Transition and Business Plan

Links to related science and transition arrangements

As depicted at the beginning of this submission, the Resilience to Nature's Challenges National Science Challenge research begins alongside a large number of related research programmes, including: other MBIE contracts, such as the Natural Hazard Research Platform; aligned GNS Science and NIWA Core Funding; and university research. The relationship and transition for these related programmes are described below.

MBIE contestable contracts

The *Understanding Rural Fire Risks* programme led by Scion (CO4X1203) will terminate in September 2016. Likewise, the GNS Science-hosted *Natural Hazards Research Platform* head contract (CO5X0907) matures in 2019, with some contracted work terminating earlier. The resources following these programmes will be allocated to the Challenge. These contracts collectively span six themes: Resilient Society; Resilient buildings and infrastructure; Risk assessment; Geological hazards; Weather hazards; and Rural Fire hazards. The Research Plan described above clearly extends from these programmes in Phase 1, while not overlapping with their research work.

The main transition into the Challenge during Phase 1 is the Scion rural fire programme. The open stakeholder and researcher elicitation process of defining the priority scope and investment pattern for Phase 1 of the RNC National Science Challenge meant that taking on the complete work plan of the outgoing *Understanding Rural Fire Risks* programme was not possible. Some elements of the terminating rural fire programme will be extended (see Resilient Toolbox – T6 Resilience to New Zealand's Hazard Spectrum) and other elements (e.g., research with a strong operation-support aspect for the Rural Fire Authority) were not prioritised into the scope of the Challenge process. However, it should be noted that much of the Scion researcher capability from the 2016-terminating *Understanding Rural Fire Risks* programme are heavily involved in the RNC National Science Challenge proposal in several of the programme teams. Aspects of this work that lie clearly out of the Phase 1 priorities for Challenge investment must be sought from other funding arrangements. To force-match these into the research programme would hinder innovation and cooperation across the board. Phase 2 research activities under the RNC National Science Challenge will, however, likely contain scope for operational research, as described in the post-2019 aspirational research statement above.

Other related MBIE-funded research that will not form part of the Challenge includes the *Resilient Urban Futures* programme led by University of Otago (U0OX1203) and the *Community resilience and good aging programme* (CRESA, RESX1201). In both cases we have paid heed to this research, seeking links where relevant, but being careful not to create overlaps. Some of the researchers within the RNC National Science Challenge have direct links to these programmes, which aids the coordination.

CRI core funding

GNS Science, NIWA and Scion have allocated significant resources to hazards resilience research in line with their respective Statements of Core Purpose:

- GNS Science: to increase New Zealand's resilience to natural hazards and reduce risk from earthquakes, volcanoes, landslides and tsunamis.
- NIWA: increase the resilience of New Zealand and South-West Pacific Islands to tsunami and weather and climate hazards, including drought, floods and sea level change.

Annual details of the relevant research programmes are available in their Statements of Corporate Intent. This research provides much of the underpinning hazard knowledge, models, risk estimations and warning systems that are vital to the Challenge. The Challenge will encourage continued research investment and development in these areas, and over time through the Partners Group governance arrangements, encourage the development of further underpinning research that fits under the vision of a Resilient New Zealand developed here.

Related National Science Challenges

Aspects of the RNC National Science Challenge naturally align with The Deep South, Our Land and Water, and Building Better Homes, Towns and Cities.

We will work to ensure that the research, including Vision Mātauranga aspects, of this Challenge is coordinated and optimised within the larger framework of the environmental and housing National Science Challenges. This is made especially relevant by the inclusion of gradually increasing hazards due to climate change (as recommended by the MBIE Science Board), and our focus on decadal time scales and building intergenerational changes to our resilience culture. The Deep South Challenge will be a key partner in taking an integrated approach to future weather and climate hazards. Direct links will be enhanced though the implementation of earth system models within The Deep South and the use of compatible high-resolution weather-related hazard models to simulate the local impacts of future changing events. We can integrate this research into resilience solutions for long-lived assets, infrastructure and communities, complementing the increases in adaptive capacity sought by The Deep South. Further, we will partner with The Deep South on our P3 Living on the Edge Co-creation Laboratory programme, and related Vision Mātauranga research.

With a significant component of New Zealand's productive economy located in the rural sector, we will also work closely with the Our Land and Water Challenge, as many of their risks to success will derive from natural hazard impacts, and we also can exploit their adaptive capacity outcomes to increase resilience in other sectors.

Opportunities also exist to benefit from research on high performance computing and data management activities being discussed in the Science for Technical Innovation Challenge. The fledgling Building Better Homes, Towns and Cities National Science Challenge will also directly relate to our P2 Resilient Cities New Zealand Co-creation Laboratory and key researchers from the Building Better Homes, Towns and Cities National Science Challenge were involved in its design.

Related university research

There is large potential to increase the effectiveness of the Challenge by drawing from a range of university research that relates to the vision of a Resilient New Zealand. Several Centres of Research Excellence (CoRE) proposals relate to our vision, and we have input ideas and support to three relating to climate-change/sea-level rise, earthquake engineering and seismic underpinning studies of New Zealand. Through very strong buy-in and involvement of university researchers in the RNC National Science Challenge Phase 1 research programme, we are in a good position to seize the initiative to grow aligned university research alongside the Challenge. This would serve to feed the resource and capability needs of future expansion and deepening of research in the area, and potentially leverage from other funding sources, such as internal-university research funding, PhD scholarships and Postdoctoral Fellowships.

Other specific research funds

The Earthquake Commission (EQC) funds resilience-related science, investing $4M p.a. in resilience research capability, collaborative resilience projects, science to practice, and professional sector capability building. This is commonly aligned with developing key research practitioner strengths in the university sector and/or supporting hazard-related projects. Through our interaction with the EQC proposed through the Stakeholder Advisory Group, we will further encourage the EQC to co-invest in research that fits with our vision of a Resilient New Zealand.

The New Zealand Fire Service Commission manages research funds that are relevant to rural fire risk, and the Building Research Levy, managed by BRANZ, contributes to increased resilience of New Zealand housing.

Key infrastructure

This Challenge will also benefit from a wide range of existing and developing science infrastructure. This includes the computational resources of the New Zealand e-science infrastructure (NeSI – high performance computing, federation and management of diverse data sets), GeoNet (co-funded by EQC), National Climate and National Hydrological measurement networks, and dedicated engineering laboratory facilities.

Business Plan

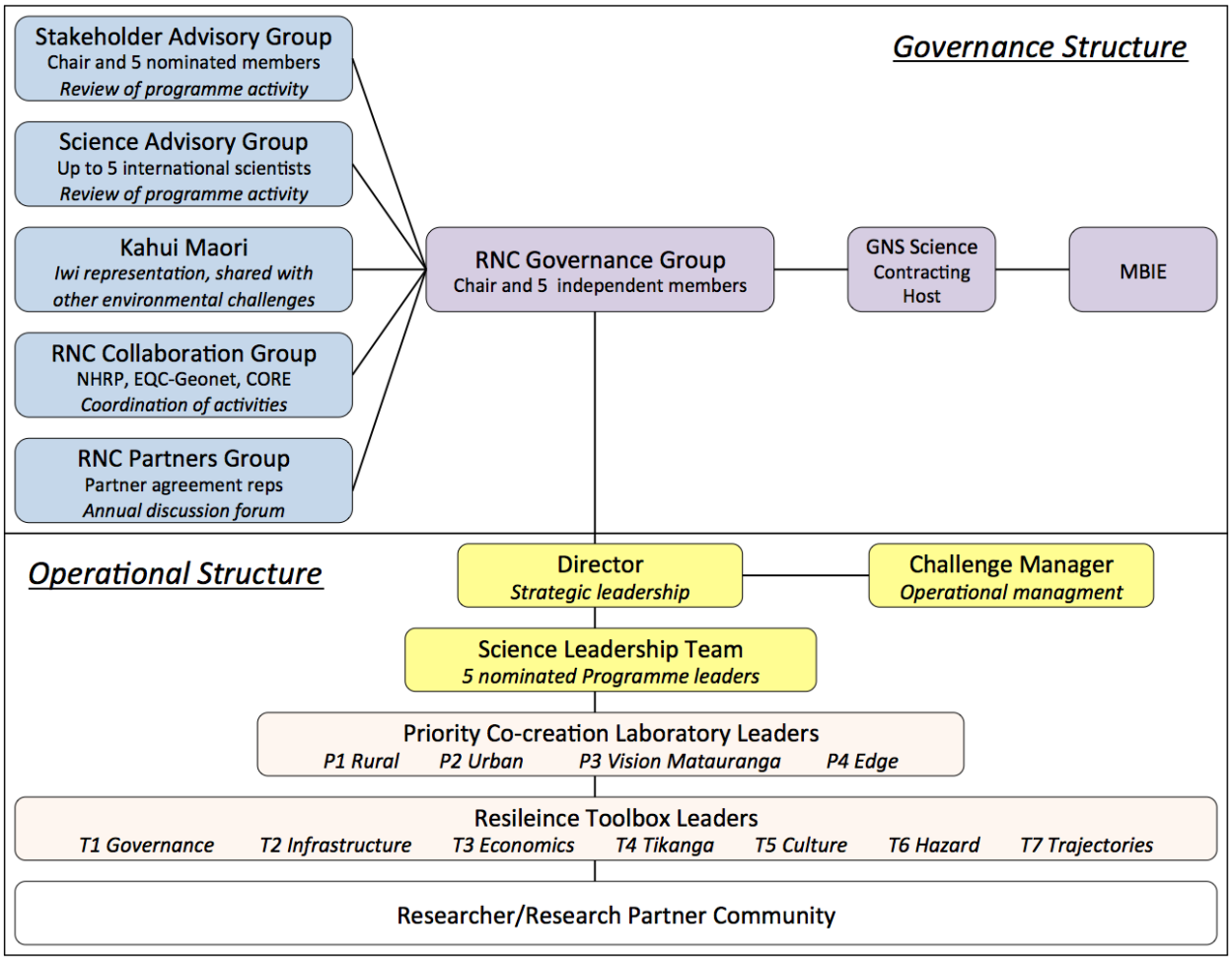
Governance and Management

The governance and management models for the RNC National Science Challenge were developed from those in the 10 June 2014 submission by the Interim Director, Prof Shane Cronin, and the Interim Governance Group [IGG].[1] The model supports a mission-led governance structure, which embeds user/stakeholder participation in parallel with the proposed science. The structure links to other closely related partners, such as the Natural Hazards Research Platform, and other organisations undertaking and commissioning related research at the Governance level.

The Challenge will be overseen by an independent, skills-based Governance Board to provide informed strategic and procedural oversight. The Board will be advised on the scientific merit and wider (global) context of the Challenge by a set of Advisory Groups (Stakeholder, Science, Kahui, RNC Collaboration, and RNC Partners Groups) and through other regular engagements with key stakeholder and user groups at board level.

[1] Prof Brigid Heywood, Massey U. (Chair); Dr Mike McWilliams, GNS Science; Dr Rob Murdoch, NIWA; Prof Richard Blaikie, U. Otago; Prof Pierre Quennville, U. Auckland; Prof David Simmons, Lincoln University; Dr Brian Richardson, Scion; Prof Mike Wilson, Victoria U.; Dr Richard Capie, BRANZ; Prof Steve Weaver, U. Canterbury; Dr Peter Benfell, Opus International Consultants Ltd.

Proposed Governance and Management Structure of the Resilience to Nature's Challenges National Science Challenge



The various Governance Advisory Groups provide a range of inputs, including:

- Stakeholder Advisory Group: input to stakeholder needs, updates on research effectiveness, connectivity and identification of co-funding opportunities.
- Science Advisory Group: input and review of the science directions and outputs of the Challenge, including identification of new science directions and strategies and new international collaboration and co-funding opportunities.
- Kahui Māori: provision of support to fulfil the Vision Mātauranga aspirations of the Challenge, potentially in conjunction with other related environmental Challenges.
- RNC Collaboration Group: includes the Director of the Natural Hazards Research Platform and equivalent other programmes that relate to this Challenge (e.g., other Challenge Directors) and provide input to potential co-developed research, new collaboration opportunities and guidance on research coordination and alignment between programmes related to the RNC National Science Challenge.
- RNC Partners Group: provides a feedback mechanism for RNC National Science Challenge partners and an opportunity for identifying synergies and new opportunities for research funding and aligned partner-funded activities that expand the breadth and depth of this Challenge.

The RNC National Science Challenge Director will be a scientist of international repute in this area. The Director will be responsible for determining the strategic and operational directions of the Challenge and seeing through the aspirations and research plans of the Challenge. The Director will be supported by a Challenge Manager, who will have oversight and responsibility for operational functions and run the daily business of the Challenge. The balance of effort between Director and Manager will depend on the successful candidate for the Director's role.

Further, a team of up to five Science Leaders will be selected from within the Challenge programme to participate on the Science Leadership Team, a group that will help guide the ongoing refinement of the research strategy, develop ideas for additional investments and develop the direction of the Contestable Funding processes during Phase 1 and 2. A small central budget component supports the Science Leaders, as well as their funding directly under research programmes.

GNS Science will be the Challenge Contractor and accountable to MBIE for the contract.

The Governance and Management arrangements will be reviewed in three years to ensure that the structures best serve the delivery of the Challenge.

Governance and Management Principles

The governance and management structure has been designed to embody the following principles:

- Enable a 'step change' in broadening defensive and adaptive resilience change in New Zealand society and fulfilling the Resilient New Zealand vision;
- Integrate a clear, aligned purpose and intent throughout the Challenge;
- Ensure delivery on the objectives and requirements of the Challenge specified in the Investment Contract;
- Embed user and stakeholder input and participation at all levels;
- Enable the introduction of new research, researchers and research organisations;
- Provide a transparent decision making process for the allocation of funding based on merit and strategic alignment;
- Facilitate linkages with other relevant National Science Challenges; and
- Provide effective, efficient management and operational structures.

Governance Group

A skills-based Governance Group, led by an independent Chair, will govern the RNC National Science Challenge. The Governance Group, which will hold delegated responsibility for delivery of the Challenge objectives, will be responsible for strategic and procedural oversight of the activities carried out under the RNC National Science Challenge, particularly in ensuring that they meet the needs and requirements of the stakeholder communities. The Governance Group will also be responsible for recommending the appointment and providing feedback on the performance of the Challenge Director.

The Governance Group will consist of up to seven members and may include representatives from the following domains:

- An independent Chair;

- A representative of the Challenge Contractor;
- A Māori representative;
- A local regional/city/local council representative;
- A government agency representative;
- A Business sector group representative;
- A Community agency and local infrastructure providers and developers representative; and
- A representative from the wider RNC Partners Group.

Governance Group members may be chosen so that they represent more than one of the above areas to minimise the size of the Governance Group, while still retaining the necessary expertise.

The Chair of the Governance Group will be a nationally prominent independent individual with background experience relevant to the Challenge and with skills in research governance and stakeholder management. Governance Group members will be selected not only as representatives of particular groups, but also based on their governance expertise and domain knowledge. Preferred candidates have been identified by the Interim Governance Group and await the approval of this proposal before an appointment is made.

Governance Group members will act in the best interests of the Challenge and New Zealand, rather than in the interests of their particular domain. Membership of the Governance Group will be reviewed after two years by a group consisting of an executive management representative from each of the Challenge parties.

Nominations for the Governance Group appointments are being recruited from partner organisations and from key stakeholder and user groups.

Science Advisory Group

The Science Advisory Group comprising up to six members will provide independent advice to the Board on the scientific merit of the activities of the Challenge to ensure that research is benchmarked against international standards for excellence and relevance. The Group will also advise the Board of any potential strategic opportunities. The Group will be selected by the Board based on international peer recognition and will include at least one independent New Zealand scientist to provide context.

Stakeholder Advisory Group

The Stakeholder Advisory Group will be made up of representatives of the key sectors related to the Challenge. This will provide strategic level advice to the Governance Group on Challenge priorities and activities to ensure the direction of the Challenge is aligned with stakeholder and user needs. The Group will also advise the Director and Governance Group of potential new opportunities and risks.

The Stakeholder Advisory Group will include representatives from:

- Māori;
- Regional/city/local councils;
- Government agencies;
- Productive sector groups;

- Community agency and local infrastructure providers and developers representative;
- Emergency response groups; and
- Community and other relevant groups.

RNC Collaboration Group

This Group will be set up to involve the leaders of related large-scale research programmes that have direct relevance to the Challenge, including, but not limited to: the Director of the Natural Hazards Research Platform, the Director of the Scion Rural Fire programme, the Directors of related National Science Challenges, and others where appropriate. This group will provide advice and guidance to the Governance Group on the alignment and collaboration opportunities afforded by these related programmes.

RNC Partners Group

The RNC Partners Group will be responsible for providing input to the Governance Group on Challenge priorities and strategic plans to ensure that the partner capabilities and resources are available to meet the objectives of the Challenge. They will also identify and promulgate opportunities within their own organisations to support the vision of the Challenge and seek out other co-funding and related-research opportunities.

The Partners Group will consist of managerial level decision makers with appropriate domain knowledge representing the main research partners involve in the Challenge.

Challenge Director

The Director will provide overall leadership to ensure that the Challenge delivers on its vision and contractual obligations, including through facilitating collaborations between Challenge parties and engaging with the Stakeholder Advisory Groups to make certain that Challenge priorities and strategies are addressing the requirements of the stakeholders. This person will be a strong, independent academic leader in the area of resilience to nature's challenges and an "honest-broker" for researchers and research partners to the Challenge. To this end, the Director will not have any direct research funding within the programme and can remain in an independent position, to guide, inspire and mentor the researchers within the component programmes.

The Director has the authority to make recommendations for approval by the Governance Group to coordinate the Challenge's scientific and strategic directions and initiatives, facilitate the allocation of resources and manage the interface with users and stakeholders. The Director will chair the Science Leadership Team.

Challenge Manager

The Challenge Manager will provide support to the Director by managing the operations and mechanisms behind the Challenge, including overseeing the business operations and sub-contracts, running reporting processes, and interfacing with programme leaders to ensure that the operational side of the Challenge programmes are optimal and equitable.

Science Leadership Team

The Science Leadership Team, chaired by the Director, will ensure that science excellence is maintained and the research objectives of the Challenge are achieved. In addition, the Science Leadership Team will play a key role in collectively shaping and delivering the Challenge research agenda, including proposing innovative new science directions. The Science Leadership Team will be responsible for developing and initiating calls for proposals for contestable funding in-line with Challenge strategies and priorities. An important task for the Science Leadership Team will be to facilitate integration across programmes and to ensure that user/stakeholder participation is implemented as part of all projects.

Each member of the Science Leadership Team will be supported by the Challenge at 0.05 FTE, plus the component of their time that is contained within operating research programmes. It is anticipated that the Science Leadership Team is selected from the pool of Leaders of the Phase 1 Research Programmes and thus already have a large time commitment to the Challenge.

Review of the Governance and Management Model

The Governance Group will undertake a review of the Governance and Management structures two years after implementation of the full structure. The governance model, including the roles and responsibilities of the Governance Group, will be reviewed by the Challenge parties at the same time.

Vision Mātauranga

The Challenge will ensure that the research undertaken within the Challenge umbrella will contribute to innovative, practical and sustainable solutions for Māori and all Aotearoa/New Zealanders. Implicit in this approach is a commitment towards Te Tiriti o Waitangi and the sharing of information, resources and opportunities, as well as learning, action and shared decision-making concerning the relevance of the programme to iwi/hapū and Māori business objectives and goals.

Established kaupapa Māori research principles will be observed and applied throughout the term of this Challenge. Core principles include: aroha [sincerity, mutual-respect, love]; kanohi kitea [seen face, in person, literally means ‘face to face’]; mana [dignity, authority, control, prestige, power]; manaakitanga [to support, take care of, give hospitality to visitors, protect, look out for]; whakapiki tangata [empowerment]; maahaki [humility]; whakatuia [integration]; tuupatotanga [caution]; and whakawhanaungatanga [kinship, process of strengthening relationships].

The governance structure for this Challenge has been designed to increase Māori involvement across all stages of the research. It is expected that formal Māori involvement from different sectors, systems and groups (includes Māori business, community groups and iwi authorities) will ensure that the programme responds to Māori issues and needs (outcomes for Māori). Further, it is expected that different levels of involvement will help to facilitate relationships between Māori, government, the science system and industry to grow opportunities for knowledge transfer, as well as iwi/hapū led research and development strategies. Māori representation will be sought from different sectors, systems and groups at all levels of the Challenge.

Investments and Financial Management

The research partners in this Challenge are all significant research organisations with a long history of financial stability. Each is independently audited for the use of public funds according to the standards of the Office of the Controller and Auditor General. The funds for the Challenge will be managed on behalf of the research providers by GNS Science, which has considerable experience in the management of public good research funds and in managing and co-ordinating multi-party consortia for the delivery of national/international projects.

GNS Science will establish discrete accounts within its financial management system for Challenge funds and distribute funds to the research partners and other research organisations in New Zealand via standard subcontracts using a standard template. Any Challenge research funding directed to GNS Science will be transferred to dedicated project accounts established on an equivalent basis to external subcontracts.

Contestable Funding

To enable refresh of the science through the entrance of new research and researchers, the Challenge will allocate a minimum of 10% of available funding to contestable funding applications. Phase 1 of the Challenge will involve one contestable-funding round, which will allocate $2 million for the period 1 July 2016 to 30 June 2019. Calls for this process will be made at the end of 2015, with evaluation of proposals taking place during the first four months of 2016 (the process for this is within the Appendix to this submission).

The purpose of the $2 million investment into contestable research is to drive refresh of science resource and encourage engagement from a wider science pool than already engaged. It will also be used to focus additional resource on emerging priority areas and/or gaps as they develop in the first phase of the programme. The timing of the research investment also gives the *Understanding Rural Fire Risks* programme an opportunity to develop proposals that may extend from their terminating work programme. This contestable funding will be used in a strategic way to allow for one major project (up to $600 k over 3 yrs), should the applications warrant it, two projects of equivalent size to a Fast Start Marsden for strong science leaders (up to $300 k over 3 yrs) and five projects that would be suited to a new emerging researcher of great promise (up to $150 k over 3 yrs). At all levels, the overriding requirement will be that the research proposed under this contestable pool will align with the Resilient New Zealand vision promulgated by the RNC National Science Challenge.

The priorities and scope for contestable funding calls will be defined by the Science Leadership Team in alignment with the Challenge Research Strategy and Vision and recommended by the Director for approval by the Governance Group. The processes to be used for the call for funding proposals will conform with MBIE practices and use MBIE processes. The Director will ensure that the processes for allocation of research funding are transparent and fair and are based on science excellence and strategic alignment to the Challenge objectives.

Co-Funding

Related funding or co-funding from third parties will not be received by the Challenge but rather will be managed by each of the research providers. Related funding and co-funding will be reported

separately to MBIE to maintain a clear differentiation between funding provided for the Challenge and that received separately by the research providers.

Monitoring and Evaluation

The Challenge Director is responsible for monitoring progress to milestones for each of the component Programmes, but also to document progress against the aspirations of the National Science Challenges. To this end, two reporting templates will be used as adapted from MBIE.

Monitoring schedule for National Science Challenge overarching objectives

Activity area	Dimensions	Monitoring
1. Delivery of Resilience to Nature's Challenges Vision	How do all Challenge activities focus on and contribtute to achieving the Vision and Mission? 1.1. Challenge Strategy and Vision informs governance, management, and research decisions; 1.2. Challenge consortium has a clear pathway to achieve the Challenge objective and makes significant progress along the pathway; 1.3. Challenge portfolio delivers outputs that contribute to the Challenge objective.	Annual report on research and business plans. Measures on a subset of resilience indicators as developed as part of the T7 Resilience Trajectories Resilience Toolbox programme.
2. Effective governance and management	To what extent do the governance and management arrangements work effectively? 2.1. Governance entity operates effectively and makes informed, timely decisions in line with Challenge objective: • resource allocation decisions generate impact and value for money; • science quality is ensured, fit for purpose, and constantly improved; • Challenge performance and risks are managed; • governance group performance is regularly assessed, membership is reviewed as necessary. 2.2. Adequate and effective processes are in place and used in areas such as performance reporting and monitoring, financial management, audit: • plans are dynamic and adjusted for changes in the external environment	Annual report on research and business plans. Value for money of governance and management activities (and cost vs budget). Governance entity performance. Evidence of quality processes (reporting, financial management etc.). Performance issues (if any) and how they are addressed.
3. Best team collaboration	To what extent is New Zealand's best team working on delivering the Challenge Vision? 3.1. Challenge team works together across disciplines and member institutions (relationships are built that did not exist previously) and draws on and aligns capabilities and resources outside Challenge; 3.2. Challenge team has the right capability, gaps are filled, and Challenge tests itself with new ideas, approaches, and mechanisms;	Annual report on research and business plans. Connections across teams, disciplines, organisations. In-flow of new researchers. Building of skills, expertise, capability of team members. Relationships with international

Activity area	Dimensions	Monitoring
	3.3. Emerging talent has opportunities (in research or leadership roles); 3.4. International science expertise is used where appropriate.	researchers.
4. Stakeholder collaboration	To what extent is the Challenge engaging with stakeholders and to what extent are stakeholders using the Challenge? 4.1. Stakeholders inform and influence Challenge priorities and research agenda, and take up and use research results; 4.2. Challenge influences investments of external stakeholders.	Annual report on research and business plans. External fee-for-service revenue earned. Value of co-funding, in-kind, other support. Engagement/relationships with stakeholders. Commercialisation outputs, eg patents, licences, spin-outs, new products, services and processes. Stakeholder adoption and use of Challenge-generated knowledge and technology.
5. Māori involvement and mātauranga	To what extent are Māori and mātauranga Māori engaged to achieve the Challenge objective? To what extent is the Challenge addressing the needs and aspirations of Māori? 5.1. Māori are involved in the Challenge or at least add influence - where appropriate - as researchers, stakeholders, governance entity members, advisors; 5.2. Challenge research unlocks knowledge, resources, and potential of Māori; 5.3. Mātauranga Māori is used in the Challenge research, where appropriate.	Annual report on research and business plans. New products, services, processes developed based on mātauranga Māori. Engagements, collaborations, partnerships, relationships built with Māori (individuals, businesses, incorporations, rūnanga, trusts, iwi, hapū, marae).
6. Public participation in the science process	To what extent is there engagement between the Challenge and the public? 6.1. Challenge is relevant to New Zealanders; members of the public are involved in the Challenge where appropriate, and engaged in the aspirations of the Challenge.	Annual report on research and business plans. Public engagement activities, e.g. seminars, website hits, school visits, sponsorships, publications in popular press, TV and radio programmes etc. Change in public attitudes towards science.

Monitoring schedule for RNC National Science Challenge specific objectives

Resilience to Nature's Challenges (RNC) – Outcome Framework Template

Vision	Inputs	Activities	Outputs	Outcomes		
				Short (1-3 years)	Medium (4-7 years)	Long (8-10 years)
New Zealand is a nation of people who have transformed their lives, enterprises and communities to anticipate, adapt and thrive in the face of ever-changing nature's challenges	Four Priority Co-creation Laboratory programmes focus on key areas for resilience change Seven Resilience Toolbox programmes coordinate the best disciplinary knowledge generation required to drive resilence outcomes for New Zealand Related research is integrated effectively and international partnerships are strong	Programme related activities Outputs and outcomes, partnerships and co-creation with stakeholders Evaluation of ongoing needs and revision of programmes to fit these Identification of key focal points for stretch and contestable funding Checking that we are on message with changing expectations of stakeholders as research progresses	Products, services, publications, websites, network groups, reports, strategies, policies and plans How do outputs relate to stakeholder needs, format, content and review Are the outputs fit for purpose? Evaluation of uptake and ongoing demand Revision of output destinations and design	Evidence of initial research uptake and implementation Evidence that research is recognised and used to inspire changes in knowledge, attitudes and behaviours Demonstration of how research adopters / influencers are behaving differently	Evidence of the widespread adoption of new ideas, products, processes, and plans deriving from this research. Evidence of influence of the research beyond case-study areas Evidence of integration between infrastructure, social and governance solutions to resilience Demonstration of how research adopters and stakeholders are operating differently	***Has the vision been realized?*** *What are the measurable changes to New Zealand resilience to nature's challenges in policy, community, infrastructure and scientific terms?* Demonstration of the difference that the Challenge has made Demonstration of how the economic, cultural, social, health and environmental outcomes have improved

Internal monitoring of science outputs

The Challenge research will be monitored using an adaptation of the GNS Science's "ONCE" information management facility. All programme leads will be required to report output data (publications, contracts, conferences attended, etc.) as it is generated and the Challenge Director and the GNS Science Research Office can monitor progress (via compliance reports) and record achievements (via performance highlights) of a research project or programme. The compliance report employs a traffic light system to monitor progress for individual critical steps/milestones of a research project. Programme leaders identify and report on critical steps toward milestones at the end of every quarter and, regardless of a step's status, they are required to provide an explanation. Between quarters and at the end of each quarter, programme leaders can enter performance highlights (achievements) and specific items that would warrant inclusion in an overall Challenge report.

Natural Hazards Research Platform Transition

It is intended that the Natural Hazards Research Platform research be incorporated into the Resilience to Nature's Challenges work programme and become part of the Challenge. This may involve developing and extending some of the research programme elements within the Challenge and/or creating new programmes. For the best interests of the Challenge mission, this transition should be completed in an effective manner.

It is proposed that a plan be developed by 30 June 2015 for the transition of the Natural Hazards Research Platform into the Challenge. This plan will be based on the following principles and activities:

- The Platform Management Group, along with the Challenge Director when appointed, will be responsible for the development of the Platform transition plan. The mode of transition and the agreement on the integration of the relevant Platform components into the Challenge will be subject to the approval of the Challenge Governance Group.
- Platform activities through the transition phase will be consistent with, and where practicable align with, Challenge activities and Research Strategy.
- The plan will, where practicable, aim to avoid any science duplication and minimise management duplication and costs through the transition.
- The plan recognises the established processes, stakeholder relationships and resources available through the Platform and will use this synergy to gain efficiencies in RNC workstreams.
- The transition plan will include:
    - a detailed timeline of the activities associated with the transition process;
    - a process for the transfer of the Platform funds to the Challenge as existing research project contracts end (or sooner if agreed by the Platform parties), noting that there may be a need to put in place some extended arrangements for PhD student support;
    - The reinvestment of these transferred funds will be the responsibility of the Challenge and as such would address the need to maintain such things as key national research capabilities and a best teams approach (e.g., technology transfer, stakeholder/community/Māori engagement, capability and skills, track record, co-funding, etc.);
    - development of a communication strategy to ensure stakeholders are well informed and engaged in the process by which the transition of the Platform into the Challenge occurs;
    - a process for ensuring existing stakeholder relationships are maintained and strengthened through the transition;
    - an agreed approach to the phasing of the Platform to the Challenge brand; and
    - a process for negotiation with MBIE of any changes required to the Natural Hazards Platform contract between MBIE and GNS Science.

Rural Fire Programme transition and relationship

The current MBIE contract to support the rural fire research programme will end 30 September 2016. MBIE have advised Scion and the current co-investors that they wish this programme to be mapped into the RNC National Science Challenge. It is, therefore, in the best interest of all Parties that we effect a smooth transition.

The RNC programme development work undertaken prior to programme submission has identified that much of the rural fire research programme, designed to meet fire stakeholder strategic priorities, is out of scope of the RNC National Science Challenge. Therefore we recognise that the Challenge will only meet a small portion of the rural fire stakeholders' underpinning research requirements. We also recognise that, although it is proposed to run a contestable funding process within the Challenge, with much of the rural fire research activities being out of scope of the Challenge, it is unlikely that this

mechanism will pick up the bulk of the fire research activities not identified as priorities in the main RNC National Science Challenge.

To support the transition of the fire programme, which ends/novates on 30 September 2016, we propose the following steps:

- Explicit agreement between the RNC National Science Challenge Governance Group, Scion and the Rural Fire Research Advisory Committee, on those rural fire research priorities that are either in scope or out of scope for the Challenge, by March 2015.
- For those priorities that are in scope: (i) an indicative plan for how those activities will be supported over the lifetime of the Challenge and how all parties can amend this plan based on needs, by the time the RNC National Science Challenge contract is implemented; (ii) a plan for incorporating the rural fire stakeholders into the Challenge's engagement process and for the avoidance of doubt of how these stakeholders will be able to input into the Challenge's science direction and prioritisation process.
- For those activities that are out of scope, it will be up to Scion, the Rural Fire Research Advisory Committee, and MBIE to agree on any alternative funding options.

Appendix 1

Detailed Roles and Responsibilities for the Governance and Management Structure

Governance Group

The principle responsibilities of the Governance Board are:

- Approve the strategic direction for the Challenge, including ensuring that it appropriately represents users and co-funder needs and priorities;
- Ensure that the Challenge delivers on its objectives and meets the terms of the Investment Contract between MBIE and the Challenge Contractor, including managing risks and constraints to Challenge delivery;
- Recommend to the Challenge host the appointment of the Director;
- Provide support to, and feedback to, the contracting employer on the performance of the Director;
- Maintain effective relationships with the Challenge Contractor, Advisory Groups and the Director;
- Appoint members to the Science and Stakeholder Advisory Groups;
- Review investment recommendations from the Director and consider advice from the Science Advisory Group;
- Approve decisions to allocate funding for research and Challenge-related activities that support the mission of the Challenge;
- Hold the Director and the Science Leadership Team to account for delivery of the Challenge objectives and adherence to the principles underlying the Challenge, through informed, astute, effective and professional oversight;
- Oversee regular strategic and performance reviews of the Challenge;
- Approve changes to the research providers and collaborating organisations in a collaborative way.

Science Advisory Group

The principle responsibilities of the Science Advisory Group are:

- Undertake reviews of the Challenge science and strategy in relation to international standards of excellence;
- Advise the Governance Group of strategic opportunities based on international expertise;
- Advise on the relative performance of the Challenge compared to international research and wider science-informed initiatives within the scope of the Challenge, using international benchmarking standards for science excellence, relevance and impact;
- Assess the success of multidisciplinary approaches and integrating activities and advise the Board on further opportunities.

Stakeholder Advisory Group

The responsibilities of the Stakeholder Advisory Group will be to:

- Advise the Governance Group on priorities and activities to ensure the direction of the Challenge is aligned with stakeholder and user needs;
- Review the research programme for the Challenge and recommend to the Governance Group any changes required to better align with stakeholder needs;
- Advise the Governance Group of potential new opportunities and risks;
- Act as ambassadors to champion the Challenge and the implementation of research outcomes with users and stakeholders.

Appendix 2

Management Processes

Process to establish Science Advisory Group

Background

The Science Advisory Group is responsible for contributing a robust scientific peer-review perspective to the science plans of the Resilience to Nature's Challenge National Science Challenge, in relation to its 10-year Mission. Specific roles of the Group include evaluating, and commenting on, science strategies, research plans and project priorities as proposed by the Science Leadership Team (SLT). The group will help ensure that the research carried out by the Challenge is of high scientific quality, of international relevance and has the potential to be innovative and of high impact. Furthermore, the Group members will provide an important conduit by which the RNC National Science Challenge activities and research outputs can be applied and integrated internationally.

Appointment of the Science Advisory Group will begin at the contracting of Phase 1. A review of the Science Advisory Group needs and membership will be conducted at the end of 2017. It is recommended five members are sought for the Science Advisory Group

General process for Science Advisory Group formation

- A call for members of the RNC National Science Challenge Science Advisory Group upon contracting Phase 1, with nominations sought from the Director, and members of the Governance Group.
- The Governance Group Chair will evaluate and appoint the nominees using the scheme below.

Guide for selecting Science Advisory Group members

A balance of specialist and cross-disciplinary experts are required for the Science Advisory Group, spanning the social, engineering, physical science, planning, economics and other fields inherent in natural hazards resilience research. The role requires individuals to have a strong understanding of international policy instruments and strategies underpinning resilience research, as well as experience in research projects that link strongly from basic research through to implementation (including researcher/user co-creation models). Individuals with experience in inter- and trans-disciplinary research will be highly valued. A familiarity with the hazard and policy setting of New Zealand or

countries similar to New Zealand is also important. As a collective, the Science Advisory Group will also be cognisant of New Zealand's Treaty of Waitangi obligations and be familiar with mātauranga Māori research. Further, the members must have a strong track record in research evaluation, and an underpinning knowledge of the resilience goals of the Challenge.

The following matrix is a guide to individual skills and fit to the RNC National Science Challenge needs as well as to ensure that across the Group there is a balance of attributes. In addition, other factors will be considered to ensure selection of a coherent Science Advisory Group including:

- Coverage of the key research areas of relevance to resilience to natural hazards;
- Linkage to other global initiatives and geographical spread in relation to potential international markets for the Resilience to Nature's Challenges outputs and products.

Science Advisory Group member matrix

Attribute
International Standing *High international levels of scientific recognition and reputation.*
Resilience Focus *Specialism and/or cross-disciplinary research track-record in an area relevant to natural hazards resilience research.*
New Zealand Context Knowledge *Familiarity with New Zealand hazard-scape and policy/economic environment, or that of similar countries.*
Research to Implementation *Experienced in end-user engagement and research discovery through to implementation, including commercialisation.*
International Best Practice *Engaged with or familiarity with international strategies and best-practice approaches to natural hazards resilience*
Research Evaluation and Cost-benefit Analysis *Experience in evaluation of the academic/scholarly merit of research, as well as the cost-effectiveness of competing research proposals*
Mātauranga Māori *Understanding of Māori and/or other indigenous research of relevance to resilience*

Process to establish Stakeholder Advisory Group

Background

The Stakeholder Advisory Group (STAG) is responsible for contributing a broad end-user and research-implementation perspective to the science plans of the RNC National Science Challenge in order to fulfil its research strategy and vision. Specific roles include evaluation of, suggesting improvements to, and evaluating science plans and project priorities as proposed by the Science Leadership Team (SLT). In addition, the STAG may be asked by the Governance Group for specific independent feedback on SLT proposals and work-plans. The group will not only ensure that research is tailored to user/stakeholder needs, but will also play an advocacy role for wider stakeholder adoption of Challenge research.

Appointment of the STAG will begin upon contracting Phase 1. A review of the STAG needs and membership will be conducted at the end of 2017. It is recommended that five members of STAG are sought.

General process for STAG formation

- A call for members of the RNC National Science Challenge Stakeholder Advisory Group upon contracting Phase 1, with nominations sought from the Director, and members of the Governance Group.
- The Governance Group Chair will evaluate and appoint the nominees using the scheme below.

Matrix for selecting STAG members

On the STAG, a balance of experience is required that spans the variety of sectors where the RNC National Science Challenge research is to be targeted. The role requires individuals to be familiar with research/stakeholder interactions and be well respected and representative of the stakeholder community. A mix of focus from local through to national level and private enterprise through to governance backgrounds and skills is needed. As a collective team, the STAG will also address mātauranga Māori strategies and aspirations and have excellent communication with other stakeholders not directly represented.

The matrix below is intended to provide a structure for assessing the collective suitability of the STAG nominees. To select a coherent group, a series of balance factors should be evaluated, including but not limited to:

- Coverage of local/community needs as well as national/regional issues;
- Inclusive of both governance and business needs;
- Collegiality and ability to work in teams.

Stakeholder Advisory Group member attribute matrix

Attribute
Standing and Policy Influence *Holding positions of influence or high visibility and high strategic value in stakeholder sectors, with roles in setting strategy, plans or providing advice to a broader range of stakeholders.*
Research Familiarity *Engaged in science-implementation partnerships and familiar with science/research in the scope of the Challenge.*
Economic Relevance *Represent major areas of New Zealand economic endeavour and/or key strategic infrastructure and/or other asset bases.*
Social/Community Representation *Engaged to work plans or strategies that are linked to social and community outcomes.*
Co-creation and Cross-disciplinary Experience *Experienced in the implementation of, and involvement in, a range of research to implementation activities.*
Connectivity *Wide connections amongst a range of economic, community, regional and/or professional-society sectors.*
Mātauranga Māori *Linked to Māori-specific needs in rural, urban and business settings.*

Process to establish Science Leadership Team

Background

The Science Leadership Team (SLT), led by the Challenge Director, will be responsible for overseeing the philosophical direction of the RNC National Science Challenge, along with leading its research

strategy toward fulfilling the research strategy and vision. Specific roles of the SLT include developing and synthesising science projects, evaluating, preliminary budgeting and (re)prioritising research areas, identifying areas for capability development and also the priorities for contestable research funding. These roles are conducted through consultation and interaction with the Governance Group. Decisions based on SLT plans and recommendations are the responsibility of the Governance Group. The SLT are ultimately responsible for guiding teams towards the successful outcomes of contracted programmes.

The SLT will comprise up to five members plus the Challenge Director. It is envisaged that the SLT members will be sourced from the pool of programme leaders, as outlined in the research plan. These roles will be for Phase 1 of the Challenge. An independent review of SLT performance will be conducted at the end of 2017.

General process for SLT formation

- A call for members of the RNC Science Leadership Team will be made as soon as Phase 1 is contracted.
- A selection team, comprising the Interim Director and a sub-set of Governance Group members will be convened to evaluate the candidates using the guidelines below.
- The GG will recommend the candidates for subcontracting via the Challenge Contractor, GNS Science.
- GNS Science to contract the SLT members, for Phase 1 of the Challenge.

Skills Matrix for selecting SLT members

***General principles**:* A balance of specialist and cross-disciplinary research experience is required that spans all fields within the Resilience to Nature's Challenges portfolio (from physical sciences to engineering, social sciences, governance and emergency management). The major emphasis for this group is on scientific leadership, and an ability to conduct business in a collaborative, non-partisan way to promote outcomes that are for the overall Challenge/New Zealand good. The role requires individuals that have an extremely high level of connectivity to both the researcher and stakeholder community and a proven ability to work in teams. A mix of highly experienced through to strong emerging research leaders will be a key to maintaining fresh ideas and approaches, along with a programme of regular team review during the course of the Challenge. As a collective team, the SLT will also address mātauranga Māori strategies and aspirations, ensure excellent channels of communication to Māori stakeholders and the research community.

As a guide to selection of the most appropriate team, the following key attributes have been developed. The chart is used as a means to identify skill and attribute balances across the team. It must be recognised that it is highly unlikely that a single individual will cover all categories, so that balance of the team will also consider:

- Interpersonal, collaborative skills and inter-disciplinary experience.
- Community, policy, planning, business, mātauranga Māori linkages.
- Geographical/community representation (i.e., Urban, Rural, any programme focus areas).
- Representation of experienced and emerging science leaders.

SLT Candidate Attributes matrix

Attribute
Scientific Leadership *Evidence of leadership, inspiration, development, management and successful delivery of major research programmes, budget development, research monitoring and mentoring emerging researchers.*
Research Credentials *Peer-esteem as measured by research outputs, awards, etc*.
Relevance of Research experience *Fit of research skills in relation to the resilience scope, both specialist areas and cross-disciplinary studies.*
Researcher Connectivity/Collaboration *Evidence of networks and active collaborations with other researchers, evidence of strong interpersonal and communication skills.*
Stakeholder Connectivity *Evidence of stakeholder engagement and active stakeholder networks with a focus on research implementation*.
Business/Economic Sector Engagement *Evidence of sector engagement and active networks.*
Legislative/Planning Sector Engagement *Evidence of sector engagement and active networks*.
Mātauranga Māori/Tikanga Māori *Evidence of Māori-specific research and active collaborative networks.*

Prioritisation of Research for the RNC National Science Challenge

Investment framework and investment categories

This Investment Framework will be used by the Governance Group in prioritising MBIE investment to funding research that fulfils the RNC National Science Challenge Strategy and Vision.

Three broad categories of research investments are proposed:

- ***Priority Co-Creation Laboratory Programmes*** *(ongoing over Phase 1 and extending into Phase 2);*
- ***Resilience Toolbox Programmes*** *(ongoing over Phase 1 and expanding into Phase 2); and*
- ***Contestable Research Projects*** *(new teams and ideas, up to three year term from 1 July 2016).*

Determining investment priorities and selecting contestable research programmes

Prioritisation of the investment for each of these categories will be based on the potential to achieve a step-change toward the vision of a Resilient New Zealand. This will be measured by:

A. **The potential scale of impact and socio-economic benefits achievable (50% weighting);**
B. **Science stretch and innovation (30% weighting); and**
C. **The degree of stakeholder engagement and co-creation (20% weighting).**

Impact assessment is semi-quantitative, based on expert judgement, supported by a set of economic cost-benefit models. Success criteria for the impact statements are coded against a set of key descriptive characteristics using a numerical scale as described and tabulated below. Vision Mātauranga principles are woven through each of these categories.

The scale/benefits of research impact are scored as follows (each considered equally):

i. Potential for change in policy/governance culture;
ii. The potential for change in individual/community/business behaviour and investment;
iii. The potential for demonstrating international leadership;
iv. The potential economic benefits;
v. The potential to lead transformative Resilience.

Science stretch and innovation are rated by (each considered equally):

i. Innovation – how is the research different to business-as-usual?
ii. Science excellence (potential for high-impact publication or equivalent);
iii. The potential for developing new skills/capabilities and new and marketable IP, products, or processes.

Engagement factors are evaluated under the following categories (each considered equally):

i. The degree of stakeholder engagement and co-created knowledge;
ii. Stakeholder co-funding and implementation of research.

Balance factors and refinement

The expectation of this National Science Challenge is that it conducts research that leads to the Resilient New Zealand vision. The approach is driven by the Research Strategy and partly captured through the scale/benefits factors described above, and in the tables below, but equally science excellence is required, along with "best teams" and expansion beyond business-as-usual. The factors around highly active forms of engagement are sourced from our original June 2014 submission, especially co-creation (with stakeholders) of research-based resilience solutions.

The application of these criteria will result in several programmes rated similarly. However, balance must be sought in the overall portfolio of programmes and projects. In determining the final investments, the Governance Group will receive advice from the Director and Science Leadership Team, as well as the set of advisory Groups. Considerations will need to include any specific areas of weakness within otherwise well rated proposals, but also strategic areas where overall investment is sought, and proposals/programmes have weaknesses that can be remedied via remedial strategies.

A. Potential Scale of Impact and socio-economic benefits (50%)		
	Criteria	**Considerations**
i.	**Policy/Governance** – Scale and potential for resilience step-change	• Evidence of the seriousness of the issue – economic, social. • Are stakeholders aware and concerned with the issue? • Can new policy planning solutions be found? • Are the solutions tractable and is there an adoption pathway? • How are specific mātauranga Māori strategies included? • Are solutions tailored to local, district and national level? • Are implications region-wide or nation-wide? • Are solutions cross-departmental and effective across all relevant Ministries/departments? • How will effectiveness be monitored and measured?
ii.	**Community, business and individual** – Scale of the potential for behavioural and investment change	• Proportion of New Zealand households, communities or businesses affected. • Evidence of the seriousness of the issue. • Are communities and businesses concerned with the issue? • What are the potential social gains from a successful solution? • How are Māori communities and businesses included or specifically targeted? • What is the magnitude of change possible? • What are the influencing behaviours and how will they be changed? • How will behavioural change be recognised?
iii.	**International leadership** – Potential for global impact, exporting ideas, products and processes	• What international policy, strategy or best-practice instruments will this extend? • How will the international leadership impact be realised? • Are solutions, IP, products and processes internationally marketable and what is the demand for these? • What will international leadership and export of resilience solutions look like?
iv.	**Economic Potential** – benefits to individuals, businesses and NZ Inc.	• How will economic benefits be promoted by the research? • How will the research help Māori communities and business prosper? • How will economic benefits be measured? • What are the cost-benefit arguments for adoption or transformation using the new research solutions developed? • What are the costs and negative growth implications associated with residual risk and failure of solutions?
v.	**Transformative resilience** – long-term outcomes	• What transformation or fundamental adaptation is being aimed for and why does it go beyond adaptation and mitigation? • What are the barriers and risks to achieving the change? • Are mātauranga Māori principles used? • What is the pathway to change? • Over what time frame is it realisable? • What alternatives are available?

B. Science stretch and innovation (30%)		
	Criteria	**Considerations**
i.	**Innovation**	• How does this research stretch beyond "business-as-usual"? • Is there an appetite for the research outcome? • What are the risks of failure and how are they countered? • How is novelty or uniqueness demonstrated? • How is successful innovation measured?
ii.	**Science Excellence**	• How will research quality be nationally or internationally recognised? • How will high-impact publications result and what is the publication plan? • Evidence that the best teams have been established, including the quality of the researchers. • How are mātauranga Māori approaches integrated? • How was the idea recognised to be of major scientific interest? • What reputational gains are possible from this work?
iii.	**New Skills, IP, Services and Products**	• How are skill shortages recognised and targeted? • What product/service niches were identified and targeted? • How are Māori researchers promoted to excel? • How are science skills being developed and nurtured? • How will new marketable IP or products be identified and developed? • How is new science capability nurtured and developed and what is the pathway to permanent employment for new researchers?

C. Engagement Factors (20%)		
	Criteria	**Considerations**
i.	**Co-creation**	• What stakeholders are involved and how do they form part of the research team? • What co-created outputs are planned? • How will the levels of stakeholder engagement be maximised, expanded to other groups and grown? • How sustainable is the stakeholder partnership and what are the risks of its failure? • How will co-created IP or products be marketed and managed? • How will success in co-created science be measured?
ii.	**Stakeholder investment**	• How much in-kind or direct financial contribution will the stakeholders make to the research? • What are the risks of support being withdraw or not maintained throughout the research programme? • How can stakeholder co-funding or other in-kind support be grown during the research?