MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
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The National Research Information System: Conceptual Framework

Version 1.1 August 2018

New Zealand Government

Version History

Version	Date	Key updates
1.0	October 2017	
1.1	August 2018	Removing out-of-date references to the timeline

The National Research Information System: Conceptual Framework

August 2018

Ministry of Business, Innovation and Employment

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Acronyms and abbreviations used in this document

HRC	Health Research Council
MBIE	Ministry of Business, Innovation and Employment
MPI	Ministry for Primary Industries
NRIS	National Research Information System
OIA	Official Information Act 1982
ORCID iD	Open Researcher and Contributor ID
R&D	research and development
RS&I	research, science and innovation

1. What is the purpose of this document?

The purpose of this document is to provide a high level view of key aspects of the design of the National Research Information System. The information within this document describes the scope of data NRIS is designed to hold, sets out a common framework and vocabulary to describe the research, science and innovation system, and explains the approach to data transfer at a conceptual level.

These provide the framework within which future data requirements and data standards for NRIS will be developed. Publishing these is intended to help partner organisations assess the way business operations may need to adjust for data sharing in the future.

This document is intended to be read alongside the *NRIS Overview*. This conceptual framework informs the *NRIS Technical Documentation*, where readers can find information about data specifications (eg entities, elements and code sets), collection, management and its intended use.

2. What is the National Research Information System (NRIS)?

NRIS is an information hub where people can easily find information about research, science and innovation (RS&I) in New Zealand.

It will contain data sourced from organisations active in the New Zealand research, science and innovation system.

NRIS will help people answer questions such as: What projects are underway? Who is working on them? Who is an expert I can contact on a particular topic? What are they working on? How much is being spent on a particular area? Which areas need additional resources and support?

NRIS will initially contain information about research, science and innovation funded wholly, or in part, by the New Zealand government. As experience and confidence with the system grows, we expect information on other RS&I activities, such as privately-funded research, could be included.

NRIS is not a repository, ie it will not hold the actual results of research (such as published papers) or research data[1]. Most of the information about research, science and innovation that NRIS holds will come from funders such as the Ministry of Business, Innovation and Employment (MBIE) and the Ministry of Primary Industries (MPI), and research institutions such as Crown Research Institutes and universities.

In line with the government's information and data management principles, NRIS supports an open data[2] approach to research information, with information easily accessible and widely available. That said, some research information is commercially sensitive or raises privacy issues and needs protecting. When this need exists, such information will be protected within NRIS. Creating NRIS does not affect legal frameworks, such as what can be disclosed under the Official Information Act (OIA) or who makes decisions about disclosure.

NRIS is expected to be operational in 2018 with data from MBIE, the Health Research Council (HRC) and the Royal Society Te Apārangi. Over the next five years, we expect all major suppliers of data to be progressively integrated. As part of this process, we will help organisations meet data collection and quality standards.

Development is being led and managed by the Ministry of Business, Innovation and Employment (MBIE). The development and operation of NRIS is driven by a commitment to collaboration, co-governance and co-design. MBIE is working in partnership with the research, science and innovation sector, including the Māori research community, to build a system that benefits all participants and users.

1 Research data is data that is collected, observed, or created, for purposes of analysis to produce research results

[2] Open data is data that anyone can access, use or share.

2.1 What information will be in NRIS?

NRIS will contain information about the inputs to, and outputs of, research, science and innovation (RS&I) as well as the context in which research, science and innovation is conducted[3].

This includes information about:

- people, groups and organisations
- projects
- the funding environment
- facilities, equipment, and services
- events (such as scientific conferences and workshops or periods of observation or experiment)
- outputs and processes
- measurements and indicators including outputs, outcomes and impacts.

The information in NRIS excludes the results of research, science and innovation (ie data, copies of outputs etc). For example, NRIS will include information about who is doing a Master's or PhD thesis and the topic of their research, but not the actual thesis and associated data. This information may include data on where to find the results of RS&I activities.

[3] After CERIF – see "Research Information the CERIF approach" (section 4, Research information) downloaded 1 September 2017 from http://helios-eie.ekt.gr/EIE/bitstream/10442/13864/1/IJMSO_2014_CERIF_authorFinalVersion.pdf

2.2 Where do I find information about NRIS?

Three main sources of documentation describe NRIS

- NRIS Overview
- NRIS Conceptual Framework
- NRIS technical documentation

These documents are available at www.mbie.govt.nz search: 'NRIS'

Their purpose and update schedule are set out in the following table:

Table 1 Purpose and Review Schedule for NRIS documents

Document	Purpose	Current Version
NRIS Overview	Overview of the purpose, benefits and design of NRIS	Release 1.1 – August 2018
NRIS Conceptual Framework	Concepts and high-level data transfer model for NRIS	Release 1 – October 2017
NRIS technical documentation	Technical information on the development and operation of NRIS, including data standards and security view	NRIS Data Specifications (December 2017, minor document updates May 2018) Further releases on specific aspects of NRIS as they become available

2.3 What is in this document?

This document covers three key views of the system that provide the conceptual framework for Release 1 of NRIS:

- a high-level overview of NRIS
- the NRIS concept model and applications
- the NRIS data transfer model

These provide core information about how MBIE is approaching the design of NRIS, and will facilitate conversations with organisations as they prepare to join NRIS. It is important to note that these are not intended to represent (nor can they function as) NRIS technical requirements and specifications[4].

2.3.1. High Level Overview of NRIS

The High Level Overview of NRIS sets out the broad scope of the data NRIS aims to collect. This framework offers a generic and flexible way of describing the data NRIS is designed to hold, and is the basis of the NRIS Data Transfer Model described later.

2.3.2. Concept Model

The concept model is a structured representation of key concepts in the research, science and innovation sector and the relationships between these concepts.

To be able to have conversations about NRIS, ask questions and design the details of data standards, a shared concept of the research, science and innovation system is needed, along with a shared vocabulary. The concept model and associated definitions add structure and richness to the high level concepts.

Accompanying the concept model and definitions are some illustrations of how common funding processes can be described using the Concept Model and associated vocabulary.

2.3.3. Data Transfer Model

The Data Transfer Model is a flexible and generic approach to the transfer of data from data holders to NRIS. It reflects the scope of data set out in the High Level Overview. This model helps organisations plan for the future by setting out the high level entities that will be involved in data transfer as well as key concepts (unit records and unique identifiers) behind the data transfer approach.

[4] Technical requirements and specifications will be published as part of the *NRIS Technical Documentation*.

3. High Level Overview of NRIS

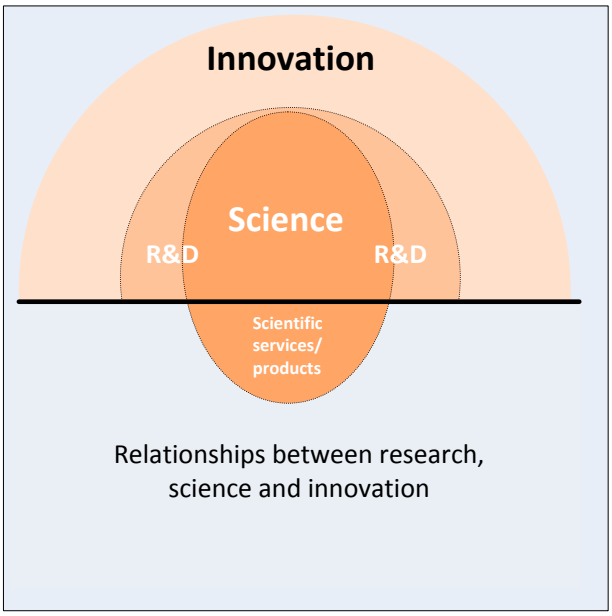
At its core, New Zealand's NRIS is being designed to hold data about people, organisations and resources involved with research, science and innovation. It acknowledges the myriad ways resources are found for research, the many different processes that occur within the research, science and innovation (RS&I) system, and the wide variety of outputs to which these give rise.

Whether we are talking about activities in the fields of genomics, supercomputers, education, jurisprudence or something else entirely, NRIS is being designed to hold and reflect data about these endeavours and how products of these endeavours are used.

Figure 1 on the right shows the relationship between research, science and innovation.

Innovation is the largest concept which includes all research and development (R&D) activities. Many R&D activities occur in the sciences, but R&D also includes research in the arts and humanities. Some science is not R&D, such as laboratory analysis, scientific monitoring and data management that are not part of R&D projects. This work can, however, underpin many R&D and innovation activities; hence they are included in the scope of this model.

Figure 1 Research, Science and Innovation

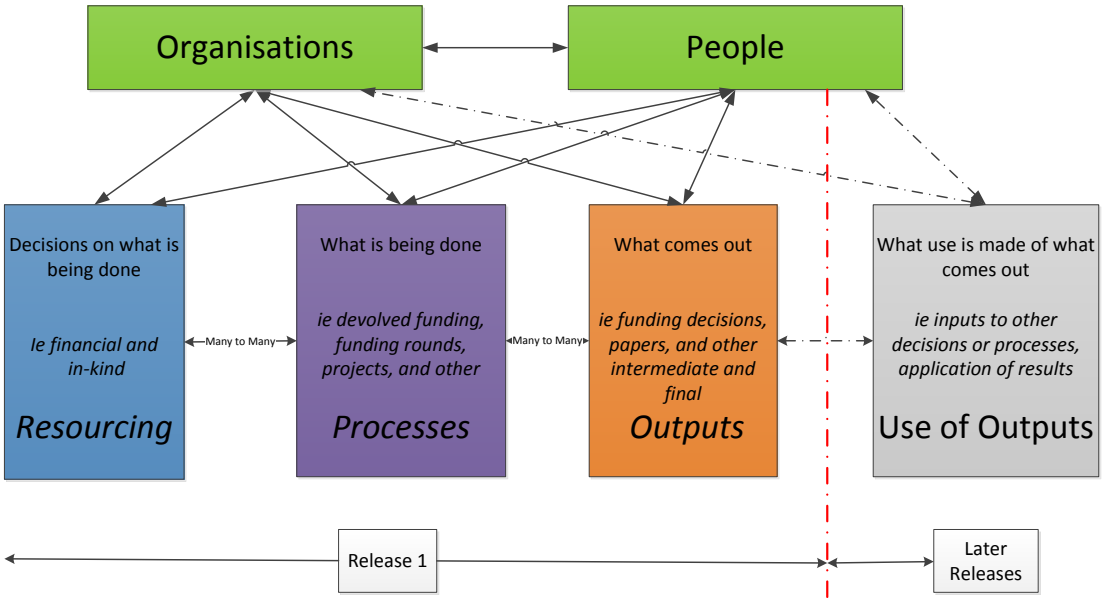


Relationships between research, science and innovation

At a conceptual level, the approach underpinning this is relatively simple and is illustrated in Figure 2 below. At its core, the end to end RS&I process includes decisions about what is being done and how it will be resourced (the far left box, "Resourcing"); what is being or planned to be done ("Processes"); what comes out ("Outputs"); and ultimately, what use is made of what comes out ("Use of Outputs").

People and Organisations interact with the RS&I system in different ways at different points in the RS&I processes. Version 1 of the *NRIS Conceptual Framework* expands on how people and organisations interact with resourcing, processes and outputs. Later versions will expand on the use of outputs.

Figure 2 High Level Overview of NRIS



There are several key points to note about this view of the research, science and innovation (RS&I) system:

- The RS&I lifecycle is not linear – there may be multiple points in time where resourcing decisions are made. For example, when a project receives resources (financial or in-kind) from multiple sources or when work is subcontracted to another organisation, there are many decisions made about what is to be done to produce something. NRIS is designed to capture this while avoiding an undue burden on any one organisation's record keeping.

- By extension, the concept of "processes" as expressed in Figure 2 extends beyond conducting projects. Sub-contracts are a type of process, as is administering a fund or making decisions within a funding round. The latter processes produce resourcing decisions. Equally, sometimes a decision is made to *transfer* resources to another organisation so that they can distribute resources via a separate mechanism. Or, a decision is made to provide resources to maintain a piece of infrastructure. Again, the design of NRIS allows for these situations.

- There is no requirement that NRIS have information about every part of the research/innovation process in order to make use of data. For example, research can be conducted and outputs produced by academics without acquiring additional resources. As such, NRIS may have records of outputs that are not linked to awards or resourcing decisions.

- Because there might be multiple records associated with a single project, a successful NRIS needs strong, unique identifiers for persons, organisations, resourcing decisions, projects and outputs.

4. Concept Model for NRIS

4.1. Overview

The concept model is a representation of the core concepts relevant to the operation of the research, science and innovation sector, and relationships between those concepts.

It provides a common understanding to underpin discussion about the way the research, science and innovation (RS&I) sector operates, and the collection of data describing this operation.

The concept model is illustrated in Figure 3.

The model also provides definitions of concepts that are important to the sector in Appendix A: Key Definitions . These definitions and vocabulary are important because we need to use words in the same way to have a common understanding and reduce the likelihood of misunderstandings.

There are several key points to note about this concept model:

- the concept model is not a flow chart. Instead, it is an abstraction to a high enough level to be able to identify the commonalities across different types of resourcing and work.
- a high level concept may have different forms in practice, for example, 'Review' for some requests for resources may require a formal peer review and a group recommendation, however, for other requests, 'Review' may simply be a check that the request meets the criteria to be allocated resources.
- the life cycle of a particular RS&I project or activity may not cover *all* of the high level concepts identified in the model below. Likewise, a particular person or organisation within the system may not have visibility over all concepts.

Figure 3 High Level Concept Model for NRIS

New Zealand Research, Science and Innovation Concept Model

Government legislation and **policy** authorises a v**ote** to allocate **resources** to a f**und** in order to achieve public sector **priorities**

Private sector **organisations** and **people** allocate **resources** to an a**sset pool** with **goals** which align with their **priorities**

An a**dministrator** grants **resources** to RS&I **organisations** or **people** for **activities** which support achievement of the **goals** of that **asset pool**

A **funder** grants **money** to RS&I **organisations** for **projects** which support achievement of the goals of the **fund**

A **funder** grants **money** to RS&I **organisations** to build and maintain **infrastructure** which is needed for **projects** supported by the **fund**

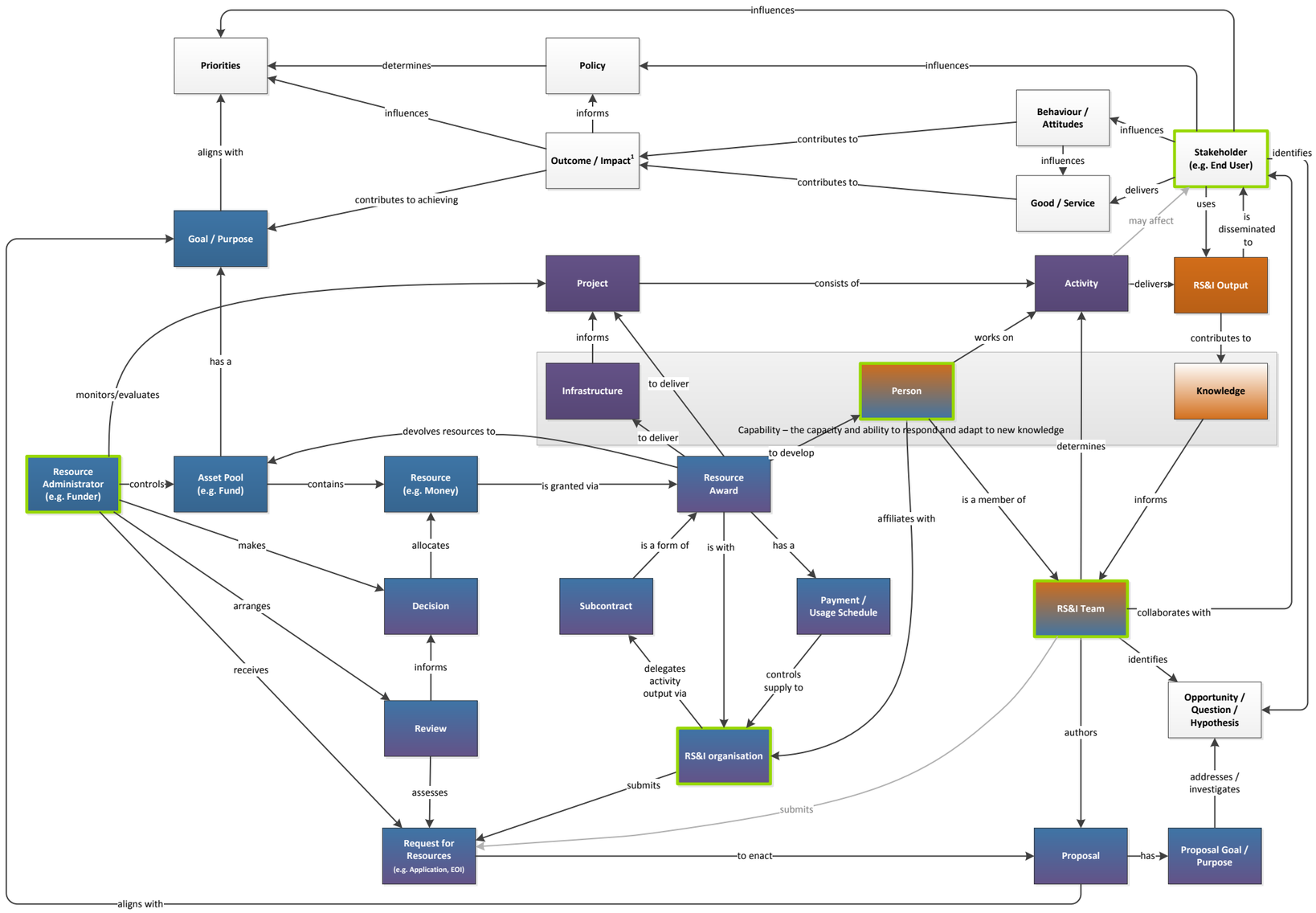
A **funder** grants **money** to RS&I **people** to develop RS&I skills and knowledge to support achievement of fund **goals**

An **administrator devolves resources** by granting them to another **asset pool**

A **funder devolves funding** by granting **money** to another **fund**

RS&I organisations **request resources** from an **asset pool** with **goals** which align with their p**roposal goal** to enable provision of **infrastructure** or delivery of a **project**

RS&I people **request resources** for professional development (e.g. scholarship) from an **asset pool** with an interest in their skills and knowledge



RS&I outputs are used by s**takeholders** to deliver new and enhanced **goods and services,** and inform RS&I **policy** and **priorities**

RS&I outputs contribute to the pool of **knowledge**, and inform **RS&I team proposals** and **activity** planning

An **RS&I team** focuses on an **opportunity or question**, and may propose one or many **project**s exploring facets of that **opportunity or question**

Stakeholders with an interest in a particular area of concern collaborate with an **RS&I team** to identify an **opportunity, question, or hypothesis**, and/or plan a **proposal**

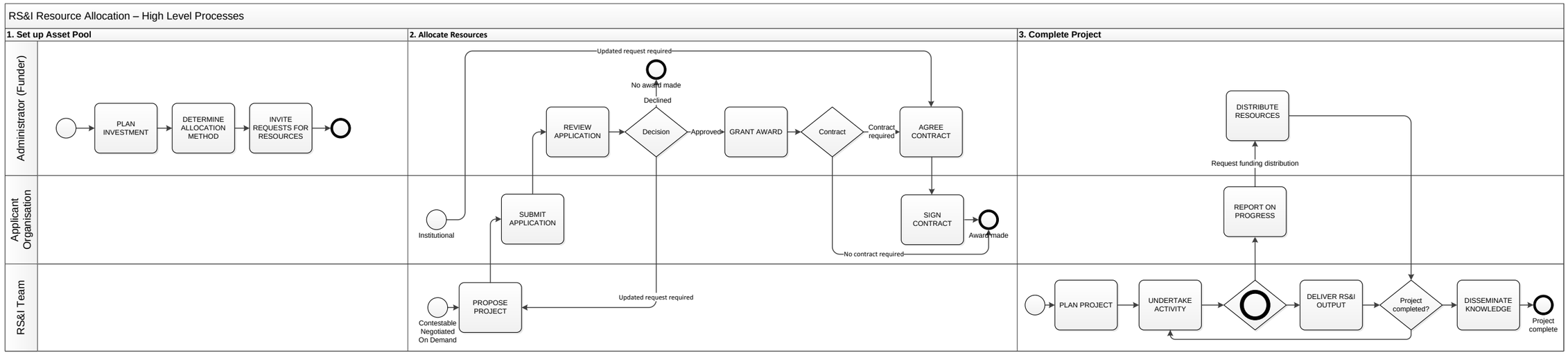
An **RS&I team** describes **project, infrastructure, or personal activities**, expected **outputs**, and the **resources** required to achieve a specified **goal** in a **proposal**

[1]Refer to "The Impact of Science" discussion paper issued June 2017: http://www.mbie.govt.nz/info-services/science-innovation/national-statement-science-investment/science-impact-discussion-paper-june-2017.pdf

Person or Organisation | Resourcing / Funding | Process / Work | Output

NRIS – High Level Research, Science and Innovation System Concept Model			
2.0	For Publication	Oct 2017	FINAL

Figure 4 High Level Processes for Resource Allocation and Project Completion



1. The administrator of an asset pool (set of resources) determines the investment plan and the method to be used to allocate resources to projects. This may be via a contested, negotiated, or on demand process, or award of funding to an institution. If resources are allocated to an institution, that institution then administers those resources and determines how to allocate them to projects.
2. RS&I teams eligible to request resources then generate RS&I proposals (describing the activities, personnel, and expected outputs) for submission to the administrator. This may be a one or many staged process. The administrator arranges a review of the requests for resources. The type of review depends on the type of allocation method used and the types of projects being resourced: for on demand requests, review will involve checking eligibility; for a contestable process, formal peer review by multiple reviewers may be required. Once the request has been reviewed, a decision is made about the allocation of resources, and if the request is successful, an award is made. For many awards a contract is required, and will be agreed between the administrator and the applicant organisation. In some cases, eg when the applicant and administrator are the same organisation, a contract may not be required.
3. Once an award has been made, the RS&I team plan and complete their project activities, reporting regularly on progress to the administrator, and receiving the agreed resources. As activities are completed, outputs are delivered, which may vary from the proposed outputs.

4.2. Extracting business views from the concept model

The pathways within the research system can then be described using these concepts. These are 'business views' using the common vocabulary. Figure 4 shows a generic pathway from resource allocation to project completion, identifying three key stages:

1. Set up asset pool
2. Allocate resources
3. Complete project

The first two stages are most relevant to the administrators of Asset Pools, who will supply information such as the resources available to be allocated, and the awards granted. This will provide NRIS with information about available resources, and their planned used (awards).

The final stage is most relevant to RS&I teams, who will supply Information about the project activity such as the awards received, actual use of resources, activities undertaken, and outputs generated. In addition, the asset pool administrators will supply information about disbursements made. This will provide NRIS with information about the actual use of resources, project activity, and outputs.

The types of questions to be answered vary for each stage:

1. What type of resources are available to be allocated for RS&I activity, and what are the goals their use is intended to achieve? Which allocation methods are being used to grant awards to applicants?
2. Which resources have been allocated to proposals, and which organisations and people are working on the proposals? What is the portfolio of awards for a given Asset Pool? Which awards have been granted or declined?
3. How many of the allocated resources have been used by a project? What are all the awards that are providing resources to a given project? What activities have been undertaken? What outputs have resulted?

A more specific example has been provided in Table 2, showing the business view of the "Ageing Well" National Science Challenge.

Table 2: National Science Challenge "Ageing Well"

Initial Resource Allocation:	1. **[Set up Asset Pool (National Science Challenge)]** MBIE set up National Science Challenge fund, with the funding and objectives set by Cabinet and specified in a Gazette notice. 2. **[Allocate Resources]** A group of organisations, led by University of Otago, request resources for an 'Ageing Well' programme and propose a set of research strands (themes)[5] and projects (that map to those themes) contained within a Research and Business Plan, with the input of research teams. The Science Board agrees to release funding to the Challenge subject to conditions (which are subsequently met) and the University of Otago and MBIE agree a contract. **[Set up Asset Pool (Ageing Well) and devolve Funding]** MBIE will provide resources for the Challenge to achieve the Challenge objective, with the Research and Business Plans as a starting point. The Challenge governance group allocates resources to a range of projects that will support the Challenge objective. 3a. **[Complete Project]** University of Otago & Canterbury DHB Principal Investigator Dr Hamish Jamieson undertakes the Drug Burden Index project, and reports on progress and outcomes to the Ageing Well Directorate and governance group. 3b. **[Complete Project]**University of Auckland Principal Investigator Dr Ruth Teh plans and undertakes the Reducing Frailty project activities, and reports on progress and outcomes to the Ageing Well Directorate and governance group. 3c, 3d, 3f. **[Complete Project]** (other specified projects are undertaken). The Ageing Well directorate and management monitor project progress, and the governance group makes go/no go decisions on continued funding for specified projects.
Subsequent Resource allocation:	1.1. **[Set up Asset Pool]** University of Otago plan investment of a portion of the 'Ageing Well ' resources via a contestable process, within a process decided by the governance group and administered by the Directorate. 1.2 **[Allocate Resources]** AUT Principal investigator Dr El-Shadan (Dan) Tautolo requests resources for a Pacific Grandparents Study, the Ageing Well Directorate oversees the process to review the application, and the Ageing Well governance group decides to allocate resources to this project. 1.3. **[Complete Project]** Dr El-Shadan (Dan) Tautolo plans and undertakes the Pacific

[5] Maintain wellness, independence and autonomy, Promote social integration and engagement, Value older people in all settings, Reduce disability and the impact of disability, Enhance age-friendly environments

	Grandparents Study project activities, and reports on progress and outcomes to the Ageing Well Directorate and governance group. The Ageing Well directorate and management monitor project progress, and the governance group makes go/no go decisions on continued funding for specified projects.

Appendix C: Sample Business Views of RS&I Pathways provides a set of diagrams illustrating a variety of generic and specific pathways. Additional examples as well as detailed scenarios will be added in subsequent versions of this document.

5. Data Transfer Model

5.1. Overview

The Data Transfer Model provides an overview of how NRIS will receive data from other organisations.

Its purpose is to act as a bridge between the concept model and the more technical logical model (entities, elements and relationships)[6].

A fundamental characteristic of this model is that, for any project or process, multiple records may be submitted to NRIS that provide information about resourcing decisions, processes, outputs and the use of outputs (see diagram in NRIS high-level description and below as Figure 5). The extent and type of information provided across these four core components is dependent on:

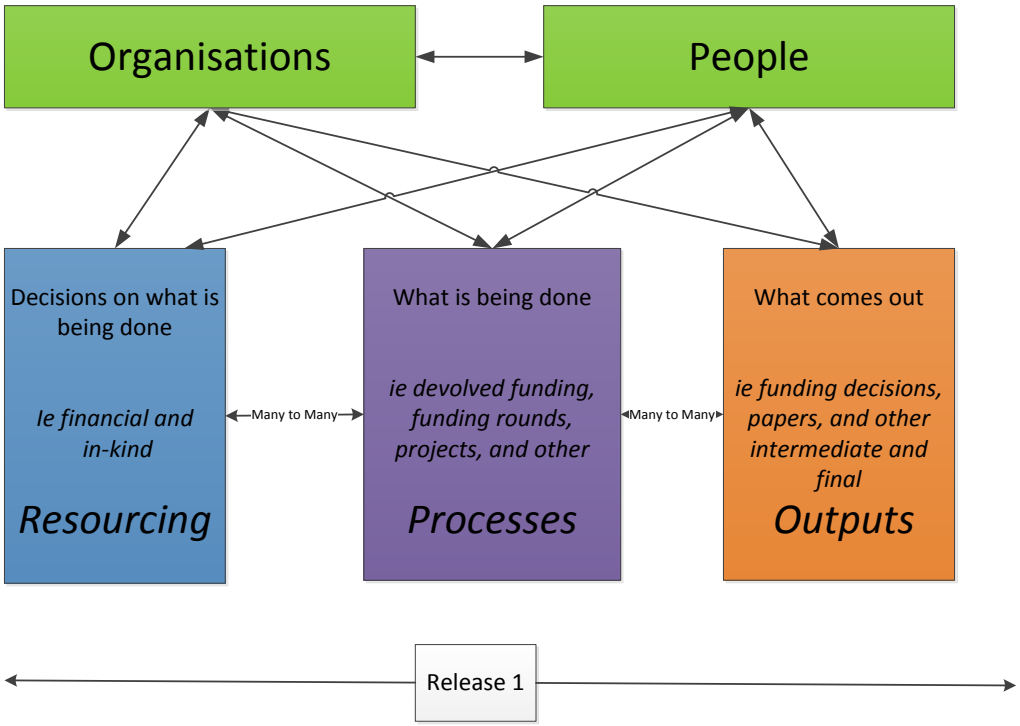
- who is providing the record
- the position of a project or process in the resource allocation, research, and innovation pathway
- the type of resourcing is being provided
- the type of project or process is being conducted

The data transfer model is the organising structure within which data standards sit.

This section explains the concepts behind data transfer and the types of information that organisations will provide. Details of data standards are contained in the NRIS Technical Documentation.

[6] The logical model is part of NRIS technical documentation to be published at a future date.

Figure 5 High Level Data Transfer Model for Release 1 of NRIS Documentation



5.2. High Level Components

Version 1 of the data transfer model has five core components capturing different types of information, described in Table 3 below.

Use of Outputs is a distinct high level concept. Further work is needed to define the concepts, standards and code sets that will guide reporting of use of outputs. Use of Outputs will be the subject of further engagement before being incorporated in the next version of the model.

Table 3 Type of information captured for different components of data transfer model

Component	Information captured
Resourcing	Information concerning the resource, and the decision about what is provided when by whom to whom. A resource may be associated with multiple processes.
Processes	Information about what is being done, when and by whom. A single process may be supported by multiple resources and may lead to multiple outputs.
Outputs	Information about results in the most general sense. Note that a single output may be associated with one or more processes or none at all. Outputs may only have people associated with them or they may also be linked back through processes to resources.
People	Information associated with a person. People interact with the RS&I system in different ways, dependent on the role they are performing (eg as a reviewer, researcher, end user, etc). A role will establish what additional information, if any, is needed.
Organisations	Information that describes the organisation. Organisations interact with the RS&I system in different ways, dependent on the role they are performing (eg as a funder, research organisation, end user, etc). A role will establish what additional information, if any, is needed.

5.3. Data Collection Milestones

A critical feature of the data transfer model is the assertion that the type of information relevant for a person or organisation can be dependent on their role. Another key determinant of the type of information to be submitted and held within an NRIS is a project or process's position in the research pathway (see Figure 4 High Level Processes for Resource Allocation and Project Completion).

Figure 6 Sample timelines and milestones for resource allocation and project activities shows a generic project timeline from the establishing of a fund through to close-out of a project and continued production of outputs.

At any stage in the timeline, we may have information about resourcing decisions, processes, and outputs. However, *what* that information is will change:

- When an application is made, there is information about the request for resources and proposed processes or activities to be undertaken and outputs to be produced.
- When a contract is signed, there will be more information available regarding the resourcing decision (eg committed funding, contracted start and end dates, award identifier).
- At midpoint, NRIS can also capture information about resources *disbursed* as opposed to just committed.

People information associated with early stages of the timeline is likely to reflect different roles (eg reviewers, principal investigators) than at later stages (eg. project team, authors, end users).

This idea is expanded in Tables 4-7 which illustrate the key pieces of data that are needed for NRIS to build a complete picture of the system.

Figure 6 Sample timelines and milestones for resource allocation and project activities

The upper timeline models the milestones involved in allocation of resources for research and innovation. The lower timeline models the milestones and activities involved in project execution and completion.

Data will need to be collected at each milestone, and may also be collected at regular intervals about work in progress.

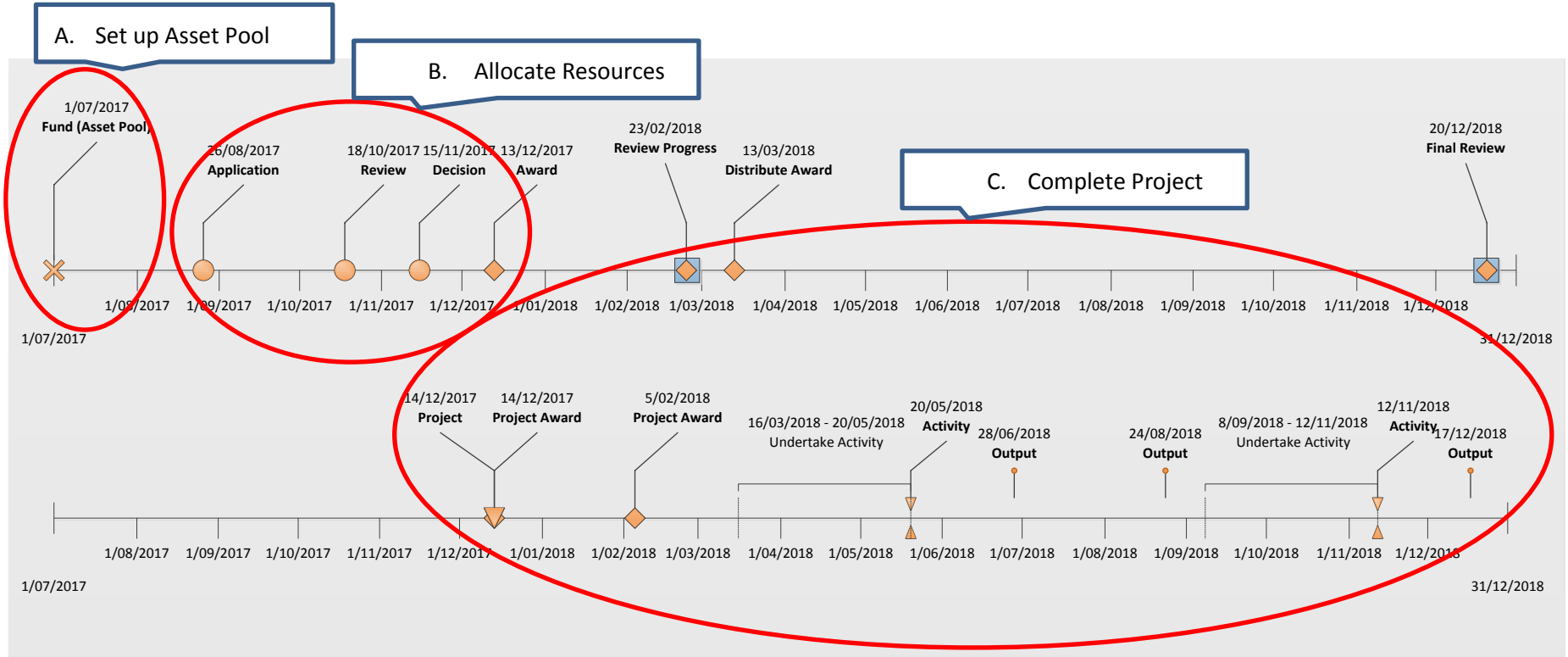


Table 4 Asset Pool Data Collection (A)

The unit record required to describe an Asset Pool or Fund; the resources available, the purpose for which they may be used, how they are allocated, and who controls their allocation.

Component/ Milestone	People	Organisations	Resources	Processes	Outputs	Primary identifier	Other identifiers
Asset pool	Administrator	Affiliated organisation	Fund Asset base Funding available Start date End date	Allocation method	Goal	Asset pool ID	ORCID iD

Table 5 Funding Request Data Collection (B)

The unit records required to describe a request for resources, the review of that request and the decision made, and the details of any award granted.

Component/ Milestone	People	Organisations	Resources	Processes	Outputs	Primary identifier	Related identifiers
Individual application	Applicant	Affiliated organisation	Fund Funding requested Timing	Allocation method Application phase	Goal Planned activities Planned output	Application ID	Prior application ID(s) ORCID iD
Organisational application	Lead (principal) investigator RS&I team members	Submitting organisation Affiliated organisation					
Individual review	Reviewer	Reviewer organisation	Fund	Assessment method	Score Recommendation	Review ID	Application ID Reviewer ID Related review ID
Group review	Group name Reviewers	Team host organisation					
Individual decision	Decision maker	Organisation	Fund Funding	Assessment method	Decision	Decision ID	Application ID Decision maker ID
Group decision	Group name Decision makers	Team host organisation	Fund Funding				
Individual award	Recipient	Affiliated organisation	Fund Funding Timing Constraints (eg match funding)	Allocation method	Contract Goal Planned activities Planned output	Award ID	Parent award ID^ Application ID Contract ID review ID Decision ID
Organisational award	Lead (principal) investigator RS&I team members	Distributing organisation Recipient organisation					

^After an initial funding award, the recipient may sub-contract activities or outputs, which will result in another related award.

Table 6 Resource Distribution (C)

The data required to describe the distribution (and return) of resources.

Component / Milestone	People	Organisations	Resources	Processes	Outputs	Primary identifier	Other identifiers
Disbursal (distribution of funds)	Recipient	Distributing organisation Recipient organisation	Fund Date Amount	Basis of payment		Payment ID	Award ID Contract ID
Return of funds	Recipient	Distributing organisation Recipient organisation	Fund Date Amount	Reason for repayment		Payment ID	Award ID Contract ID

Table 7 Project Execution Data Collection

The data required to describe project resourcing, activities, and outputs.

Stage / Milestone	People	Organisations	Resources	Processes	Outputs	Primary identifier	Other identifiers
Individual award	Recipient	Affiliated organisation	Fund Funding Timing Constraints (eg match funding)	Allocation method	Contract Goal Planned activities Planned output	Award ID	Parent award ID^ Application ID Contract ID review ID Decision ID
Organisational award	Lead (principal) investigator RS&I team members	Submitting organisation Affiliated organisation					

Stage / Milestone	People	Organisations	Resources	Processes	Outputs	Primary identifier	Other identifiers
Project	RS&I person RS&I role Stakeholder Stakeholder role	Organisation Organisation role (eg collaborator, lead, supplier)	Resource Quantity (eg funding, facility usage, dataset access)	Project type		Project ID	Award ID ORCID iD
Activity	RS&I person RS&I role Stakeholder Stakeholder type (eg Iwi, Industry etc) Stakeholder role (eg objective setting)	Organisation Stakeholder type Organisation role (eg collaborator, lead, supplier)	Resource Resource quantity (eg funding amount, facility usage timeframe)	Project type Activity status		Activity ID	Project ID ORCID iD Output ID
Output	Author / Producer Recipient Audience	Producer organisation Recipient organisation		Output status	Output type[+] Output identifier (eg ISBN number) Output identifier type (eg ISBN)	Output ID	Activity ID Project ID ORCID iD

[+] The Output type must align with the Project type. Some outputs can only be associated with particular project types, for example the outputs of commercialisation activities are not the same as the outputs of Scientific services projects.

5.4. Form of Data Transfer

5.4.1. Introduction

This section provides information about the concept of a unit record and the role of unique identifiers. Together these will form the heart of data transfer and the way NRIS will join information from different sources.

5.4.2. Each organisation supplies a slice of data

At the heart of the data transfer model is a layered approach to defining components and the information required about these components. Organisations will be asked to provide data on resourcing and/or processes and/or outputs for their work as funder or researcher or both. Each organisation will provide a horizontal slice of data relating to information they have. Unique identifiers will join together information from different sources.

5.4.3. The core of data transfer is a unit record

At the core of NRIS data transfer is the idea of transferring unit records.

A unit record contains information about resources, what is being done and what is produced along the way. Each unit record that is supplied to NRIS will be in the form of a "slice" across this model with Resourcing, Process and Output information and associated People and Organisations.

5.4.4. Unit records are unique

Each unit record from each organisation sharing data is unique; indeed this is what defines a unit record. While different organisations may supply information about the same process, for example, the fact that it comes from a different organisation makes it unique.

5.4.5. The concept of a unit record is consistent irrespective of role

All data input will be in the same basic form (ie information about resources, what is being done and what is produced along the way as well as the people and organisations associated with each of these) irrespective of whether an organisation is a funder or a research institution (or both for different processes).

Different organisations will supply data about the same research to NRIS, and while the content may differ for some specific components, the form in which the information will be supplied is the same whether one looks from the perspective of a funder or a research organisation.

5.4.6. Each organisation will need to use unique identifiers

Unique identifiers are at the heart of a generic and flexible data transfer model. Each organisation will need to store a unique identifier for each funding stream, process and output. Depending on the specific situation, these will be created by the organisation or person or passed on from another organisation or person. For example, an organisation:

- will need to create a unique identifier for each project and will receive a unique identifier for each funding stream from each funder
- will need to supply an identifier for each member of a research team (ideally a unique identifier such as an ORCID iD)
- will need to supply an identifier for outputs, such as an ISBN for a book

5.4.7. Unique identifiers join unit records

Unit records are joined to describe larger events or sequences through the use of unique identifiers. Organisations supplying unit records will generally only be asked to supply data about themselves and the unique identifiers that link to other contributing organisations.

5.4.8. Complexity is captured by joining unit records

A straightforward research project may be captured in one unit record. A situation where a single funding stream supports several processes will involve a unit record for each process.

More layered funding systems may require several records chained together with unique identifiers. Crucially, each organisation will only be supplying information related to their role in a given chain. Identifiers will be used to join up information from different organisations in a given chain.

5.5. Further Information

This conceptual framework document provides a high level overview of the scope of data, key concepts and definitions and the data transfer model for NRIS. It will be amended as required following discussion with the sector.

Other NRIS documentation provides an overview of the NRIS system and project, and technical information about data standards, data security.

All NRIS documentation is available on the MBIE website (go to www.mbie.govt.nz and search for 'NRIS').

Information or queries can be emailed to nris@mbie.govt.nz

Appendix A: Key Definitions

Term ("Synonym") [Context]	Description	Source/derivation
RS&I	research, science and innovation	
Innovation	The introduction of new or significantly improved goods, services, processes, or marketing methods. Note that this includes R&D	Science and Innovation System Performance Report 2016
Research and Development ("R&D")	Creative and systematic work undertaken in order to increase the stock of knowledge – including knowledge of humankind, culture and society – and to devise new applications of available knowledge	Science and Innovation System Performance Report 2016
Frascati R&D	Creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society. For an activity to be an R&D activity it must be novel, creative, uncertain, systematic and transferable and/or reproducible	This definition is sourced directly from the OECD's Frascati Manual (2015). Note that all R&D activities are innovation activities
Non-R&D Innovation	Non-R&D activities aimed at the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method	This definition is based on the Oslo Manual 2005, but modified to reflect non-business innovation
Scientific Services and Products	Non-R&D activities and outputs based on a scientific process. These activities do not meet the five criteria of R&D. This includes monitoring and data management, curation of collections, laboratory analysis, field surveys, expert advice and assessment, and selling of products	
Knowledge Transfer, Outreach and Extension	The diffusion, dissemination and application of knowledge, including through community engagement and outreach activities	
Commercialisation	Activities involved in the process of taking an RS&I output to market, such as activities aimed at intellectual property protection	

Appendix B: Definitions for the High Level Concept Model

Term ("Synonym") [Context]	Description	Source/derivation
Asset Pool	A pool of resources to support (a) specified purpose(s) or goal(s)	
Resource	An asset that can be used to complete an activity, usually money, physical facilities, research inputs, or staff	
Administrator [Asset Pool]	An organisation or individual responsible for allocation of asset pool resources	
Allocate	Grant an award to an applicant	
Allocation Process	The set of activities the Administrator must complete to allocate Asset Pool resources (eg a competitive Funding Round)	
Fund	(noun**)** An asset pool containing only financial resources; A pool of financial resources to support (a) specified purpose(s) or goal(s)	
Funder	The Administrator of a Fund; Any entity, either a government or non-government organisation, that funds RS&I activities	
Funding (money) [Resource]	A financial resource	
Infrastructure [Resource]	A physical resource which enables RS&I activity	
Allocation Criteria	The standards against which an application is assessed (usually based on the Fund priorities)	
Funding Round	The set of Awards allocated by a single Fund within a specified period OR a specified period within which the Funder runs an allocation process	
Devolve	To award resources from one Asset Pool to another Asset Pool	
Devolved Resourcing	The resources devolved by an Administrator from one Asset Pool to another Asset Pool	
Goal*	A state an organisation is seeking to establish and maintain	

Priority*	A thing that is regarded as more important than others	
Application ("Request for Resources")	A request by a researcher or research organisation for a Fund to allocate resources to partially or fully resource a proposal for a coherent programme of RS&I	Derived from elements of guidance notes from various funding councils, including the Royal Society Te Apārangi, National Institutes of Health (NIH) (United States) and Engineering and Physical Sciences Research Council (EPSRC) (UK)
Project	A planned set of activities completed within a fixed period to extend or expand RS&I knowledge (Definitional Rule: "The definition of a project is a funded set of activities that: • is organised and managed for a specific purpose; • has its own objectives; • has expected outputs and outcomes; and • occurs over a specific period with defined start and end dates.")	Derived from elements of the following three definitions of a project contained in the Frascati Manual, CASRAI data dictionary and CERIF model **Note – revised definition removes the requirement that a project is linked to an award**
Assessment Criteria	The standards against which a project, output, or outcome is assessed	
Review [Application]	Assessment of an application against allocation criteria	
Review [Proposal]	Formal scientific assessment of a proposal to determine whether the proposed research is worthwhile, well planned, and appropriately staffed	
Review [Project, Output]	Assessment of a project activity, output, or outcome against contract criteria	
Organisation	An organised group of people with a particular purpose, such as a business or government department	
Applicant	A person or organisation requesting funds for a project (submitting a proposal to a funder)	
Reviewer	A professional responsible for the review of an application, activity, project or output	

Proposal ("Research Proposal")	A plan for a particular RS&I team to: • investigate a specific issue in order to create or extend knowledge; OR • implement a new or significantly improved product, process, or method; OR • deliver scientific services and products; OR • diffuse, disseminate or apply knowledge; OR • take a research output to market	
Peer Review	Evaluation of scientific, academic, or professional work by others working in the same field	www.dictionary.com accessed 4 October 2017
Application Decision	The result of an application review	
Award ("Grant")	Resources allocated to an applicant to enable all or part of the work described in a proposal to be completed	
Primary Award	The allocation of resources by a funder to support research, science and innovation activities, that is the subject of a contractual agreement. A primary award may support one or more projects; may be for a fellowship or scholarship; or may specifically support infrastructure. A primary award sets the requirements for the award holder	
Co-funding Award	An award, providing direct cash and/or in-kind contributions, to support achieving the requirements of a primary award	
Collaboration	Active participation (by an organisation) in joint R&D and innovation projects with other organisations, excluding pure contracting out of work. It can involve the joint development of new products, processes or other innovations with customers and suppliers as well as horizontal work with other enterprises or public	OECD Science, Technology and Industry Scoreboard 2011, p. 104

	research organisations	
End user collaborator	An end user engaged in a collaborative project	
Subcontract [Award]	Allocation of awarded resources to another research team or organisation to complete an activity and/or deliver an output	
RS&I Team ("Research Team")	A group of people working on a project, often led by a lead researcher or principal investigator, usually affiliated with a research organization	
Contract	A formal legal agreement describing an award, the expected deliverables, and the associated assessment criteria	
Goal [Project]	An outcome a research team is seeking as a result of a project, usually as a result of delivering one or more outputs	
Goal [Fund]	An outcome the funder is seeking as a result of funding projects, usually as a result of achieving project goals	
RS&I Output	Output: Goods or services generated from RS&I activities	
Outcome/Impact	An effect of an RS&I activity	Refer to "The Impact of Science" discussion paper issued June 2017: http://www.mbie.govt.nz/info-services/science-innovation/national-statement-science-investment/science-impact-discussion-paper-june-2017.pdf
Activity	An act of mental and/or physical effort to achieve a result which contributes to achieving a goal	
Researcher	A professional engaged in the conception or creation of new knowledge. They conduct research and improve or develop concepts, theories, models, techniques, instrumentation, software or operational methods	Frascati Manual 5.35
Stakeholder	A person or organisation with an interest or concern in the activities and/or outputs of a project	

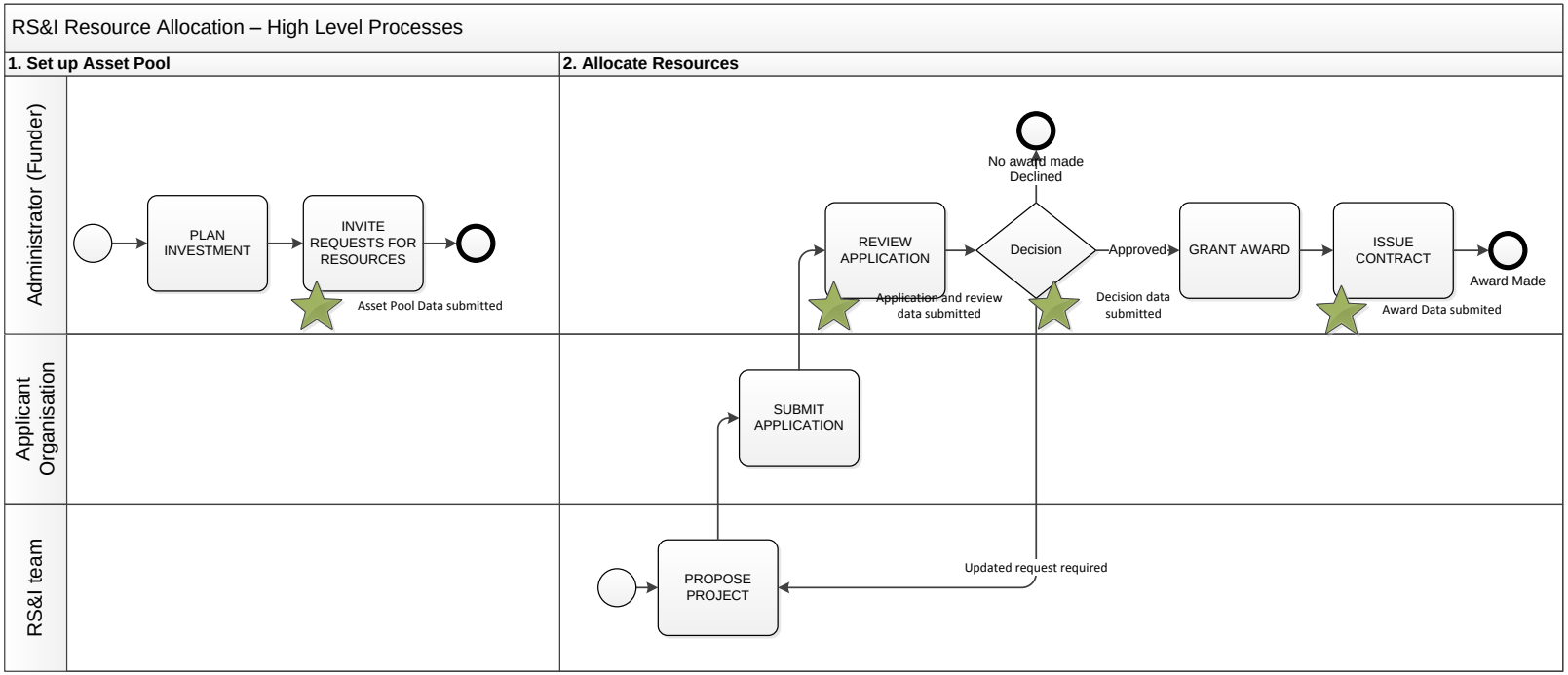
End User	A stakeholder that is likely to use the research and who will benefit directly from it. An end user may be an organisation, a business, a sector, or a community group including iwi/Māori. An end user may be involved in defining the research questions and shaping the work, not just involved in the uptake of its findings	Endeavour Fund Applicant Guidelines for Completing a Proposal
Opportunity	A time or set of circumstances that makes it possible to do something	
Question	A subject or point about which more information is required	

Appendix C: Sample Business Views of RS&I Pathways

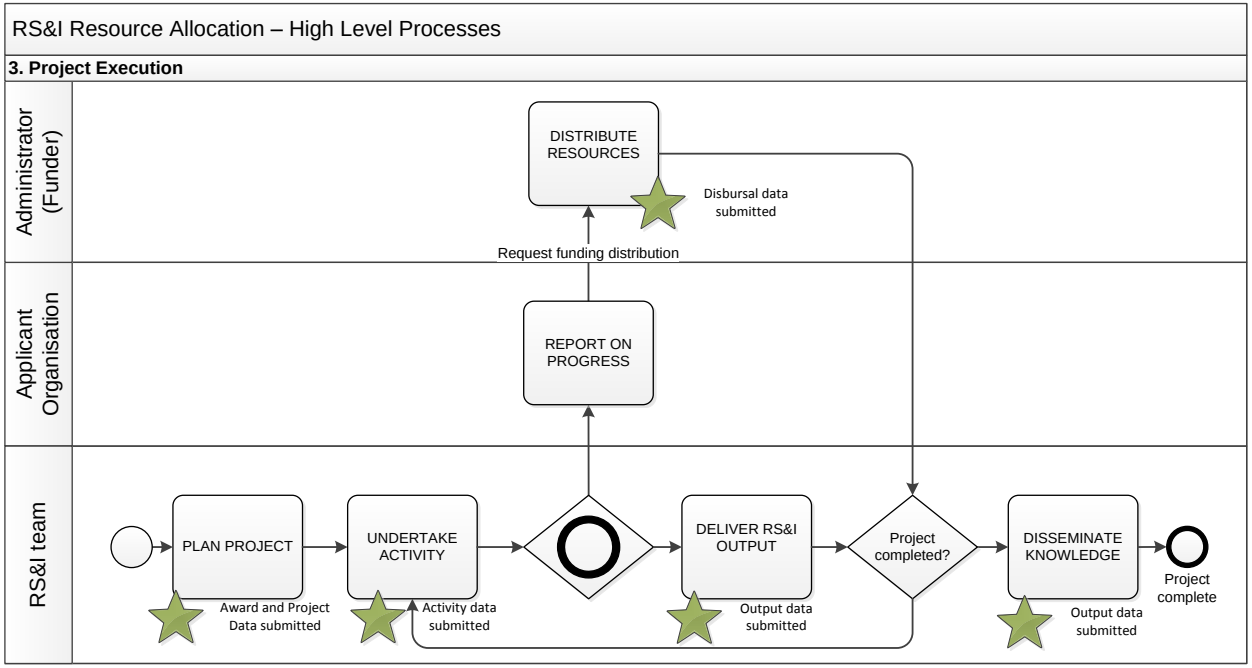
The diagrams that follow show a high level view of the sequence of tasks required for each stage in the RS&I lifecycle for particular funds and projects, and who is responsible for each task. The stars indicate which tasks result in unit records being supplied to NRIS, and the type of record(s) being supplied.

Generic Process

An administrator determines the resources available to be allocated, and invites applications. Applicants submit requests for resources, which are reviewed, a decision is made, and if an award is granted, a contract or agreement is made for specific resources to be allocated to the applicant.

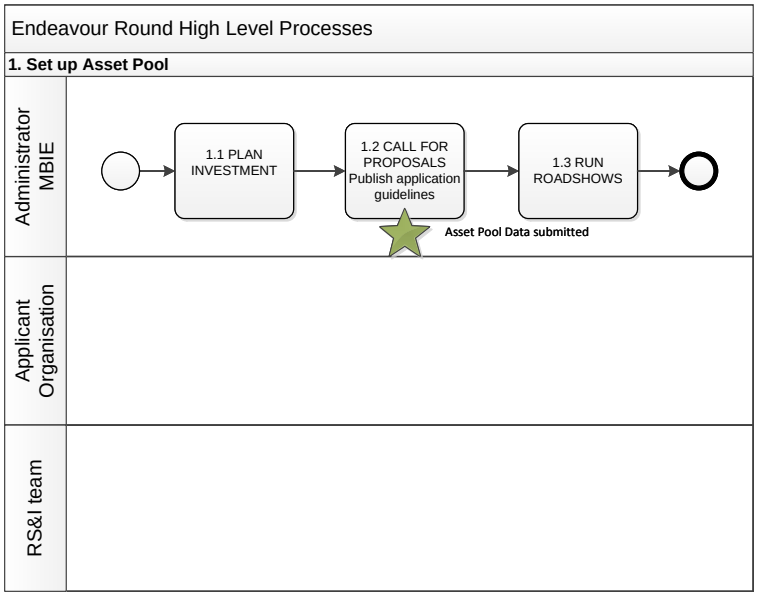


Once a Project has been allocated sufficient resources, the RS&I team can plan and execute the project activities, delivering outputs, with resources being disbursed as agreed with the award administrator.

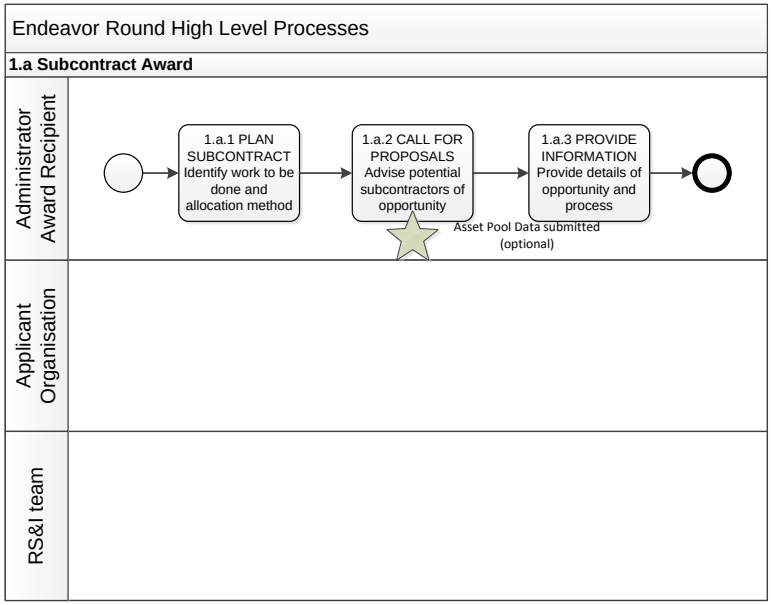


Endeavour Round

Once MBIE has completed the investment plan and the Endeavor Fund opens the call for proposals, information about the resources available and allocation method to be used can be submitted.

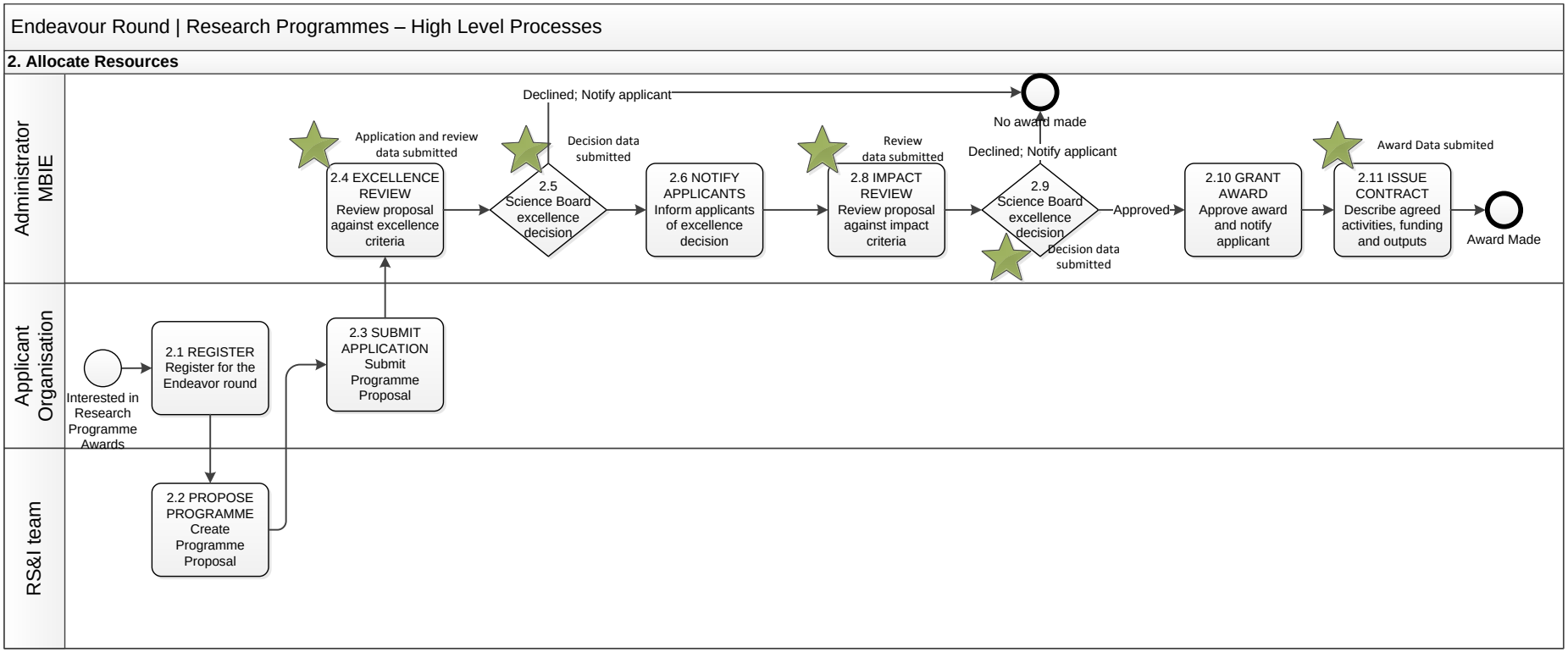


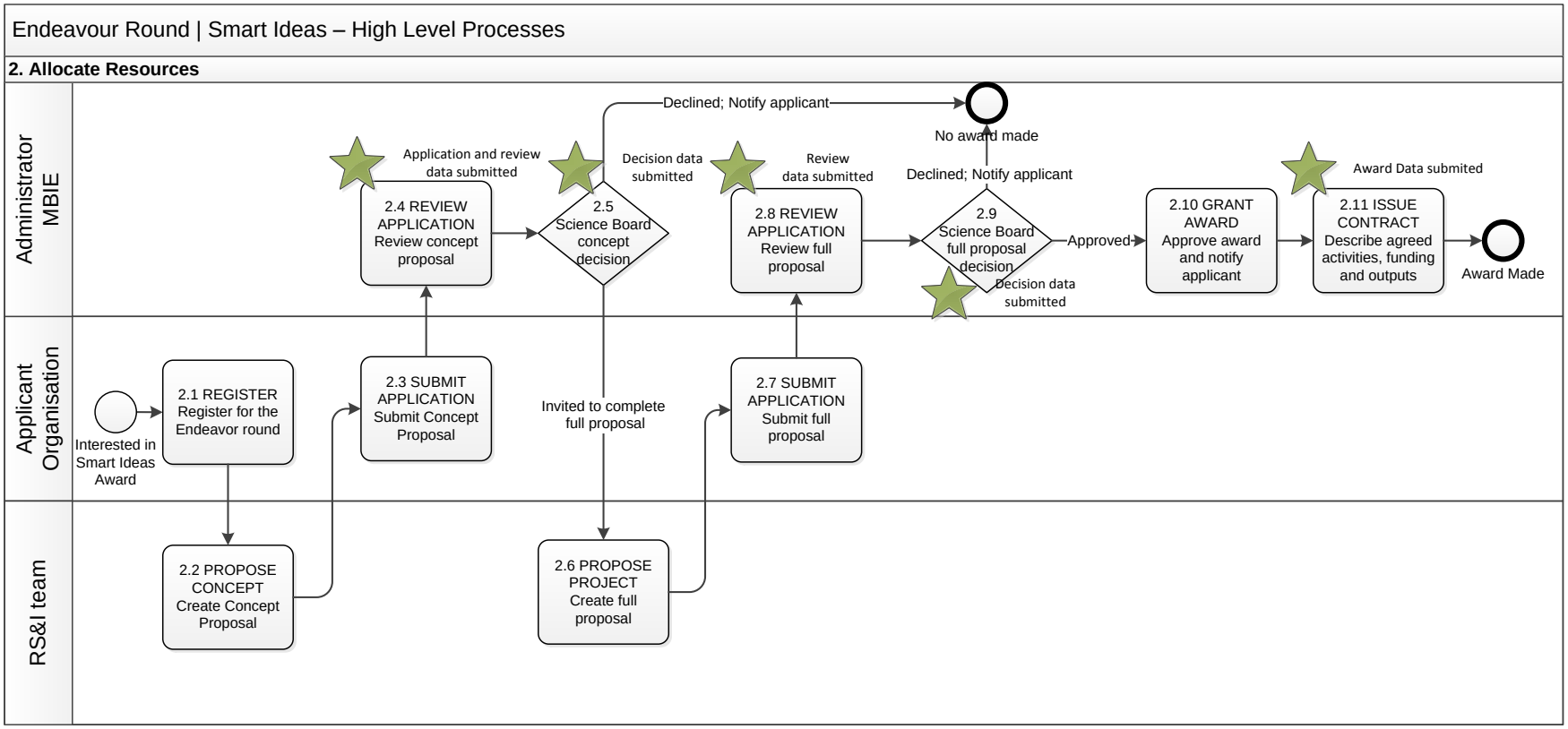
Subsequently, if an award recipient chooses to subcontract some activities, they may submit information about the scope of resources to be subcontracted, and the allocation method.



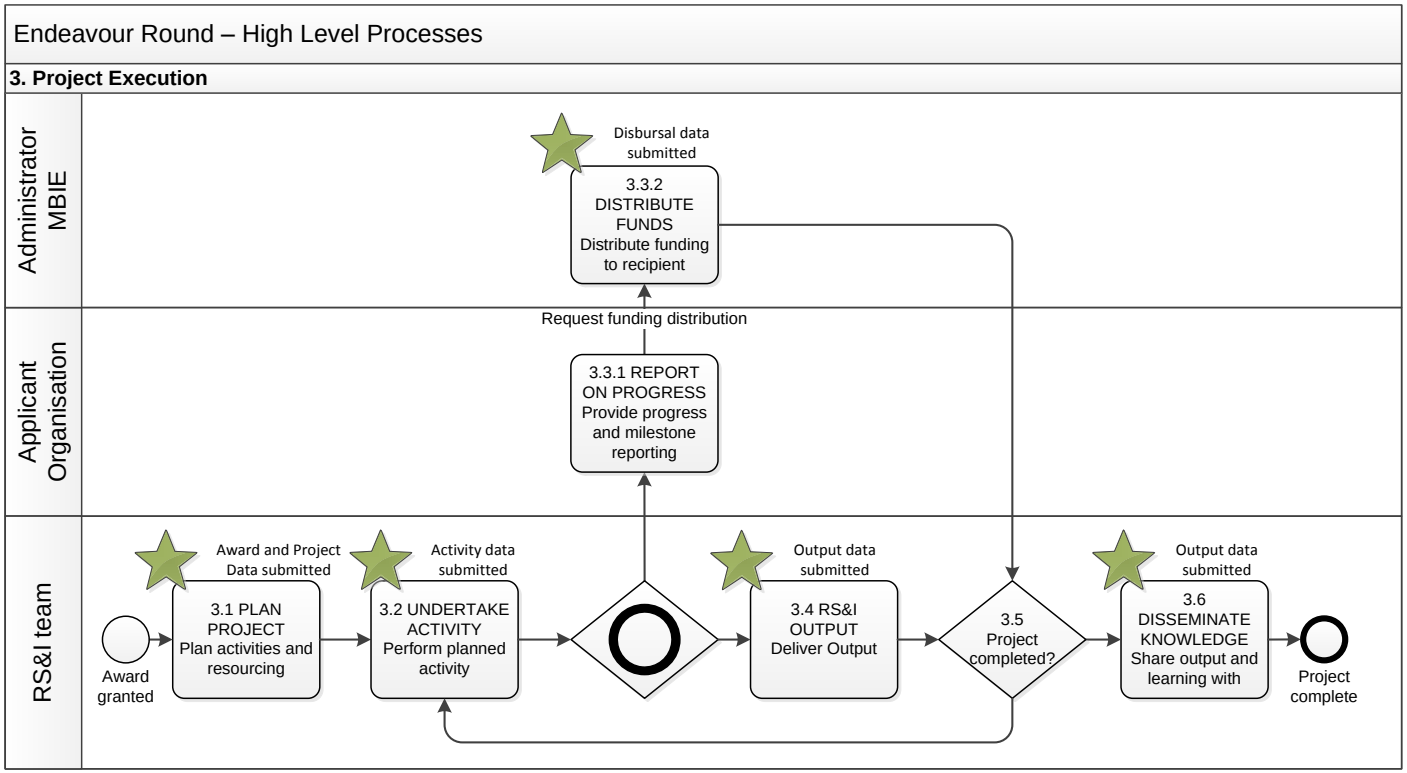
Once the round is open, every group with an interest in receiving an award from the Endeavour Fund needs to register their interest, and then submit a proposal.

Once the administrator receives the proposals, they can then allocate unique identifiers for each proposal and submit information about that proposal as it progresses through the process. This includes information about the application, review, decision(s) and details of any award granted to the applicant. If an applicant is seeking a Smart Ideas award, two proposals may be submitted – a concept proposal, and, if that is accepted, a full proposal. The administrator will need to include the concept proposal identifier when supplying information about the full proposal. For proposals for which an award is granted, the administrator will supply information about the award, and identify the related proposal.


Endeavour Round | Research Programmes – High Level Processes
2. Allocate Resources
Administrator MBIE
Applicant Organisation
RS&I team
Interested in Research Programme Awards
2.1 REGISTER Register for the Endeavor round
2.2 PROPOSE PROGRAMME Create Programme Proposal
2.3 SUBMIT APPLICATION Submit Programme Proposal
Application and review data submitted
2.4 EXCELLENCE REVIEW Review proposal against excellence criteria
Decision data submitted
2.5 Science Board excellence decision
Declined; Notify applicant
No award made
2.6 NOTIFY APPLICANTS Inform applicants of excellence decision
Review data submitted
2.8 IMPACT REVIEW Review proposal against impact criteria
Declined; Notify applicant
2.9 Science Board excellence decision
Decision data submitted
Approved
2.10 GRANT AWARD Approve award and notify applicant
Award Data submited
2.11 ISSUE CONTRACT Describe agreed activities, funding and outputs
Award Made

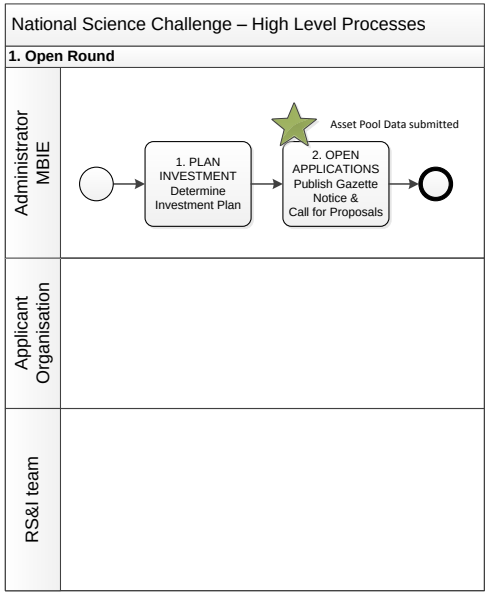


Once the contract is agreed and work starts, the RS&I team will need to plan the project, and supply data about the award(s) received to resource the project. This may be a subcontract award to complete part of a programme, or an award granted directly from a Fund (Asset Pool). The RS&I team will need to allocate a unique identifier for each activity. As the planned activities are undertaken, regular reporting about planned, in progress, cancelled, discontinued and complete activity will be submitted. As outputs are generated, the RS&I team can submit information about the outputs planned, in progress, and complete, using standard output identifiers.

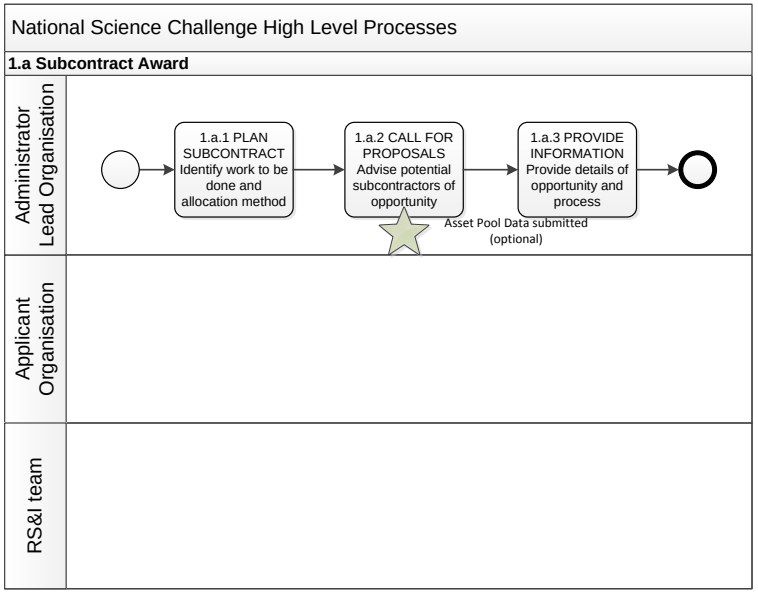

Endeavour Round – High Level Processes
3. Project Execution
Administrator MBIE
Applicant Organisation
RS&I team
Disbursal data submitted
3.3.2 DISTRIBUTE FUNDS Distribute funding to recipient
Request funding distribution
3.3.1 REPORT ON PROGRESS Provide progress and milestone reporting
Award and Project Data submitted
Activity data submitted
Output data submitted
Output data submitted
Award granted
3.1 PLAN PROJECT Plan activities and resourcing
3.2 UNDERTAKE ACTIVITY Perform planned activity
3.4 RS&I OUTPUT Deliver Output
3.5 Project completed?
3.6 DISSEMINATE KNOWLEDGE Share output and learning with
Project complete

National Science Challenge

Once MBIE has completed the investment plan and the National Science Challenge opens the call for proposals, information about the resources available and allocation method to be used can be submitted.



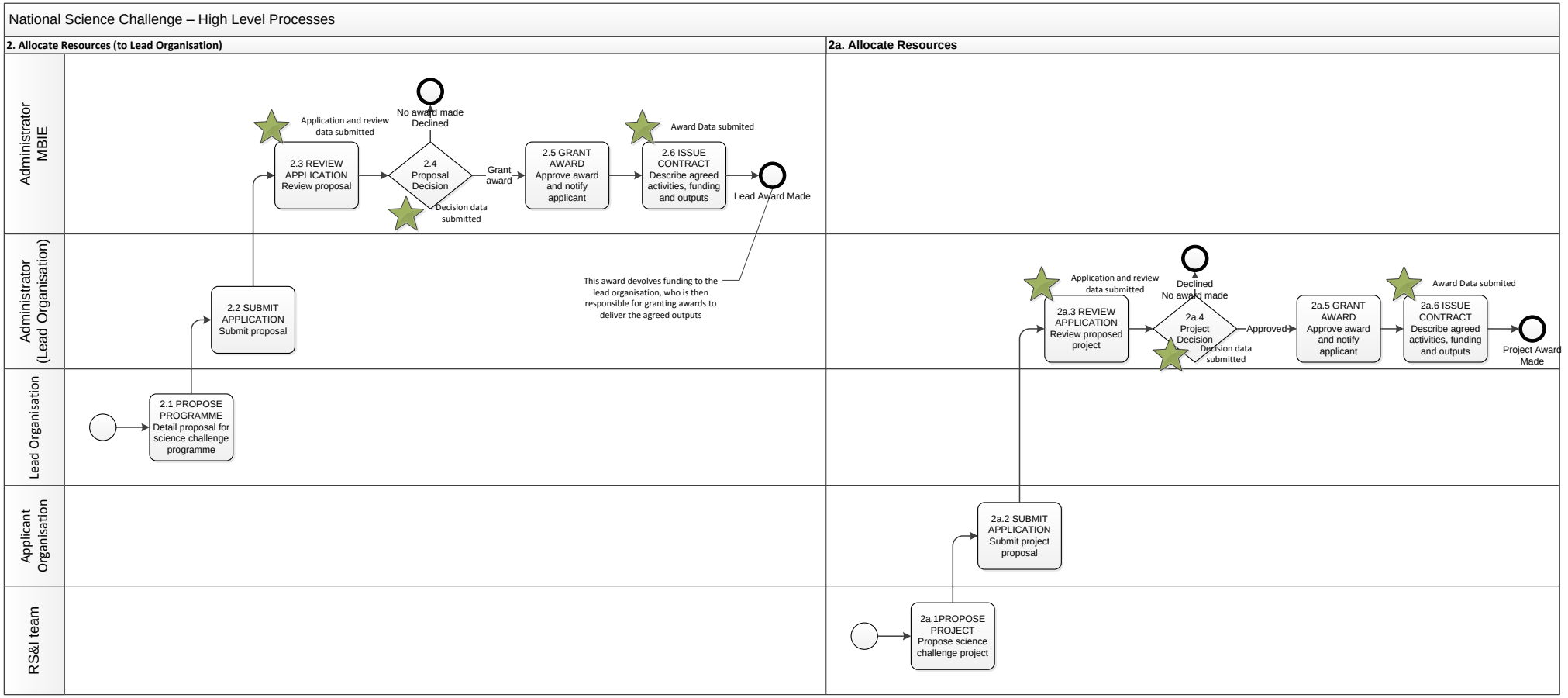
Once an award has been granted to a Lead Organisation, that organisation will then need to allocate resources to projects which will deliver elements of the programme.

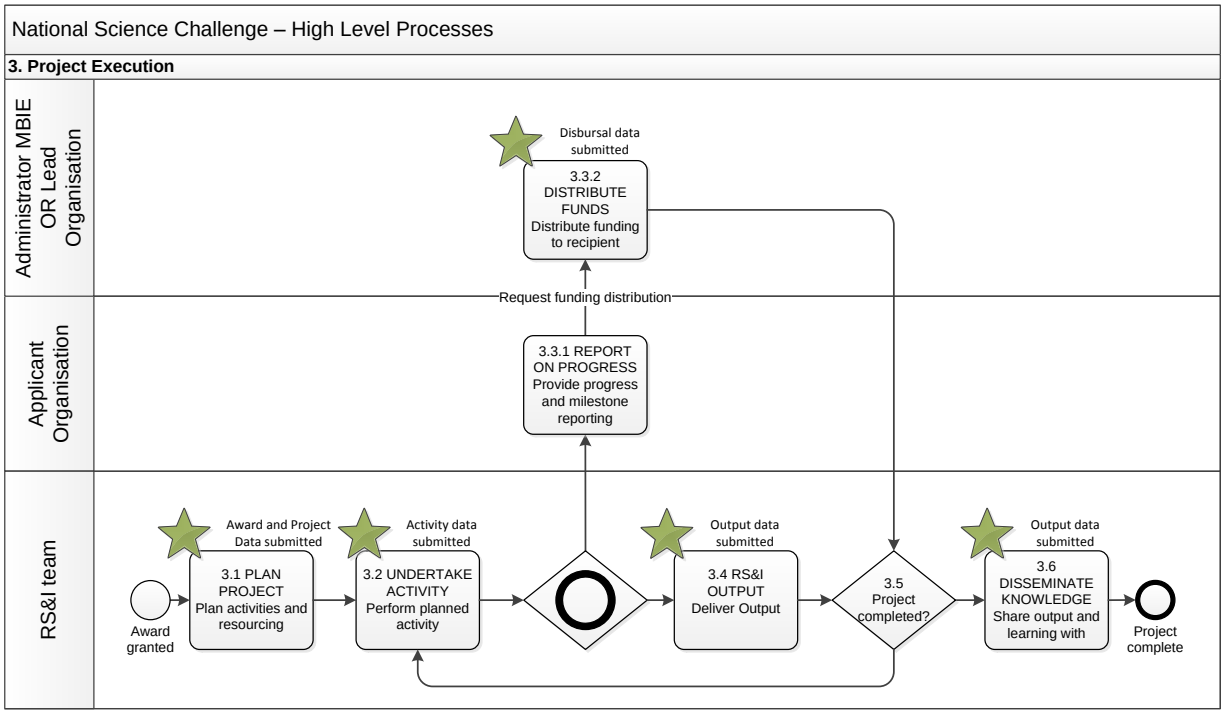


Once the round is open, every legal entity with an interest in receiving an award from the National Science Challenge needs to register their interest, and then submit a proposal.

Once the administrator receives the proposals, they can then allocate unique identifiers for each proposal and submit information about that proposal as it progresses through the process. This includes information about the application, review, decision(s) and details of any award granted to the applicant.

The Lead organisation follows a similar process as an administrator to allocate funding to projects if a contestable allocation method is used (see 2a below)



Once the contract is agreed and work starts, the RS&I team will need to plan the project, and supply data about the award(s) received to resource the project. This may be a subcontract award to complete part of a programme, or an award granted directly from a Fund (Asset Pool). The RS&I team will need to allocate a unique identifier for each activity. As the planned activities are undertaken, regular reporting about planned, in progress, cancelled,

discontinued and complete activity will be submitted. As outputs are generated, the RS&I team can submit information about the outputs planned, in progress, and complete, using standard output identifiers.