date of delivery	Medium
Primary	Prevented public health response costs	Government – GPs / primary care	Assuming 10% infection rate – 500,000 cases per year Each case has a public health response cost of $1,886	$943m p.a. during outbreak	From date of delivery	Medium
Jobs and earnings Secondary	Prevented lost work and productivity	Parents or carers of those infected, or the infected themselves	Each case costs an average of $979 in lost wages	$489m p.a. during outbreak	From date of delivery	Medium
Knowledge and skills Secondary	School attendance and learning	Government – schools	Less disruption of schooling. Low vaccination rates make schools and pupils vulnerable for disruptions.	Moderate	From date of delivery	Medium

[86] Hayman DTS et al. Cost-benefit analyses of supplementary measles immunisation in the highly immunized population of New Zealand. Vaccine (2017), http://dx.doi.org/10.1016/j.vaccine.2017.07.077

Appendix 5: Summary presentation of Long List options assessment

	Scope					Solution			Delivery			Funding		
Description	Status quo	Repository only	Plus Immuniser web portal	Plus missed event mgmt	Plus public web portal	Build new	New COTS / SaaS	Reuse NSS	Ministry only	Ministry + vendor	Vendor only	Existing Ministry	Crown funding	Private built & licensed back
Objective 1 – Service and equity improvement	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Objective 2 –WoL data and appropriate access	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Objective 3 – lower technology risk	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Strat fit & bus needs	No	Partial	Yes	Yes	No	No	Yes	Yes	No	Yes	No	Yes	Yes	Partial
Potential value for money	No	Partial	Yes	Yes	No	Partial	No	Partial	Yes	Yes	Partial	No	Yes	No
Supplier capacity and capability	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes
Potential affordability	Yes	Yes	Yes	Yes	No	Partial	Partial	Yes	Yes	Yes	Partial	No	Yes	No
Potential achievability	Yes	Yes	Yes	Partial	No	Partial	Partial	Yes	No	Yes	No	No	Yes	No
Overall assessment	Shortlist	Discard	Shortlist	Shortlist	Discard	Discard	Discard	Shortlist	Discard	Shortlist	Discard	Discard	Shortlist	Discard
Shortlisted options														
Status quo														
Replace and maintain														
Replace and improve														

Option	Positives	Negatives
Scope option 1 – Status quo **Shortlist**	Nil	• Does not deliver investment objectives • Does not Ministry or Government strategy • Supplier capacity and capability not available in market.
Scope option 2 – Replace repository **Discard**	• Lowers technology risk by shifting core data on to a modern platform (investment objective 3) • Suppliers available in market to deliver and support project and solution.	• Without Missed Event Management functionality, cannot deliver service and equity improvements (investment objective 1) • Without delivering immuniser web portal, cannot expand access to all vaccinators. This prevents a whole-of-life immunisation data approach being enabled (investment objective 2) • Only partially meets strategic fit and business needs, as does not support digitisation of records or ISSP principles (specifically: design for the customer, services first).
Scope option 3 – Replace repository, immuniser web portal **Shortlist**	• Enables whole-of-life immunisation data set (investment objective 2) • Lowers technology risk by shifting core data on to a modern platform (investment objective 3) • Suppliers available in market to deliver and support project and solution.	• Without Missed Event Management functionality, cannot deliver service and equity improvements (investment objective 1).
Scope option 4 - Replace repository, immuniser web portal, add missed event management functionality **Shortlist**	• Can meet all investment objectives • Can meet all critical success factors.	• Larger scope may compromise timeframe.
Scope option 5 - Replace repository, immuniser web portal, add missed event management functionality, public web portal **Discard**	• Meets all investment objectives • Suppliers available in market	• Does not meet strategic fit – would replicate proposed functionality for NHIP • Does not demonstrate value for money or affordability if replicating functionality • Is likely unachievable in the timeframe required.
Solution option 1 – Build a new system **Discard**	• Can meet all investment objectives	• Does not meet strategic fit (use SaaS as available to enable responsiveness to change) • Is unlikely to provide value for money • Likely to be unachievable within current timeline.

Solution option 2 – Buy a new COTS/SaaS system **Discard**	• Can meet all investment objectives	• Not aligned to Ministry strategy, specifically, maximising value from existing investments • Is unlikely to deliver value for money, as existing integrations and security frameworks would need to be replicated in the new system • May not be achievable in the timeframe if replicated work mentioned above is required.
Solution option 3 – Reuse existing system **Shortlist**	• Can meet all investment objectives	• NSS solution is more complex than known requirements for NIR, licensing may be more expensive than using a simpler solution.
Delivery option 1 – Ministry resources only **Discard**	• Can meet all investment objectives	• Does not meet business needs (and subsequently, supplier capability or capacity, or achievability), Ministry capability will not be able to deliver solution alone, nor upskill to the level required in the time available.
Delivery option 2 – Ministry and vendor resources **Shortlist**	• Can meet all investment objectives • Can meet all critical success factors	Nil
Delivery option 3 – Vendor resources only **Discard**	• Can enable whole-of-life immunisation data set (investment objective 2) • Can lower overall technology risk (investment objective 3)	• Is unlikely to enable significant service or equity improvement without Ministry involvement (investment objective 3).
Funding option 1 – Use existing Ministry funds **Discard**	• Can meet all investment objectives	• Funding is not available in current Ministry baselines (value for money, affordability, achievability).
Funding option 2 – Crown funding **Shortlist**	• Can meet all investment objectives • Can meet all critical success factors	Nil
Funding option 3 – Vendor funds build cost and licences back to the Sector **Discard**	• Can meet all investment objectives	• This may not deliver to business needs if developed independently • This is unlikely to deliver value-for-money if Ministry and sector resource are not utilised in design • This is unlikely to be achievable in the time required.

	Option description	Result
Scope	1. Status quo – leave existing technology in place.	**Short-list**
	2. Replace the data repository only, reintegrate to existing systems.	Discard
	3. Replace existing data repository, web-based portal for vaccinators and re-integrate other existing services.	**Short-list**
	4. Replace existing data repository and the web-based portal for vaccinators, add missed event management capability, and re-integrate to existing services.	**Short-list**
	5. Replace existing data repository and the web-based portal for vaccinators, add missed event management capability, create a public access portal and re-integrate other existing services.	Discard
Solution	1. **Build a** solution which is supported wholly by the Ministry.	Discard
	2. Procure and implement a new commercial-off-the-shelf or software-as-a-service **(COTS/SaaS)** solution, managed jointly by infrastructure providers and the Ministry of Health.	Discard
	3. Reuse an existing **National Screening Service (NSS)** solution.	**Short-list**
Delivery	1. **Ministry only team** – all project resources (technology and subject matter experts) are sourced from within the Ministry.	Discard
	2. **Mixed team** – project resources are sourced from either the Ministry or a vendor, as is best meets project needs.	**Short-list**
	3. **Vendor only team** – all project resources (technology and subject matter experts) are sourced from an external vendor.	Discard
Funding	1. **Existing Ministry baseline** – fund the project and ongoing opex requirements out of existing Ministry funding.	Discard
	2. **Crown funded** – request new funding through appropriation.	**Short-list**
	3. **Privately funded, solution licensed** back to Ministry – procure a new solution which is built and maintained by a vendor and licensed back to the Health Sector.	Discard

Appendix 6: Senior Responsible Officer's letter

October, 2020

To whom it may concern

Ministry of Health: National Immunisation Register Replacement Single Stage Business Case

This Single Stage Business case is a significant deliverable of a strategic project to investigate value for money options to meet its future requirements.

I confirm that:

- I have been actively involved in the development of the attached investment proposal through its various stages
- I accept the strategic aims and investment objectives of the investment proposal, its functional content, size and services
- the indicative cost and benefit estimates of the proposal are sound and based on best available information
- the financial costs of the proposal can be contained within the agreed and available budget.

This letter fulfils the requirements of the current Better Business Cases guidance. Should either these requirements or the key assumptions on which this case is based change significantly, revalidation of this letter of support should be sought.

Yours sincerely

Deborah Woodley
Deputy Director-General
Population Health and Prevention

Appendix 7: Removed

Appendix removed – no longer required

Appendix 8: Referenced documents

Where possible, documents referenced in this case have been embedded below.

Title	Document
Cost-benefit analyses of supplementary measles immunisation in the highly immunized population of New Zealand	
Davanti report: National Immunisation Register: Salesforce Capability Analysis, dated 10/2/2020	
WHO IMMS competencies	
Equity data	
Monetary benefits calculation	
Excel spreadsheet supporting Financial Case estimates	