



## Terms of Reference

Audit COVID-19 data analytics and modelling  
Final Version 8 December 2022

### 1 Background and purpose of the audit

#### 1.1 Background

The National Institute for Public Health and the Environment (RIVM), works towards a healthy population living in a sustainable, safe and healthy environment. RIVM pursues those goals based on independent scientific research. Working with our commissioning clients, we identify the research that is needed and conduct studies accordingly. RIVM provides advice to the government, to professionals and to members of the public, and shares knowledge. This is how RIVM supports society in staying healthy and keeping our environment healthy.

To assess whether the activities of the RIVM comply with current scientific standards, an independent assessment (audit) is organized regularly for each field of work or expertise. An audit on the quality and relevance of the work of the RIVM fulfils a duty of accountability towards government and society. Audits are organized by the independent Scientific Advisory Board (Commissie van Toezicht) of the RIVM, supervising its research quality and independence, and conducted by an external audit committee. The Executive Board of the RIVM decides how it will follow up on the external audit committee's recommendations.

In April 2022, the Scientific Advisory Board decided to conduct a scientific audit into the RIVM's activities in COVID-19 data analytics and modelling. COVID-19 was first noticed in December 2019 in China, the first case in the Netherlands was reported on February 27<sup>th</sup> 2020. The disease threatened to overwhelm the health care infrastructure in the Netherlands. The epidemic waves led to strict control measures that affected society at large. When vaccines became available in 2020-2021, a large-scale vaccination program was implemented. The advice for infection control in the Netherlands has been informed to a large extent by the data collection, data analysis, modelling and interpretation conducted at RIVM's Center for Infection Disease Control. The audit primarily focuses on the work that has been carried out by the Center for Infectious Disease Control of the RIVM.

RIVM

A. van Leeuwenhoeklaan 9  
3721 MA Bilthoven  
Postbus 1  
3720 BA Bilthoven  
[www.rivm.nl/en](http://www.rivm.nl/en)

T 088 689 91 11

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This study is commissioned by the Scientific Advisory Board of the National Institute for Public Health and the Environment (RIVM) as part of an international scientific audit on COVID-19 data analytics and modelling.

For the current audit the Executive Board of the RIVM appointed an internal project team to set up the audit and prepare all supporting tasks. Members of this team are directly involved in the work related to the subject of this audit. Two members of the Scientific Advisory Board have been appointed as Liaison Officers who have daily oversight of the audit.

Parties involved in the audit are:

- the [Executive Board](#) / Board of Directors RIVM (BoD)
- the [Scientific Advisory Board](#) (SAB)
- the audit committee (AC)
- a selection of stakeholders of COVID-19 data analytics and modelling
- the project team (PT)

The Terms of Reference (this document) specifies the purpose and criteria of the assessment, the overall schedule of the assessment procedure and the responsibilities of the audit committee.

## **1.2 The roles of RIVM**

The RIVM operates at the interface of science, policy, and society. It accepts or declines research commissions based on its values (public health, scientific independence, and transparency), and depending on the available expertise and the available staff. To carry out these tasks properly, it needs both up-to-date scientific knowledge (and the ability to generate it) and an up-to-date understanding of developments in policy and society and of specific target groups such as patients. RIVM operates in networks working closely together with stakeholders.

In general, the work of RIVM focuses on research, policy support, information provision, monitoring and surveillance, crisis and incident management, and program coordination. A brief description of these roles can be found below.

### **1.2.1 Research**

Scientific knowledge forms the basis for the execution of all RIVM's tasks to society. This knowledge is gathered by RIVM itself, commissioned by RIVM, or collected by RIVM from elsewhere. Additionally, the RIVM uses a part of its funding for its own Strategic Programme RIVM (SPR) for innovative scientific research and preparations to respond to future issues in health and sustainability .

### **1.2.2 Policy advice**

Based on the scientific evidence or advice of the RIVM, commissioners aim to make evidence-based or evidence-informed policy. For the RIVM, the term policy is used in a broad sense. It often implies advice on implementation or inspection issues.

### **1.2.3 Information provision**

To fulfil its role as a trusted advisor to 'society at large', information provision to citizens, non-governmental organizations (NGO's), (inter)national stakeholders, media, professionals etc. is a crucial part of the RIVM's role.

### **1.2.4 Monitoring and surveillance**

Monitoring and surveillance concern continuous, systematic collection, analysis and interpretation of data and observing and checking the progress or quality of something e.g., public health. For RIVM for example this role is visible in networks for monitoring air quality, surveillance of infectious diseases, identifying new risks in innovative technologies.

### 1.2.5 Crisis and incident management

An important aspect of crisis and incident management evaluation is whether crisis and incident management initiatives, carried out by RIVM, were timely and resulted in a trusted intervention. Crisis and incident management initiatives are considered successful when they “follow pre-anticipated and/or relevant processes and involve the taking of decisions which have the effect of minimizing loss of life/damage, restoring order and achieving political goals, while attracting universal or near universal support and/or virtually no opposition”.

### 1.2.6 Programme coordination

‘Programme coordination’ implies a form of steering, i.e., goal compliant influencing of social interactions that is based on alignment of actors, their goals, and their actions to create a coherent entirety, focused on a certain result. For example, RIVM coordinates programmes regarding population screening, such as screening for breast or colon cancer.

### 1.2.7 The roles of RIVM and this audit

A specification regarding the scope of this audit is made by indicating the applicable RIVM role(s) on which the audit is focused. The field of COVID-19 data analytics and modelling contributes specifically to research, policy advice, and monitoring and surveillance.

## 1.3 Purpose of the audit

The main objective of the audit is to determine the scientific quality and independence of the RIVM's work on COVID-19 data analytics and modelling. This work was used to inform advisory bodies (such as the Outbreak Management Team and the Health Council of the Netherlands) that offered advice on infection control. The audit is to assess scientific quality and independence, and suggest specific improvements to the process of data analytics and modelling and its use in policy advice; it is important for the audit committee to tailor their recommendations accordingly.

## 1.4 Scope and key questions

The scope of the audit concerns the COVID-19 data analytics and modelling for policy advice in The Netherlands, primarily focusing on advice provided to the ministry of Health Welfare and Sports, the Outbreak Management Team, and the Health Council of the Netherlands. The audit therefore covers the work of the RIVM from January 1<sup>st</sup> 2020 up to June 1<sup>st</sup> 2022. This includes the period when the COVID-19 pandemic was declared, when strict control measures were implemented, when a vaccination program was rolled out, and most measures were relaxed in the Netherlands. The audit includes the advice for the Caribbean parts of the Kingdom of the Netherlands, but excludes research projects on COVID-19 that have not yielded results that have been used for policy advice. The audit does not address the COVID-19 control policy by the government of the Netherlands, it does not address the organization of the scientific advice in the Netherlands with respect to infectious disease control, and it does not address the research and advice carried out by other actors with respect to the COVID-19 pandemic in the Netherlands.

As per the RIVM's audit guide and the new “Strategy Evaluation Protocol 2021-2027” (SEP 2021-2027), the evaluation should take account of the organization's own goals and strategy.

The scope of this audit into scientific quality and independence can be summarized in four main questions:

1. What is the scientific quality of RIVM's work on COVID-19 data analytics and modelling for policy advice? Quality addresses the type of models, the relation between model and data, the predictive performance of models when relevant,

the quantification of uncertainty, the participation in international consortia, the documentation of models and publication of results.

2. Were the resources adequate for conducting this work? Resources include access to data streams, IT infrastructure, expertise and capacity within the RIVM team.
3. Did the advice allow for informed public-health decision making by the government? This addresses the types of questions asked, the communication of advice to relevant stakeholders and the general public, the communication of uncertainty.
4. Was the outcome of RIVM's work on COVID-19 data analytics and modelling affected by influences from actors who have an active interest in specific outcomes, such as the government, ministries or pharmaceutical industry? Scientific independence is interpreted as that choice of methods and reporting of outcomes have not been affected by these actors; according to the law on the RIVM the government and ministries can commission research on specific topics, but they cannot determine how research is carried out.

### **1.5 Criteria of the assessment**

As per the RIVM Audit Guide, the following evaluation criteria should be considered when performing an audit:

- a) research quality,
- b) operational quality
- c) relevance to society,
- d) integrity,
- e) viability and future proofing,
- f) open science,
- g) timeliness,
- h) and human resources.

The evaluation criteria and how they can be used will be further described in the paragraphs below.

These evaluation criteria depend on the six RIVM roles as described in paragraph 1.2. As previously stated, these roles are not all equally relevant for this audit. The roles that are particularly relevant in the context of COVID-19 data analytics and modelling are research, policy advice and monitoring and surveillance.

Most of these evaluation criteria connect with the four key questions on the RIVM COVID-19 data analytics and modelling, as illustrated in Table 1: evaluation criteria a connects to key question 1; evaluation criteria e and h connect to key question 2, evaluation criteria c and g connect to key question 3, and evaluation criteria d connects to key question 4. The remaining evaluation criteria b and f are cross-cutting over the key questions. Of these, the criteria of operational quality is regularly audited under International Organization for Standardization (ISO), e.g., ISO9001 and requires less emphasis in this audit. Some of the criteria have been audited and reported in 2017 (Research review mathematical health modelling RIVM) and may only require an update in this audit. The evaluation criteria and how they can be used will be further described in the paragraphs below.

*Table 1 The scope of the audit, with four main questions and eight criteria of the assessment*

	<b>1 scientific quality</b>	<b>2 resources</b>	<b>3 enabling informed decision making</b>	<b>4 scientific independence</b>
a research quality	X			
b operational quality	X	X	X	X
c relevance to society			X	
d integrity				X
e viability and future proofing		X		
f open science	X	X	X	X
g timeliness			X	
h human resources		X		

### 1.5.1 Research quality

According to the SEP 2021-2027, research quality, the central theme in key question 1 addresses the quality and scientific relevance of the research, academic reputation, and marks of recognition from peers for researchers or research products.

Typical aspects of COVID-19 data analytics and modelling at RIVM are an integrated approach to data collection, data analysis and modelling to interpret the state of the epidemic and to analyze the effectiveness of control measures and to advise on infection control. Some of the work is specifically tailored to the setting in the Netherlands, some of this effort has been carried out as part of an international collaboration. The suitability of this approach can be assessed by several indicators, including the predictive performance of the resulting model projections, and whether research findings have been used in subsequent research by other teams. Such an assessment requires an international perspective.

Scientific publications are part of the work on COVID-19 data analytics and modelling, this is often done as a by-product and not the main objective. The audit will not include a full bibliometric analysis of the RIVM team, but the self-assessment will include an overview of publications (in peer-reviewed journals, as preprints or as reports, with number of citations (according to google scholar or equivalent)). The scientific quality of the research aims to back up policy advice. Examples of COVID-19 data analytics and modelling used for advice will be provided in the self-assessment, together with documentation for data sets, models and code will be provided in the self-assessment.

### 1.5.2 Viability and future proofing / human resources

The findings on viability and human resources relate to key question 2. Viability tells us how future proof an organization or product is. According to the SEP 2021-2027, it is "the strategy and vision and the position in the field that the unit, or in this case a broad and multidisciplinary project team, intends to pursue in the years ahead and the extent to which it is capable of meeting in research and society during this period". Viability and future proofing address whether the RIVM is capable of providing policy support and whether it will also be able to provide policy support in the future. It concerns e.g., an analysis of strengths and weaknesses on strategic planning, investments and collaboration, research topics planned for the near future and their perspectives, flexibility and anticipation of expected changes, research facilities (including IT infrastructure), financial resources, and expertise within the institute. A description will be provided in the self-assessment. A component for future proofing is 'quality assurance' and accountability. Data, methods, processes, outcomes and uncertainties, should be documented and accessible such that the results can be reproduced. A description of the quality assurance procedures, practices and checklists will be provided in the self-assessment.

### 1.5.3 Relevance to society / timeliness

Whether the knowledge generated with COVID-19 data analytics and modelling is communicated efficiently will be assessed according to question 3. The societal relevance of COVID-19 data analytics and modelling can be evaluated by assessing the impact of the research on the work of policy makers, and other stakeholders, and (indirect) society at large. The self-assessment will include examples of how advice was communicated to policy makers, with special attention to the communication of uncertainty in outcomes, and the timelines of the question and answers to address the timeliness. The stakeholder assessment will provide input on how stakeholders perceived the advice. As COVID-19 data analytics and modelling acts as a base for decision making, its role in evidence-informed policymaking is self-evident. Although the primary target audience of COVID-19 data analytics and modelling are policymakers, the studies are relevant for many other audiences as well. The extent to which COVID-19 data analytics and modelling conveys its information can be assessed by defining various products and processes as indicators of societal relevance and impact. For example, membership of (inter)national advisory committees, publications in magazines for professionals, presentations for professionals, interviews in the national media, articles in media about the advice.

### 1.5.4 Integrity

The evaluation of research integrity, as well as the way that COVID-19 data analytics and modelling core team facilitates the relevant actions and requirements formulated in the Netherlands Code of Conduct for Research Integrity, will provide input on question 4. The COVID-19 data analytics and modelling core team is tasked to independently develop a comprehensive and balanced picture of state of the pandemic and reflect on possible control policies. The Center for Infectious Diseases stated in its Strategy for 2016-2021 that commissioning clients have no influence on the research methods and results of studies, or whether results will be published. Relevant evaluation criteria in this respect are e.g., data integrity as well as the extent to which an independent and critical pursuit of science is made possible and how the COVID-19 data analytics and modelling-team has dealt with relevant dilemmas, for example how disputes with the commissioner or other parties are resolved, how conflicts of interests are prevented, how the internal quality assurance is arranged.

### 1.5.5 Generally relevant criteria: operational quality / open science

The criteria operational quality and open science will be addressed when considering the central themes scientific quality and independence, which are addressed by all four questions. For example, for the criteria within "operational quality", the capabilities at the center of infectious disease epidemiology and surveillance should result in a project team with the appropriate knowledge and expertise that is necessary for the data analytics and modelling. Most of the data collected for COVID-19 surveillance and monitoring and data from COVID-19 studies contain sensitive personal information which can only be shared publicly in an anonymized and aggregated format according to the General Data Protection Regulation(GDPR). An important task of the COVID-19 data analytics and modelling team at the RIVM is to convert available data into anonymized, aggregated data sets that can be shared publicly. Whenever possible, the products, from data set to report, should be available as open access; the methods and models used should be transparent. Relevant evaluation criteria in this respect are which obstacles have been encountered in acquiring data sets and making information available in line with both the regulations for data protection as well as the guidelines for open science, and how these obstacles may be overcome in the future.

## 2 Approach

### 2.1 Setup of the audit

The applied setup of the audit is based on:

- 'Strategy Evaluation Protocol' (SEP 2021-2027)
- 'Guide for external evaluations at the National Institute for Public Health and the Environment of the Netherlands [RIVM]' (which is based on SEP 2021- 2027)

If there are significant deviations from either the SEP 2021-2027 or the RIVM Audit Guide, then the reasons will be given. The working language for the audit will be English.

### 2.2 Elements and planning

The approach to the Audit is based on existing practice and experience with audits within RIVM and the two protocols mentioned in 2.1. The steps to be taken, according to the audit scenario, are given below, as well as the actors and timeline.

List of abbreviations:

AC	Audit Committee
SAB	Scientific Advisory Board
BoD	Board of Directors RIVM /Executive Board
PO	Portfolio Owner (Director RIVM/CIB, Jaap van Dissel)
PL	Project Leader (Agnetha Hofhuis from RIVM interim pool)
PT	Project Team (members hired at RIVM)
CO	Case officer (from RIVM interim pool)

Activity	Actor	Advice to	Month/Yr
Appointment of liaison officers from the Scientific Advisory Board	SAB		Apr 2022
Put together a project team	PL		September 2022
Formulate the principles (scope, functions, framework)	PT	BoD, SaB	May 2022
Prepare the budget	PL		August 2022
Draw up an action plan	PL, PT		August - October 2022
Request meeting schedule SAB en BoD	PL		August 2022
Put together the AC – proposal to SAB	PL	BoD, SAB	June 2022
Define the principles, action plan and composition of the AC	SAB	BoD	June 2022
Contact with the proposed chair of the AC	PL, PT		September 2022
Contact with the proposed AC members, after consulting the proposed chair	PL, PT		September 2022
Kick-off meeting with PT	PT, PO		October 2022
Drawing up the terms of reference	PT		June 2022
Adopting the terms of reference	SaB	BoD	June 2022
Budget approval	PO		September 2022

<b>Activity</b>	<b>Actor</b>	<b>Advice to</b>	<b>Month/Yr</b>
Start drafting and implementing the self-assessment	PT		October 2022
Start of the stakeholder assessment: part I – getting a picture of the stakeholders	PT		September 2022
Completion of part I of the stakeholder assessment	PT		October 2022
Setting the audit date; formal invitation to the AC	CO	BoD	October / November 2022
Drawing up the provisional online audit programme	PL, CO		November 2022
Organization of the online AC visitation	CO		Q4 2022 – Q1 2023
Preparing online meeting. Signing the AC chair and secretary in at reception, reserving rooms, laptops, lunches/snacks, specific elements of the programme, etc.	CO		Q4 2022 – Q1 2023
Start of the stakeholder assessment by external bureau AEF: part II – interviews	PT		October / November 2022
Completion of the self-assessment	PL		October / November 2022
Completion of the stakeholder assessment by AEF	PL		December 2022
Annotation of progress report to be sent to the SAB for discussion by the BoD:	PL,CO	BoD	28 November 2022
To be sent to the SAB for discussion within the SAB: self-assessment, stakeholder assessment, audit programme	PL,CO	SAB meeting 15 Dec'22	8 December 2022
Formal acceptance of the self-assessment, stakeholder assessment and audit programme	SAB		15 December 2022
Documentation to be sent to the AC	CO		February 2023
Finalized audit programme to be sent to the AC	CO		Q1 2023
Audit carried out at RIVM. AC-secretary facilitates 4 days online and for locals at the RIVM	AC	PT	20-24 March 2023

<b>Activity</b>	<b>Actor</b>	<b>Advice to</b>	<b>Month/Yr</b>
Reporting by the AC during the audit. AC-Secretary facilitates	AC	Sec	20-24 March 2023
Intermediate report to the SAB on preliminary findings & outcomes from the AC-visitation.	AC-chair	SAB meeting 20 April'23	20 April 2023
Send final audit report to PL	AC		May 2023
Final audit report plus PL's response to be sent to the SAB to inform the BoD	PL,CO	BoD	May 2023
Final audit report discussed in the SAB (preferably attended by the AC chair or AC secretary)	SAB meeting 13 June'23, AC		June 2023
Start follow-up actions resulting from the audit	PT		September 2023
Publication of final audit report: website, annual report, etc.	BoD		September 2023
Financial settlement	PL, CO	PH	Q4 2023
Report on the follow-up actions sent to the SAB for discussion by the BoD	PL, SAB	BoD	September 2024
Report on the follow-up actions sent to the SAB for discussion within the SAB	PL, CO		September 2024
AC informed of the follow-up actions	SAB		Q4 2024

### **2.3 Preconditions for the planning**

The assumption for the planning is that the inspection by the audit committee will be held in the third quarter of 2022.

We anticipate that this inspection is only feasible on such a short notice when we allow for the audit committee to conduct their work online with a remote site visit.

This means that the results of the Audit will be presented to the RIVM Scientific Advisory Board in December 2022. If it is not feasible to adhere to the abovementioned schedule this will be communicated to the Scientific Advisory Board.

### **3 Process**

#### **3.1 Principles**

The Scientific Advisory Board is responsible for the audit. The Centre for Infectious Disease Control is responsible for the preparing the documentation and for supporting the audit. A project team will carry out the audit process internally. The project team is responsible for the content of the evaluation. The project team also includes a case officer for the practical and logistical issues.

#### **3.2 Process steps**

The steps to be taken in the audit process are:

1. Determining the principles
2. Selecting the Audit Committee (external to RIVM)
3. Self-assessment by the organization
4. Stakeholder assessment
5. Site visit (with a possibility to do this remote for all members of the Audit Committee)
6. Analysis of the results
7. Evaluation report
8. Publication
9. Follow-up

The process will largely be sequential in nature, as virtually all steps proceed from the previous step. This means that there will be little or no opportunity to carry out activities in parallel. It is therefore important that the planning is realistic and that this should be closely monitored during the entire process.

The steps 3-9 will be explained in the following paragraphs. Steps 5, 6 and 7 will be conducted by the Audit Committee. Preparation for the audit will be carried out by the Audit Committee.

#### **3.3 Determining the principles and Selecting the Audit Committee**

The principles of the audit, including the scope and the questions to be answered, are determined and described in this document, the Terms of Reference.

The external audit will be performed by an Audit Committee. The project team suggests candidates for the audit committee to the Scientific Advisory Board of RIVM. The Scientific Advisory Board then appoints the members of the audit committee. The composition of the audit committee is based on the conditions set for the members of the committee in accordance with the audit guidelines and on the principles of the audit.

#### **3.4 Self-assessment by the organization**

A self-assessment will be written by the project team. The self-assessment will contain at least:

- A description of the activities carried out by RIVM's COVID-19 data analytics and modelling, the team that has conducted these activities, the relevant areas of expertise and the challenges; this will be broken down for the various stages of the epidemic over the entire 2.5 year period from January 2020 to June 2022.
- An overview of the questions received from policy makers, and data requests from researchers.
- A brief summary of the legal basis for the COVID-19 data analytics and modelling at RIVM in the Netherlands.
- A brief motivation for the approach to COVID-19 data analytics and modelling taken by the RIVM.
- A brief assessment of issues with data acquisition, data sharing, regulations for data protection, the impact that these issues had, and possible future ways to address those issues.

- An overview of the critique from various sources (opinion makers, politicians, journalists, scientists) and the response provided.
- An overview of the various models and scripts that have been used, quality control, publication, (if relevant) performance measures
- An overview of the web sites, reports, scientific publications, advice that were generated.
- A SWOT analysis focusing on internal Strengths and Weaknesses and external Opportunities and Threats.
- Relevant parts of a recent scientific audit of Health Modelling at the RIVM, carried out in 2016

### **3.5 Analysis of the stakeholders**

The Stakeholder Assessment focuses on the interaction between RIVM and its environment in the context of COVID-19 data analytics and modelling. For the purpose of the Stakeholder Assessment, the most relevant stakeholders will be identified. The policy advice based on COVID-19 data analytics and modelling is created with input from experts inside and outside the RIVM, within and outside the Netherlands — scientists, professionals and policy makers working at universities, knowledge institutes, healthcare and public health organizations, advisory councils, governments and intragovernmental agencies.

The analysis of stakeholders consists of two parts:

1. Identifying relevant stakeholders and their role with respect to RIVM's COVID-19 data analytics and modelling by the project team
2. Structured interviews with those identified stakeholders, performed, analyzed and reported by an external and independent bureau [AEF](#). This stakeholder report will be published on the RIVM website (see §3.9).

### **3.6 Organizational preparations for the audit**

The organizational preparation of the audit consists of the following steps:

1. Identifying and selecting interviewees (both from within the organization and external stakeholders) who will provide qualitative input for the audit.
2. Planning the audit days (scheduling the interviews between the audit committee and interviewees from either the to be evaluated organization or the external stakeholders).
3. In coordination with the chair of the audit committee, a compressed overview of relevant information is made for members of the audit committee. The self-assessment is an important part of this. The members of the audit committee also receive the audit protocol, background information about the interviewees and an explanation of the audit programme.
4. In consultation with the chair of the audit committee, a concise discussion guideline is drawn up for the parties to be interviewed, so that they can prepare for the interview. This discussion guide can be sent to the parties to be interviewed together with the invitation for the interview.
5. Members of the audit committee prepare by studying the audit protocol, self-assessment and other background information.

### **3.7 Audit carried out by the Audit Committee**

The audit committee will be asked to perform the audit online or at the RIVM for tree tp four consecutive days. During these audit days, the following steps will be taken:

1. Kick-off meeting audit committee: run through procedures and discuss the results based on the documentation received in advance (Terms of Reference, self-assessment and stakeholder assessment). A Liaison Officer and the chair of the

SAB will be present at the start to provide a short introduction into this audit and to answer any questions.

2. Interviews with employees of the organization to verify and/or supplement the information provided. For example:
  - The director/management of the unit
  - The head/heads of the research groups in the unit
  - A number of staff members (tenured and non-tenured)
  - Liaison Officers from the Scientific Advisory Board
3. Interviews with the clients and/or important stakeholders (external stakeholders) to verify and/or supplement the information provided.
4. Evaluation by the audit committee, in which key findings are identified.
5. (Oral) feedback of the findings by the audit committee to the organization and opportunity for response by the organization. A Liaison Officer and the chair of the SAB will be present.

### **3.8 Analysis and reporting**

The audit Committee analyses the results of the visit to the RIVM. Based on this analysis, as well as the Terms of Reference, the self-evaluation and the stakeholder assessment, answers to the four main questions are formulated by the Audit Committee. With this analysis, the Audit Committee assesses COVID-19 data analytics and modelling against the main audit criteria.

A general outline for the audit report according to the SEP 2021-2027 will be provided to the Audit Committee with the request to follow this outline as much as possible (for the sake of readability and comparability with other audit reports). During the audit, the secretary of the audit committee will make an initial draft of the audit report. The chair leads the overall process of writing the audit report, supported by the entire audit committee.

The chair shares the audit report to the project leader for an adversarial procedure. Any (factual) inaccuracies will be corrected by the secretary. If there are more fundamental comments, the secretary and the chair will have to come to an agreement about this. The final audit report will be sent by the chair to the Scientific Advisory Board, who will make the report available to the Board of Directors of the RIVM

### **3.9 Publication**

According to RIVM's audit guideline, the final audit report must be published within six months of the audit committee's visit to RIVM. The Executive Board is responsible for this. With the proposed schedule (Chapter 2), publication will take place after about two months. This will be done in two ways:

1. The audit report will be published on the RIVM website, together with a response in which the Scientific Advisory Board takes a position on the results and in which it indicates what consequences it draws from the audit. Alongside, the stakeholder report will be published, which was produced by an external bureau.
2. The audit report is included in the annual report of the Scientific Advisory Board. This will include the scope, main conclusions, recommendations and follow-up actions of the audit.

### **3.10 Follow-up**

The Center for Infectious Disease Control is responsible for implementing this step, which looks at how RIVM will proceed with the results and recommendations from the audit report. The project team provides a response to the audit report that includes:

1. What actions the project team proposes.
2. How progress on these actions will be tracked.

It may be necessary for the project team to create an "action plan". In that case, such an action plan must be approved by the RIVM Executive Board. One year after the audit, the Scientific Advisory Board will take note of the progress of the actions.

### 3.11 Composition of the teams

#### 3.11.1 Project team and leadership involved

Project team:

- Dr. Agnetha Hofhuis, audit project leader from RIVM interim pool.
- Prof. Dr. Jaap van Dissel (I&V), Director of the Center for Infectious Disease Control.
- Prof. dr. Jacco Wallinga (I&V/EPI), head of the Modelling Unit, within the Centre for Epidemiology and Surveillance of Infectious Diseases.
- Dr. Susan van den Hof (I&V/EPI), head of the Centre for Epidemiology and Surveillance of Infectious Diseases.
- Four team members to assist the RIVM with writing the Self-Assessment.
- Audit case officer from RIVM interim pool.

#### 3.11.2 Audit Committee

The candidates for the audit committee will be international renowned experts in the field of infectious disease modelling and data analytics, with expertise in how to communicate the results and uncertainties of their scientific work and how to advise governments for public health policy making, preferably on COVID-19. The committee will consist of experts from abroad to provide an international perspective, and from the Netherlands.

The international audit committee will be chaired by Prof. André Knottnerus, of the University of Maastricht. Prof. Knottnerus has a background in clinical epidemiology and is familiar with our advisory system for public health policy decisions through his former role as president of the Health Council of The Netherlands from 2001 to 2010 and his former position as chair of the Scientific Council for Government Policy (WRR) from 2010 to 2017.

<b>Name</b>	<b>Organization</b> (country)	<b>Role in the Audit Committee</b>
Prof. Dr. André Knottnerus	University of Maastricht (NL).	Chair
Prof. Dr. P.J. White	Health Security Agency & Imperial College London (UK).	Member
Prof. Dr. B.F. de Blasio	Norwegian Institute of Public Health & University of Oslo (NO).	Member
Dr. V. Colizza	INSERM & Sorbonne Université (FR).	Member
Dr. W.G. van Panhuis	NIAID (USA).	Member
Prof. Dr. Juliet Pulliam	Stellenbosch University (SA)	Member
Prof. Dr. Andy Haines	London School of Hygiene & Tropical Medicine (UK)	Advising member
Prof. Dr. M. Lipsitch	Harvard School of Public Health & CDC Center for Forecasting and Outbreak Analytics (USA).	Advising member
Dr. Linda van den Berg	Washoe (NL).	Secretary to the AC