

NEW ZEALAND TRANSPORT RESEARCH STRATEGY

Creating a research environment to maximise the benefits from transport-related research

2016 – 2020



ORGANISATIONAL ENDORSEMENT

The New Zealand transport sector is large and diverse, contributing to around 5% of GDP and employing over 80,000 people whose work can involve anything from building roads, operating trains and aircraft, negotiating land use and resource management, keeping people safe and secure and ensuring that the transport networks are aligned with the location of hospitals, schools, work and

leisure venues. It is challenging to develop a shared vision and priorities for research under these circumstances.

This Transport Research Strategy (Research Strategy) is the result of collaboration and engagement among the following key transport stakeholders, each of whom endorses this Research Strategy.



The Ministry of Transport (the Ministry) provides leadership and direction to the sector and, together with the New Zealand Transport Agency, has led the project to develop this Research Strategy. The Ministry will continue to support the development of the transport knowledge hubs and oversee the implementation of the Research Strategy.



The New Zealand Transport Agency (NZTA) has a specific function to invest in innovative and relevant land transport research that contributes to an efficient, effective and safe land transport system in the public interest. The Research Strategy provides us with clear top-down expectations to align our research investment under the Government Policy Statement on Land Transport. NZTA will continue to work to deliver a collaborative approach across agencies and research stakeholders.



The Civil Aviation Authority (CAA) works with emerging technologies within an industry characterised by high cost and inherent safety challenges. Research that increases safety, reduces cost and expands the applications of aerial transport is highly relevant to the work of the CAA. Aviation technology is being increasingly influenced by advances in other fields and the Research Strategy provides a valuable opportunity to encourage collaborative research toward better collective outcomes.



Maritime New Zealand (MNZ) has a particular interest in promoting safer recreational and commercial boating and understanding people's behaviour and approaches to risk-taking and making safe choices. The Research Strategy is valuable as it will encourage the development of a comprehensive and coherent body of knowledge, much of which will be applicable to different modes of transport. Understanding more about the choices people make, and on what they base these choices, will help target education and compliance efforts and contribute towards fulfilling the MNZ vision of a maritime community that works and plays safely on secure and clean waters. MNZ, therefore, endorses this Strategy.



The Ministry of Business, Innovation and Employment's (MBIE) purpose is to grow the New Zealand economy to provide a better standard of living for all New Zealanders. MBIE develops and delivers policy, services, advice and regulation that support people, businesses, communities and regions to be successful. This includes strategies for the development of built environments, of which transport infrastructure is a key feature. MBIE is also responsible for science and innovation policy and investment, with a vision of science excellence making a more visible, measurable contribution to New Zealand's productivity and well-being. This Research Strategy provides a framework for the science sector and transport research users to co-ordinate effort and to deliver excellent science and innovation that has a positive impact on the economy, society and environment. Note that MBIE's support of this Research Strategy does not imply any priority for funding administered under the Research, Science and Technology Act 2010.

**We are.
LGNZ.**

Local Government New Zealand (LGNZ) represents the national interests of councils and leads best practice in the local government sector. As local government owns, manages and bears the risk for over 88% of the road network length in New Zealand, LGNZ supports the Research Strategy with transparent principles for selecting research and that consequently creates a research environment intended to maximise economic and social benefit and to minimise harm.

Related documents



1.



2.



3.

Read this Research Strategy in conjunction with:

1. **New Zealand Transport Domain Plan**
Online PDF at: www.transport.govt.nz/transport-domain-plan.pdf
2. Full List of Recommendations
Online PDF at: www.transport.govt.nz/full-list-recommendations.pdf
3. New Zealand Transport Information Strategy and Architecture
* Under development, to be published in 2017/18

MINISTER'S FOREWORD

Technologies, travel patterns and user behaviour have all changed significantly since the last Transport Research Strategy was released in 2007.

New and innovative ways to get people, services and goods safely and efficiently to where they need to be continue to develop, and our ability to respond to these changes rests on how well we understand our transport systems, and how the transport sector works.

This is where our Transport Research Strategy comes in.

Being able to adapt to these changes will be a critical part of making transport more efficient and effective.

We are already embracing the benefits of new technology with flexible new rules for the small passenger service sector, while maintaining a focus on safety for passengers, drivers and vehicles. Fit-for-purpose regulation, based on accurate information and evidence, will enable more innovation such as this.

This Strategy comprises four critical enablers: ensuring we invest in the right research; facilitating collaboration among all transport research stakeholders; ensuring visibility of transport research and its findings; and accessing and investing in the right research capability.

I am confident that the sector shares a common view of, and commitment to, the future direction of transport research. Engagement across the sector has clearly shown that priority should be given to research that helps us to understand, for example, the reasons for the use of the transport system and also the barriers to transport.

This will be particularly helpful to us in understanding the transport needs of specific user groups.

Finally, I would like to thank all those who have given their time and energy to bringing this Strategy together, in particular the Ministry of Transport and the New Zealand Transport Agency who jointly led the project and involved people from Maritime New Zealand, Civil Aviation Authority, Ministry of Business, Innovation and Employment and Local Government New Zealand as well as an advisory group including the Auckland Council, Auckland Transport, University of Auckland, New Zealand Automobile Association, Opus Research and the Waikato Regional Council.



Hon Craig Foss
Associate Minister of Transport



CHIEF EXECUTIVE'S INTRODUCTION



New Zealand's transport system is essential. It allows us to access economic and social opportunities across New Zealand and connects us with the rest of the world.

Research plays a crucial role in enriching our understanding of this system. It gives us insights into the preferences and behaviour of its users, and the social, economic and environmental impacts it has for New Zealand. Research is also a defining factor in how well we plan for the future of the transport system. This Strategy provides guidance on how to prioritise research efforts, gives clear signals on transport research priorities for New Zealand, and will help contribute to the transport sector's strong history of quality, evidence-based decision-making. It will also help to ensure the sector is working closely together to co-ordinate our limited research resources.

New Zealand is a small economy. Working collaboratively with different parts of the sector is important to ensure we deliver better transport outcomes. The *New Zealand Transport Research Strategy 2016-2020* has been developed in partnership with stakeholders across the transport and research sectors. This partnership is set to continue through the transport knowledge hubs that will be developed to give life to this strategy, and to support collaboration in how we plan for, design and deliver transport research.

We want New Zealand to have a research environment with the capacity and capability to ensure transport research maximises the economic and social benefits of the transport system and minimises harm. This Research Strategy puts us in a great position to achieve this.

A handwritten signature in black ink that reads "P. Mersi".

Peter Mersi
Secretary for Transport
Chief Executive
Ministry of Transport

THE RESEARCH STRATEGY AT A GLANCE

Goal

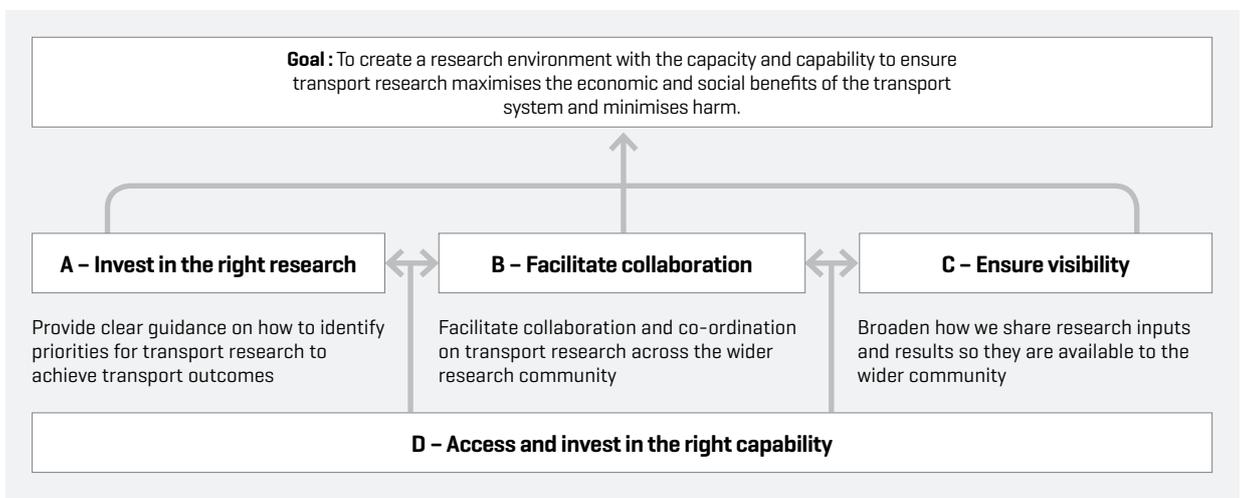
To create a research environment with the capacity and capability to ensure transport research maximises economic and social benefits of the transport system and minimises harm.

Purpose

To provide a structure for fostering a more effective and efficient research environment by identifying four enabling mechanisms to achieve the goal. The Research Strategy gives clear guidance on transport research direction as well as a way of collaborating across the diverse research community to work together into the future.

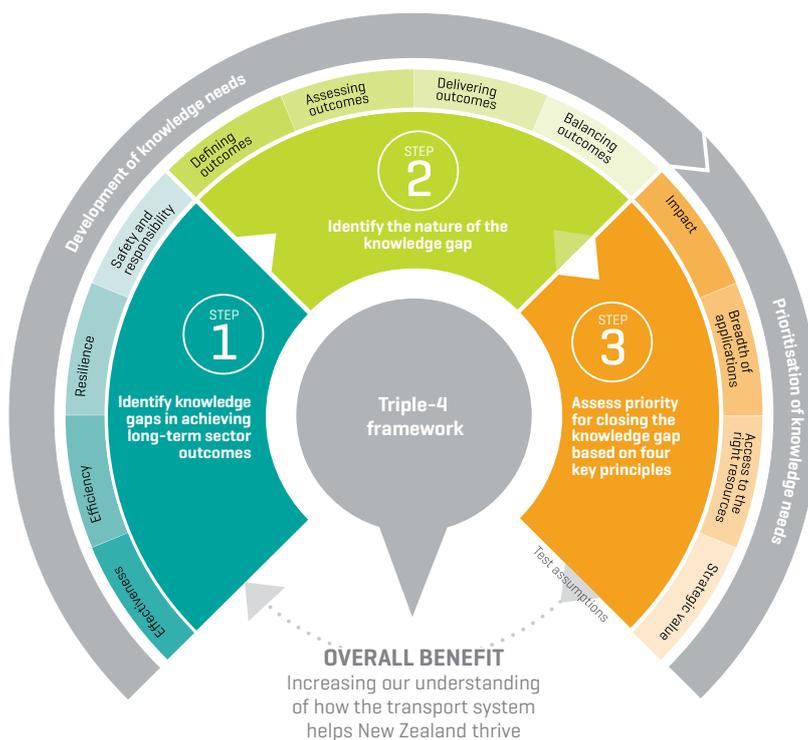
Strategy

A clear strategy goal with four enablers to achieve the goal.



Tool

Triple-4 knowledge development and prioritisation framework



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CONTEXT

**WE WANT NEW ZEALAND TO HAVE
A RESEARCH ENVIRONMENT WITH
THE KNOWLEDGE AND SKILLS TO
MAXIMISE THE BENEFITS FROM
TRANSPORT-RELATED RESEARCH.**

CONTEXT

The Government’s overall objective, shared across the transport sector, is for a transport system that supports growth of our economy to deliver greater prosperity, security and opportunities for all New Zealanders.

Changes in technology, travel patterns and behaviour affect both short- and long-term transport demands.

Accordingly, research and information that improve our ability to understand and predict such changes is important. Research and information play a key role in shaping the policy landscape. Good, evidence-based policy decisions also help New Zealand to enhance the delivery of services provided by both the public and private sectors. These services will, in turn, create and add economic value for New Zealanders (Figure 1).

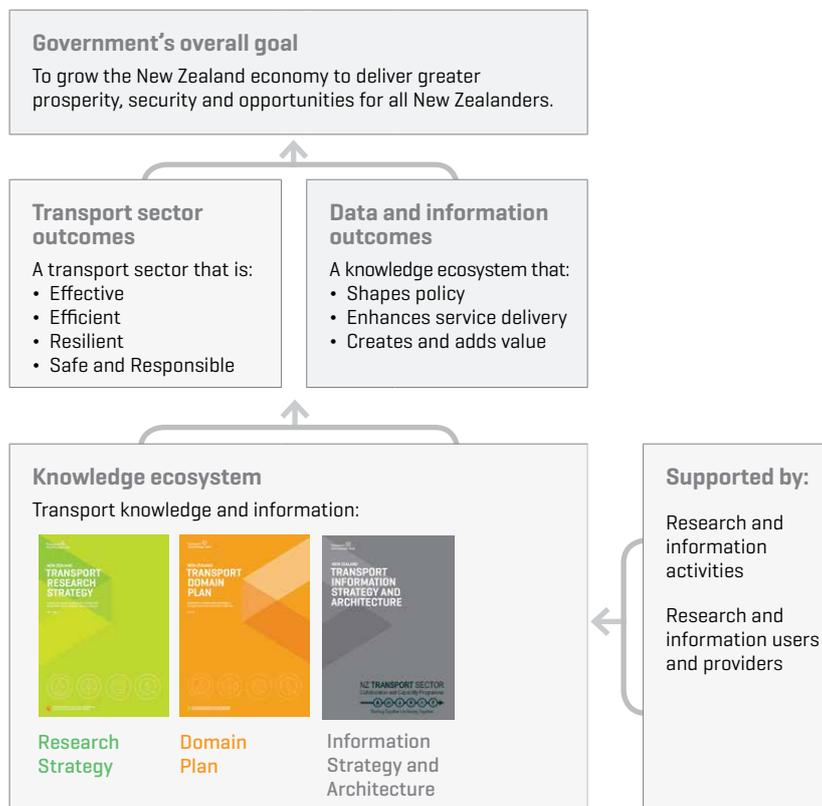
This **Research Strategy** is supported by the Transport Domain Plan, and the Transport Information Strategy and Architecture.

The **Domain Plan** provides a macro-level view of the data, statistics and information requirements to understand our transport system and to make evidence-based decisions. Actions are required to improve the effectiveness and efficiency of the ways data, statistics and information are collected, shared and used. These actions range from

improving the quality of what we do have, improving data access, and collecting, integrating and publishing additional or new data, statistics and information. The Domain Plan process established enduring questions to provide context behind the long-term statistical and information needs. By identifying the knowledge gaps and priorities to maximise the value of data, statistics and information, the Domain Plan provides the content as well as the actions that are needed now and into the future.

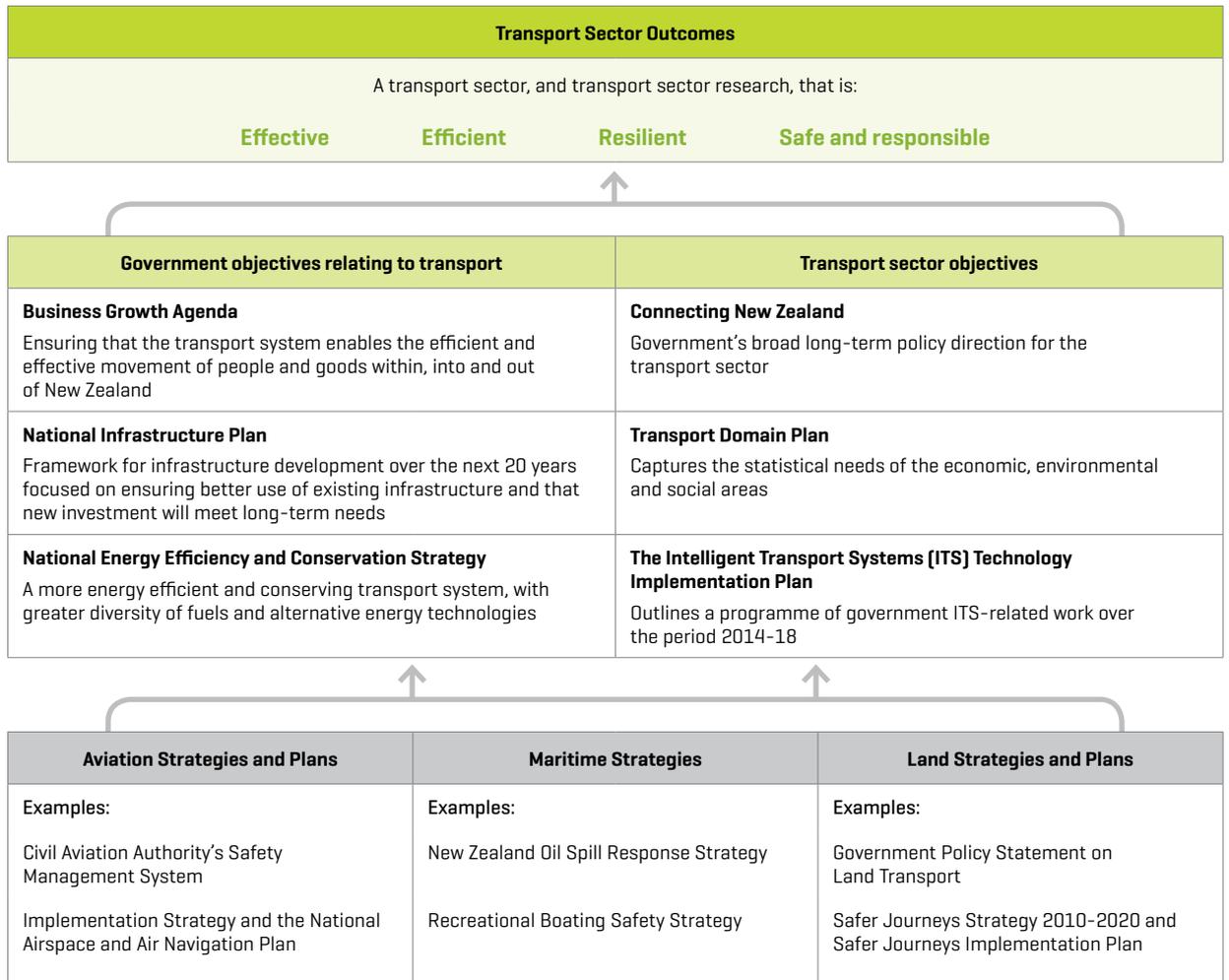
The **Information Strategy and Architecture** complements and updates the stocktake of transport data, information and statistics that has been carried out as part of the Domain Plan process. It provides the structure that is required to develop systems and standards stewardship to support data integration and sharing, enable the transport sector to work together to learn from each other to improve how information is managed and shared, and help to improve how transport statistical and information services are provided to users.

FIGURE 1: MEETING TRANSPORT KNOWLEDGE NEEDS IN OUR STRATEGIC ENVIRONMENT



This Research Strategy is aligned with a range of government outcomes, strategies and plans as outlined in Figure 2.

FIGURE 2: THE TRANSPORT SECTOR STRATEGIC RESEARCH ENVIRONMENT





The value of the Research Strategy

Historically transport research has not been well co-ordinated, resulting in research efforts being duplicated and low uptake of research findings. There has been loose alignment around some shared high-level outcomes across the energy, health, environmental, social and economic sectors. If the public sector works more closely with the private sector in this area we can better understand the extent to which each sector (business, government and higher education) contributes to transport research.

This Research Strategy helps to achieve a better balance between multiple priorities and ensure that finite research resources focus on closing important knowledge gaps. Depending on the gaps and their relative priority, the requirement for this will range anywhere from blue skies to applied research.

Initiatives with a positive impact on achieving the aims of the Research Strategy include:

- ▶ a common framework to guide research development and prioritisation
- ▶ co-ordination between researchers, providers and users of transport research
- ▶ sharing research results through multiple channels
- ▶ investment in research capability.

Choosing the right research themes will improve how well we understand long-term sector outcomes, and how to deliver these so the sector can better understand New Zealand's transport future. How these themes are prioritised will be updated as policy and strategic direction change.



Transport sector outcomes

The sector has identified the following four sector outcomes to deliver a world-class transport system.

- ▶ **Effective** – the core function of our transport system is to connect New Zealanders domestically and internationally. Transport links employees, employers and businesses, and enables access to services and social connections. Transport also enables international tourism and is part of the supply chain that delivers goods to domestic and international markets. We want the transport system to move people and freight where they need to go in a timely manner.
- ▶ **Efficient** – the benefits of investment in the transport system include its contribution to the functioning of a successful, competitive economy and a connected society. We want the transport system to deliver the right infrastructure and services to the right level at the best cost.
- ▶ **Resilient** – the transport system has infrastructure that often has a long life and services that shape long-term land use, so the transport decisions that we make today must accommodate future needs and uncertainties as well as current requirements. A resilient transport system requires planning and management that considers risk identification and risk reduction or mitigation, readiness, response and recovery. We want the transport system to meet future transport needs, endure, respond and adapt to shocks.
- ▶ **Safe and responsible** – transport can have undesirable consequences, such as road crashes, greenhouse gas emissions and other environmental impacts (including on the built environment), and public health impacts (such as air quality, noise and heart disease). We want the transport system to reduce harms from transport.

Transport research needs to contribute to these outcomes, and they form a key component of the Research Strategy.

GOAL AND PURPOSE

OUR GOAL IS TO CREATE A RESEARCH ENVIRONMENT WITH THE CAPACITY AND CAPABILITY TO ENSURE TRANSPORT RESEARCH MAXIMISES THE ECONOMIC AND SOCIAL BENEFITS OF THE TRANSPORT SYSTEM AND MINIMISES HARM.



PURPOSE

At a basic level, this Research Strategy provides guidance to answer three questions.

- ▶ **Why do this research?**
- ▶ **What is the right research?**
- ▶ **How should this research be done?**

Its purpose is to: define the mechanisms for fostering a more effective and efficient research environment; act as a reference document to guide research development and prioritisation; provide clear transport research direction to the sector; and propose a new way of working into the future.



Research

This Research Strategy does not suggest any changes to existing funding mechanisms. Instead, it focuses on identifying the broad themes of research that need to be covered and the research environment we want to create. If this approach is not successful in the medium term, we will consider what changes may need to be made to funding mechanisms.

ENABLERS

**OPPORTUNITIES TO CREATE
NEW IDEAS OCCUR WHEN
THERE IS A SHARED
UNDERSTANDING OF THE
OUTCOMES SOUGHT AND
A SHARED COMMITMENT
TO ACHIEVING THEM.**

RESEARCH STRATEGY ENABLERS

We are a small trading nation that performs well on the world stage. Effective transport links to the rest of the world are critical to the growth and well-being of all New Zealanders.

Transport research contributes to the ongoing capacity and capability to innovate and respond to the challenges presented by an ever-changing transport environment. This requires allocating resources to the right challenges, developing the capability for New Zealand to be a smart and agile purchaser aware of international developments, and applying these to New Zealand's advantage.

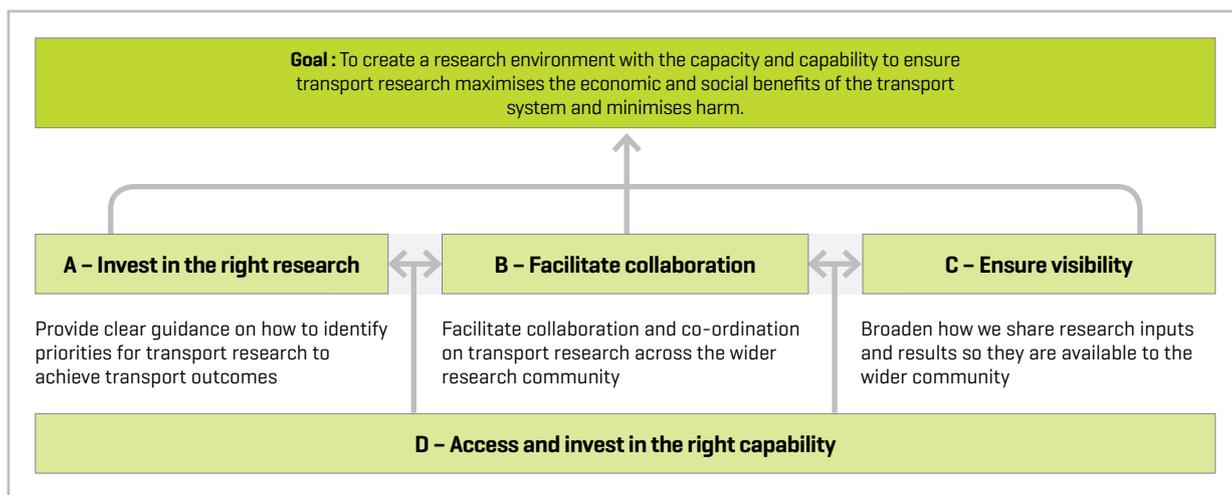
This Research Strategy incorporates a small number of nested frameworks that have resulted from a mix of "top-down" signals relating to the Government's strategic outcomes and the "bottom-up" proposals and views articulating the sector outcomes. This has resulted in a clear strategic goal with four enablers to achieve the goal.

The four key and mutually reinforcing elements required to achieve the goal of the Research Strategy are:

- A. invest in the right research
- B. facilitate collaboration across the wider research community
- C. ensure visibility of research inputs and results
- D. access and invest in research capability.

These enablers contribute to the aim of creating a research environment with the capacity and capability to ensure transport research maximises the economic and social benefits of the transport system and minimises harm. This is illustrated in Figure 3.

FIGURE 3: TRANSPORT RESEARCH STRATEGY ENABLERS



The following discussions describe the four enablers in more detail.

A – Invest in the right research

Investing in the right research will help us to deliver the greatest contribution to the sector outcomes. This is fundamental to a successful Research Strategy. To assist the sector with the process, a common framework has been developed to support transport research development and investment in New Zealand.

The Triple-4 prioritisation framework

A focus on the four transport sector outcomes can help to ensure the selection of the right research, including establishing priority among competing research needs. The need to find ways to improve our understanding and assessment of the outcomes and close any gaps, while maintaining a good balance between outcomes and effort, led to development of the Triple-4 framework.

The Triple-4 framework (Figure 4) has three components. The first two help with research development and the third component helps with prioritisation.

The framework is iterative and ensures the following.

- ▶ **Research gaps in sector outcomes can be identified**
 - this requires assessing whether a research gap exists, and how addressing the gap can help to achieve understanding or to deliver the four long-term sector outcomes.
- ▶ **The nature and extent of the research gap can be identified** – this requires assessing the type of research gap that exists, to make sure research efforts are appropriately spread across different types of research gaps. Current research gaps can be found in any or all of the following categories.
 - **Defining outcomes** – identifies and defines the outcome to pursue
 - **Assessing outcomes** – identifies how the outcomes might be best assessed
 - **Delivering outcomes** – identifies the best interventions to secure improvements or to close any gaps to the desired state
 - **Balancing outcomes** – identifies the appropriate balance and trade-off between outcomes and efforts

Addressing these research gaps often requires a mix of research activities including data analysis and modelling, forecasting, and user surveys.

- ▶ **Priority can be assessed** – Prioritising transport research objectively will maximise the benefit from the research effort. Clear understanding of the potential for advancing knowledge and the probability of a successful result is fundamental to identifying the value for money of the proposed research. The framework applies the following four tests to assess the relative priority of proposed research.
 - **Impact** – Can we identify existing and potential end use and end users? Do we know what the benefits will be and how big they are? Do we know how necessary the research is?
 - **Breadth of applications** – Will the knowledge gained by the research be visible and accessible? Can the knowledge be used flexibly and applied in different situations? Can the knowledge be transferred and used in a wide range of applications and across organisations? Can the research be leveraged off relevant domestic and international research?
 - **Access to the right resources** – Are we able to access the skills, capability, techniques, tools and systems required? Is the required data reliable and available? Do we have the capacity to do the work and is it affordable?
 - **Strategic value** – Can the knowledge gained by doing the research help to address the strategic issues¹ faced by the sector? Is this the right time to do this research, considering the strategic issues?

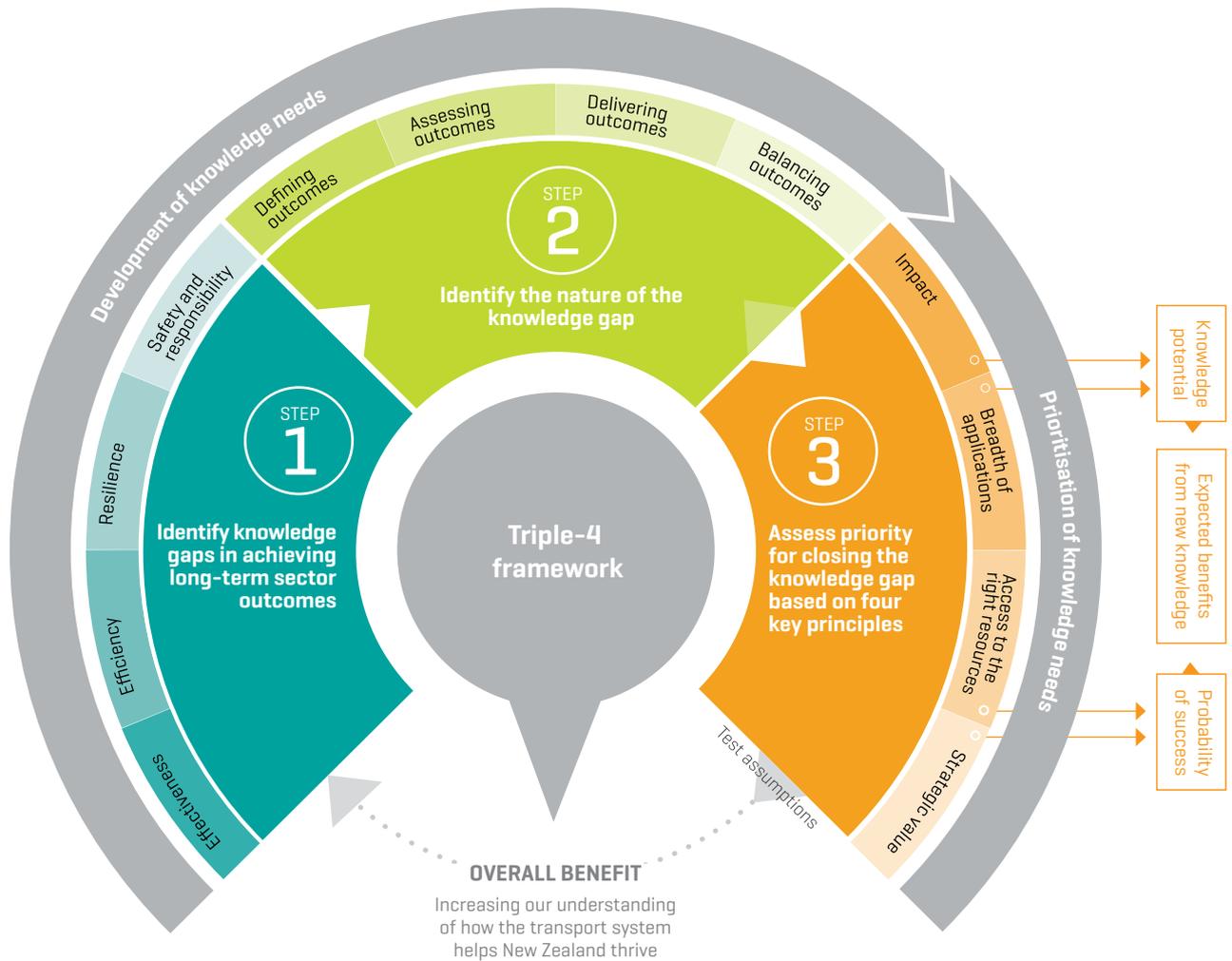
Taken together, these three key steps form the Triple-4 framework. This framework is flexible and can be adapted for selecting high-level research themes, specific research topics, projects or programmes. We recommend that researchers and agencies use the Triple-4 framework as a reference to help develop and prioritise research programmes and projects.

1 Strategic issues faced by the sector are:

- understanding and responding to changes in future demand
- funding the transport system in the longer term
- investing wisely to support economic growth
- embracing the technology challenge and opportunity
- responding to transport's environmental externalities.

Source: Ministry of Transport Four-Year Plan 2015

FIGURE 4: THE TRIPLE-4 KNOWLEDGE DEVELOPMENT AND PRIORITISATION FRAMEWORK



Definitions:

Effectiveness

Moves people and freight where they need to go in a timely manner

Efficiency

Delivers the right infrastructure and services to the right level at the best cost

Resilience

Meets future transport needs and endures shocks

Safety and responsibility

Reduces harm from transport

Defining outcomes

Identifies and defines the outcome to pursue

Assessing outcomes

Identifies how the outcomes might be best assessed

Delivering outcomes

Identifies the best intervention(s) to secure improvements or to close any gaps to the desired state

Balancing outcomes

Identifies the appropriate balance and trade-off between outcomes and efforts

Impact

Assessing the extent to which current knowledge can be advanced

Breadth of applications

Assessing the extent to which the new knowledge can be spread and absorbed across the wider sector and applications to help build sector capability

Access to the right resources

Assessing whether there is access to the right capacity, capability, tools, data, systems and financial resources [e.g. through better sector integration] to close the knowledge gap

Strategic value

Assessing whether the new knowledge can be used to help address the strategic issues faced by the sector

Knowledge potential

Size and breadth of benefits

Probability of success

Extent to which the new knowledge can be translated into tangible outcomes

Note: The process can be iterative and research gaps may need to be re-checked to ensure they pass the three steps of the Triple-4 framework.

Prioritising the research themes

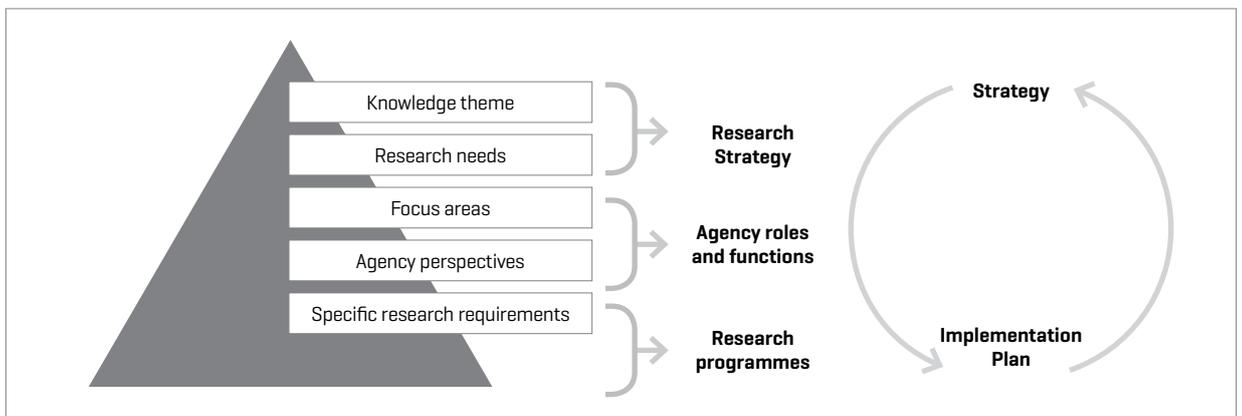
Figure 5 shows the hierarchical relationships between the strategy, programmes and specific research requirements. The process of determining the transport research directions for New Zealand is an iterative mix of “top-down” and “bottom-up”. The top-down elements come from the respective agencies exercising their leadership responsibilities to articulate the broad vision and mission for the sector, with the bottom-up elements coming from the practical experience of transport users and research providers.

This Strategy was developed in close collaboration with the sector and particularly the advisory group which

comprised a number of private sector organisations and academics. Considerable interest and effort attaches to working with the first of the four enablers to identify the specific research requirements – “the right research”.

There are many detailed research requirements that need further development by the research community to turn them into specific research topics and projects. Individual research funders and providers can identify specific research requirements under the themes, needs, areas and perspectives according to their respective roles and functions.

FIGURE 5: HIERARCHY OF KNOWLEDGE AND RESEARCH REQUIREMENTS



These four knowledge themes have been developed for the Domain Plan and Research Strategy to help identify knowledge needs. They came from applying the Research Strategy’s Triple-4 framework to bottom-up research requirements identified by stakeholders at a

sector-wide workshop. This was supplemented by top-down information from the *National Infrastructure Plan*, *Safer Journeys* and the *Safer Journeys Implementation Plan*, and by considering the long-term strategic issues outlined above.

FIGURE 6: KNOWLEDGE THEMES

Knowledge themes			
User behaviour and needs	Transport impacts	System planning and management	Future funding and charging
Better understanding the transport choices and preferences of users, communities and society and how to manage uncertainties [such as those arising from technological advances] around changing preferences, behaviour and needs.	Better understanding the size, exposure, valuation, interactions and influences of social, economic, cultural [including transport impacts for Māori ² as tangata whenua] and environmental impacts as well as the potential effects from mitigations.	Better understanding of how users make transport decisions by mode, location and industry and how to measure monetary and non-monetary benefits and costs of transport as well as aligning with the cultural, spiritual, social, physical economic and political dimensions of Māori well-being.	Better understanding how transport cost burdens are distributed, how users respond to changes in cost and price, and what the impact on revenue and charging is of changing technologies and user needs.

² Māori include individuals with a Māori cultural identity and ancestry [whakapapa] including Māori belonging to iwi/hapū/whānau, marae, Māori organisations, urban authorities, kaitiaki groups, Māori landowners, Māori businesses and Māori networks.

FIGURE 7: APPLYING THE KNOWLEDGE THEMES TO IDENTIFY PROPOSED FOCUS AREAS

Knowledge themes	Research needs	Proposed focus areas	Perspectives
 <p>User behaviour and needs Do we understand the transport choices and preferences of users, communities and society? How do we establish evidence and manage uncertainties around changing preferences, behaviour and needs?</p>	Reasons for travel and transport and non-travel choices	<ul style="list-style-type: none"> ▶ Barriers to using transport ▶ Distributional effects ▶ Demographic effects ▶ Influence of available choices 	<p>When developing specific research projects, it is necessary to consider the multitude of perspectives to ensure efforts are invested in the right knowledge at the right level of detail.</p> <p>These perspectives vary according to the research organisation and include both the impacts on and impacts of:</p> <ul style="list-style-type: none"> ▶ Users / Communities / Society / Cohort ▶ Planning / Policy / Standards / Management / Activities / Interventions ▶ Systems / Modes / Assets / Services / Operations ▶ Industry / Sector / Public / Private ▶ Understanding Past / Managing Current / Future Planning ▶ Economic / Financial / Non-monetary ▶ Supply / Demand ▶ Networks / Corridor / Route / Service / Journey / Journey Purpose ▶ New Ideas / Emerging Ideas / Leverage Proven Ideas
	Behaviours during travel	<ul style="list-style-type: none"> ▶ Risk-taking ▶ Time use ▶ Influence of the transport system ▶ Interaction with other system users 	
	How society and users value transport	<ul style="list-style-type: none"> ▶ Social connectedness ▶ Safety ▶ Amenity ▶ Resilience ▶ Influence of the transport system ▶ Quality elasticity ▶ Price elasticity ▶ Access and/or mobility 	
	Impacts on transport use of changes	<ul style="list-style-type: none"> ▶ Demographics ▶ Society ▶ Technology 	
 <p>Transport impacts There is a need to maximise positive impacts, mitigate negative effects ex-ante and manage impacts ex-post</p>	Quantification and valuation of relationships between transport and harms	<ul style="list-style-type: none"> ▶ Quantification and valuation of harms ▶ System features as risk factors 	
	Relationship between transport and land use	<ul style="list-style-type: none"> ▶ Quantification and valuation of access ▶ Interaction effects on system users 	
	Relationship between transport and the economy	<ul style="list-style-type: none"> ▶ National, regional and local ▶ Interaction effects 	
	Relationship between transport and health	<ul style="list-style-type: none"> ▶ Quantification and valuation of impacts ▶ Interaction effects 	
	Measures of distributional impacts	<ul style="list-style-type: none"> ▶ Quantification and valuation of access ▶ Interaction effects 	
	Measures of environmental effects	<ul style="list-style-type: none"> ▶ Quantification and valuation of impacts ▶ Assessment of mitigation 	
 <p>System planning and management How do we better plan, manage demands and operate the transport system to achieve desired impacts? We need to be able to make appropriate decisions given available evidence and uncertainty</p>	Effectiveness and efficiency of interventions	<ul style="list-style-type: none"> ▶ Resilience ▶ Local, regional and national economy ▶ Safety ▶ Regulation ▶ Technology ▶ Multimodal ▶ Integrated approaches ▶ Monitoring and reporting 	
	Relationship between interventions and impacts	<ul style="list-style-type: none"> ▶ Resilience ▶ Local, regional and national economy ▶ Safety ▶ Monitoring and reporting 	
 <p>Future funding and charging How do we fund and charge for transport into the future as technologies and needs are changing over time?</p>	Where and how the incidence of transport-related costs and benefits are borne	<ul style="list-style-type: none"> ▶ Users and non users ▶ Private and public ▶ Externalities ▶ Distributional effects 	
	The impact of technology on funding	<ul style="list-style-type: none"> ▶ Distributional effects 	
	The impact of technology on charging systems	<ul style="list-style-type: none"> ▶ Distributional effects ▶ Big data 	

We recommend that all research projects developed based on this priority list of research themes should go through the Triple-4 framework again to make sure the proposed research is worth pursuing. Individual agencies should also conduct a value-for-money assessment of specific research requirements.

B – Facilitate collaboration

Opportunities to create new ideas occur when there is a shared understanding of the outcomes sought and a shared commitment to achieving these – albeit from different perspectives. Engagement with stakeholders has been a feature of the development of the Research Strategy. Effective stakeholder engagement supports transport researchers and research users moving from “telling and selling” style engagement through to the collaborative partnership approach. This enables co-creation of the

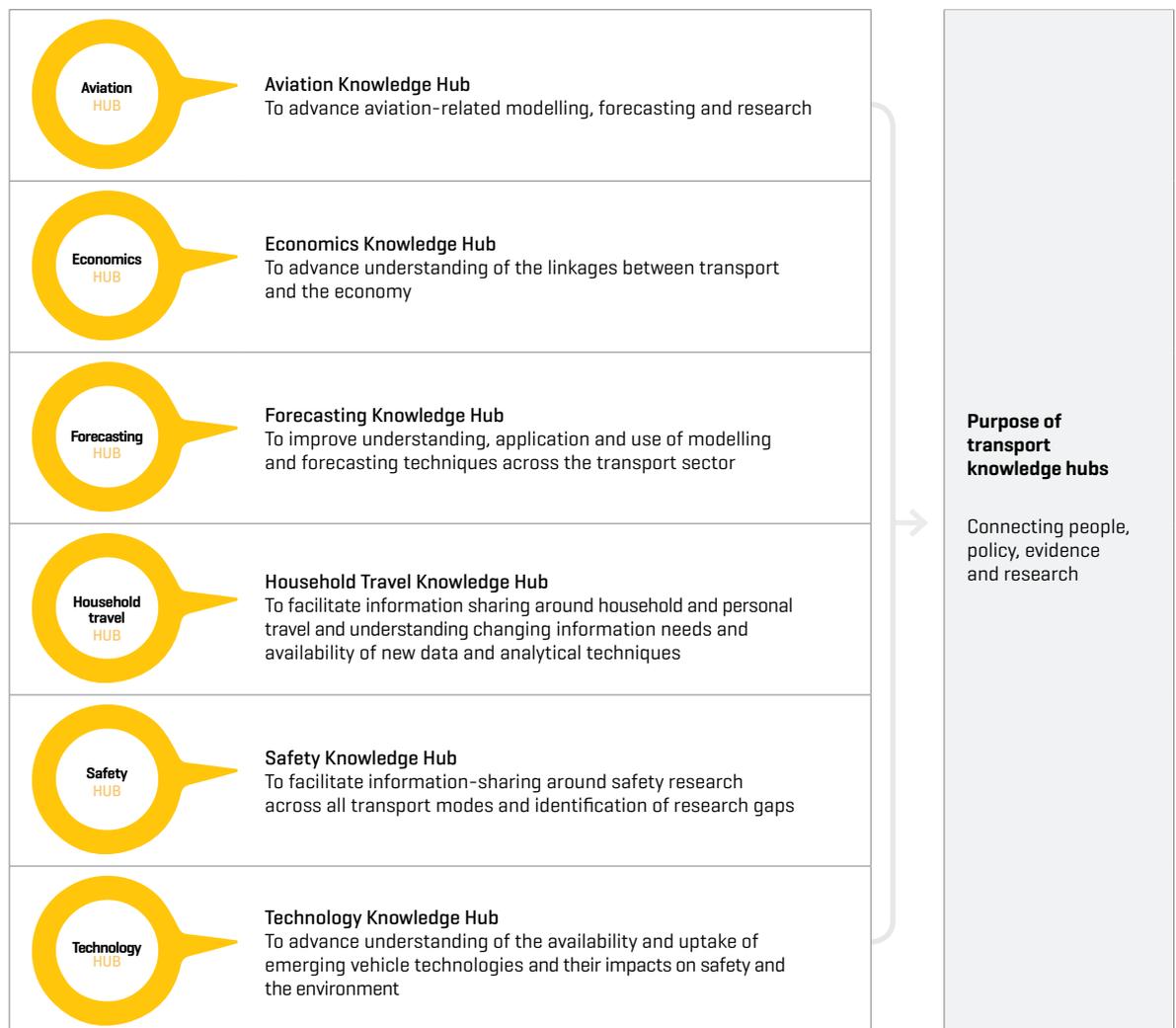
research programmes and ultimately co-delivering the research projects to meet the needs of the sector.

Development of transport knowledge hubs

Critical infrastructure like the development of knowledge hubs, provided from the centre but governed by the broader group including investors and users, will develop a more systematic approach to building and maintaining the necessary research community. This will also provide a channel to share research results.

There has been sufficient interest already to establish knowledge hubs for aviation, economics, forecasting, safety, household travel and technology as shown in Figure 8. The requirement and objectives for each knowledge hub may vary over time and with the needs of the research community. As the research community works more closely together, knowledge hubs may change over time to meet research needs.

FIGURE 8: THE FUNCTIONS OF THE FIRST SIX TRANSPORT KNOWLEDGE HUBS



Governance of transport knowledge hubs

Effective and efficient knowledge hubs require a well defined governance structure with clear purposes. Having an appropriate governance structure will provide a formal process to enable the sector to regularly assess and review research, data, statistical and information gaps and priorities, and to identify opportunities to conduct collaborative research.

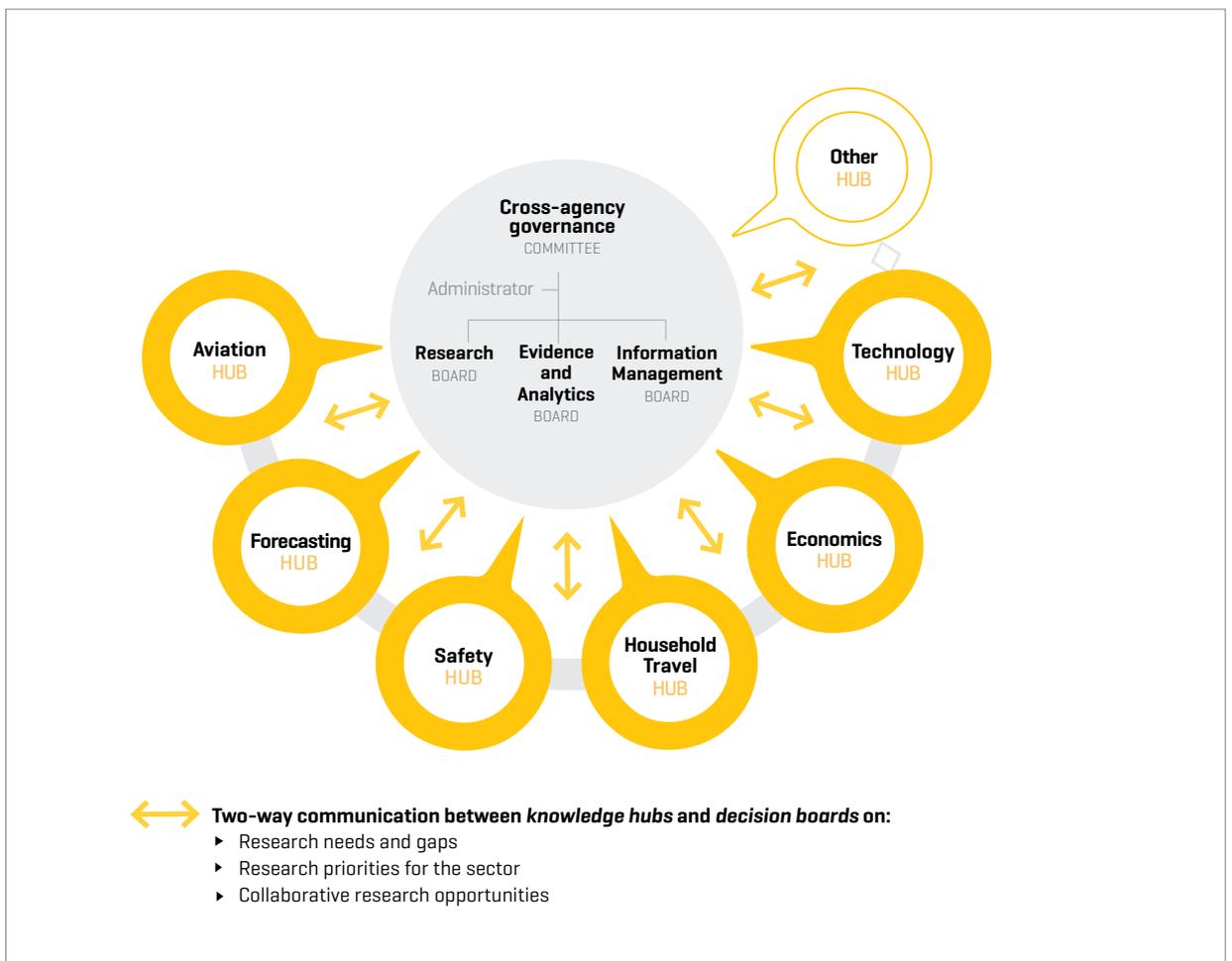
The proposed governance structure [Figure 9] involves stakeholders working through leaders of the knowledge hubs and their members. This governance structure does not interfere with the internal communication and collaboration arrangements that are already operating.

To bring the wider sector voice into decision-making and to give investors and users the opportunity to be represented we picture that the governance structure will include a cross-agency governance committee and three decision boards:

- ▶ the Research Board will make decisions around research priorities
- ▶ the Evidence and Analytics Board will make decisions around data, statistics and information
- ▶ the Information Management Board will make decisions around information governance, access, integration and management.

One of the initial tasks of the implementation plan will be to set up this structure, including setting out the agreed terms of reference for the governance committee and the decision boards.

FIGURE 9: GOVERNANCE STRUCTURE FOR THE TRANSPORT KNOWLEDGE HUBS



The governance of the knowledge hubs has the following three key purposes (Figure 10):

- 1 lead the sector to develop and meet its transport knowledge needs, including helping implement three inter-related projects: the Domain Plan, the Research Strategy and the work of the transport information architecture group
- 2 consider the wider domestic and international contexts and opportunities when implementing the three pieces of work
- 3 ensure information and knowledge-sharing and development to improve evidence-based decisions and capability building.

Once established, the leaders of the knowledge hubs will communicate with the decision boards on knowledge gaps and initiatives to fill them. In doing so, the leaders will consider the wider context as well as the opportunities to diffuse and build knowledge. The decision boards will then make recommendations to the governance committee for consideration. These recommendations can potentially include decisions around sharing resourcing and joint priorities for the agencies involved.

FIGURE 10: PURPOSES OF THE GOVERNANCE STRUCTURE



Governance principles of the transport knowledge hubs

The stated purpose or function of the knowledge hubs is to:

Connect people, policy, evidence and research.

Ultimately, the knowledge hubs will support broadening of the research, evidence, analytical and modelling knowledge, and sector capacity and capability.

Governance arrangements for the knowledge hubs need to align with the principles in Figure 11.

FIGURE 11: GOVERNANCE PRINCIPLES FOR THE TRANSPORT KNOWLEDGE HUBS

Governance principle	Description
Effective composition and performance	An effective governance body needs a balance of independence, skills, knowledge, experience and perspectives. Therefore, the management and organisation of the knowledge hubs should be flexible to allow the knowledge hubs to evolve and change to meet the needs of participants.
Strong leadership	The governing body should lead and be seen to lead knowledge development for the transport sector.
High standards of ethical behaviour around knowledge building and sharing	<p>The governance body should set high standards of ethical behaviour around sharing and building the knowledge of the sector and make sure these standards are clearly stated.</p> <p>These standards include:</p> <ul style="list-style-type: none"> ▶ value integration – the knowledge hubs focus on whole-of-government benefits and shared benefits, not just benefits to individual organisations and any tendency for thinking in silos. The knowledge hubs commit to reduce duplication, increase collaboration and join up top-down and bottom-up aspects ▶ transparent operation – information and communication through the knowledge hubs (such as information related to the Domain Plan and the Research Strategy) should be open, unless there is good reason to keep it confidential ▶ efficient operation – the knowledge hubs commit to use existing resources more efficiently and effectively to derive greater value from existing information and knowledge ▶ actions to add value – the knowledge hubs commit to actions that add value to the sector as a whole.
Effective communication and stakeholder management	The governance body should have the ability to provide effective communications to the knowledge hubs and other stakeholders. It needs to be clear about the role of the knowledge hubs and the value to participants, and able to describe measures of success.

C – Ensure visibility

The development and application of research inputs and outputs needs to be made visible and accessible. A collective approach is needed to ensure that similar visibility can be achieved across government agencies, public and private research, and academic organisations.

Benefit of visibility

The benefits of making research visible are significant. It is an essential part of increasing the overall intelligence of the transport system as it enables researchers from different disciplines to consider the same essential questions and ultimately enables innovation to take place. As the transport knowledge community increasingly becomes more aware of the research activities around them, it reduces the risk of duplicating research and increases incentives for researchers to improve or to build on past research.

Increasing visibility of research is also an enabler in the identification of research communication needs, which vary with the project stage or programme cycle. Identifying these needs requires understanding of what needs to be communicated, by when, to whom, and how. The more research inputs and outputs are made visible, the more researchers will know about who the members of the audience are and what they need or would like to know.

Communication and tools

Engaging with stakeholders will help to effectively increase visibility of transport research and reduce duplication. While the knowledge hubs are critical to supporting collaboration and the visibility elements of the Research Strategy, its effectiveness could be further supported by appropriate communication channels and tools.

Work on stakeholder engagement revealed several high-value but low-cost initiatives to supplement traditional communication methods such as word of mouth or email. These include:

- ▶ a contact database with information on name, organisation, topic, expertise and industry/sector
- ▶ a research calendar with information on research themes and projects that are currently under development and will soon be in the pipeline
- ▶ a channel (such as an independent website) to support the self-organising communities (or knowledge hubs) where people can collaborate, team up, find out what's going on and ask questions
- ▶ regular seminars and an annual conference to communicate up-to-date research ideas and results.

Implementing these initiatives will form part of the implementation plan for the Research Strategy. The Ministry of Transport is already progressing several of these. For example, the Department of Internal Affairs' Shared Workspace platform has been used for the knowledge hub members to share information and research documents. Regular seminars are being run and the third annual Transport Knowledge Conference is being developed for late 2016.

D – Access and invest in the right capability

Having access to the right capability to identify, specify, deliver and understand research is another key enabler. Such requirements vary with organisations and their needs so there is no one-size-fits-all approach. The Research Strategy assists by clarifying the strategic research directions for the sector to pursue. This in turn provides certainty around capability requirements so that organisations can develop approaches to attract, develop and retain capability that suits their needs.

Capability-building

Providing a clear set of strategic research directions for the sector alone is not sufficient to ensure that the sector develops and maintains its capability. Researchers with specific skills and knowledge are often better placed to help identify certain research needs or topics. Therefore, it is important to encourage the research community to take an active role in this process. The knowledge hubs provide a channel through which the research community can actively engage in research identification and development. More active engagement with the research community is needed to harness the benefits created by the knowledge hubs.

In addition, the Research Strategy recommends developing a capability-building programme to ensure investment in the right people and places. There are a number of initiatives that are relatively easy to implement and are endorsed by this Research Strategy. They include:

- ▶ developing new researchers through internship or secondment programmes
- ▶ collaborative research between organisations – this includes in-house (e.g. through secondments) and external research (e.g. through joint funding)
- ▶ sharing research inputs and outputs (e.g. through implementation of the Transport Domain Plan)
- ▶ short training exercises (e.g. master classes)
- ▶ regular seminars and annual conferences.

Developing international linkages

There are a number of important players in transport research in New Zealand, in central and local government as well as in business and higher education. This includes both transport and non-transport agencies. However, New Zealand's size means that, while we have some internationally recognised experts, coverage is patchy with little or no research capacity in some areas.

It is important for New Zealand to connect with the international research community (e.g. Australia, United States and the OECD³). There are already some strong international relationships. For example, New Zealand is a member of the OECD and a member of the International Transport Forum⁴, a think tank for transport policy and research. New Zealand is also a partner in the Austroads programme providing direct representation into Australian research. Further opportunities to engage with international research communities to leverage off development worldwide would be beneficial.

Academic transport research has moved from an engineering focus and gradually expanded in scope to include behaviour, economics and planning disciplines. Much of the academic effort has been self-motivated within institutions and there appears to be an opportunity for this Research Strategy to provide a basis for co-ordination. A research centre or a research chair may be the mechanism for such co-ordination.

Initiatives for investigation during the implementation plan include opportunities to support connection with international research communities and identification of areas where there is value in establishing a research centre or a research chair at a university.

³ Organisation for Economic Cooperation and Development

⁴ New Zealand held the Presidency of the International Transport Forum's Annual Summit in 2015.

NEXT STEPS

IMPLEMENTING THIS STRATEGY INVOLVES A RANGE OF ACTIONS – SOME NEED TO START NOW, AND OTHERS ARE DEPENDENT ON COMPLETING EARLIER ACTIONS.

PUTTING THE RESEARCH STRATEGY INTO PRACTICE

Implementation planning

The Research Strategy is a strategic document that looks into research needs over a 30-year horizon. Taken together, the four elements – investing in the right research, facilitating collaboration, ensuring visibility, and accessing and investing in research capacity – form the basis of the implementation plan to put this strategy into action.

The Research Strategy applied both top-down and bottom-up approaches to determine the strategic research priorities for the sector. Adhering to principles of efficiency and effectiveness means that decisions on strategic research directions need to be made with the longer term in mind. In some instances, it may take some years to accumulate enough knowledge to gain the necessary insights. Therefore, there must be mechanisms in place to maintain the focus through long periods. We will develop an implementation plan to provide a focus for research in a three-year cycle. We will work with stakeholders to develop the first implementation plan during the remainder of 2016 to reach agreement across the sector on shared responsibilities for advancing individual actions.

Implementation

This Research Strategy develops the knowledge themes and the corresponding strategic research priorities for the sector to pursue. The four knowledge themes cover over 15 research needs and 50 focus areas (Figure 7). While the list of focus areas is not complete, it provides agencies with some initial research directions for developing research programmes.

In the short term, an implementation plan will be produced with the intention to fully implement the knowledge hubs and governance structure. The plan will include specific actions to facilitate ongoing collaboration between funders, researchers and research users and to enhance the visibility of research.

In the medium term, specific actions on developing the sector's capability and capacity to review, conduct and use research will be needed.

For certain knowledge gaps, it is necessary to develop a longer-term implementation plan to make sure necessary information and knowledge can be accumulated to enhance the sector's ability to derive the insights needed to inform decisions.

Individual and collaborative responsibilities

In this Research Strategy, the Ministry of Transport has established the initial strategic research directions for improving the knowledge of the transport system on behalf of the transport sector. The next focus will turn towards developing the implementation plan in collaboration with other organisations. The Ministry of Transport will maintain oversight of the implementation process and will co-ordinate efforts across the sector. We envisage that some other organisations may take responsibility for delivering some specific research programmes and projects. It is a collaborative responsibility to ensure that we are working together to deliver the Research Strategy.

Reviewing and monitoring the Research Strategy

An important part of any strategy is to be able to assess if and when the planned outcomes have been delivered and whether the expected benefits have accrued. A periodic review will identify what works and what doesn't. Continuous improvement from the lessons learned is a key part of any successful strategy and is built in from the outset.

The first formal review of the Research Strategy will be aligned with the Government's four-year planning cycle and will take place in 2020. This requires the knowledge hubs' governance committee to agree on the approach to assessment of success, and to develop a set of actions to monitor and evaluate the outcomes of the Research Strategy.

It would be most useful to focus on evaluating the success of each of the enablers. This should help us to discover whether these are both appropriate and sufficient to ultimately deliver on the aims of the Research Strategy.

FIGURE 12: ASSESSING SUCCESS OF THE ENABLERS

Enabler	Assessment
Invest in the right research	<p>Is the research informing our understanding of how the transport system helps New Zealand to thrive?</p> <ul style="list-style-type: none"> ▶ Clarity on whether and how addressing a research gap can help us to understand and deliver the long-term sector outcomes ▶ Research efforts are appropriately spread across different types of research gaps to deliver meaningful benefits
Facilitate collaboration	<p>Is the research community working together effectively to fill key research gaps?</p> <ul style="list-style-type: none"> ▶ Sharing information and discussing research ideas with the broader research communities ▶ Collaborating and teaming up with each other across agencies and the sector ▶ Finding out what is going on and asking questions about research
Ensure visibility	<p>Is there greater visibility around the ways transport research is developed, disseminated and applied than there was previously?</p> <ul style="list-style-type: none"> ▶ Research always has a built-in communications strategy ▶ Knowledge hubs host regular seminars to share research and enable knowledge transfer ▶ Researchers increasingly use the communication channels provided, including knowledge hubs, to connect with each other effectively and efficiently
Access and invest in research capability	<p>Is there greater capacity and capability in the transport research environment than there was previously?</p> <ul style="list-style-type: none"> ▶ Improvement in the quality of evidence for decision-making ▶ Improved levels of public understanding of transport issues and quality of debates ▶ Increased numbers of capable and talented people attracted into the transport research environment

APPENDICES



APPENDIX 1: GLOSSARY

Framework

A broad overview, outline or skeleton of interlinked items or ideas which support a particular approach to analysis of an issue.

Impact

The tangible and intangible effects or consequences of an action upon the outcome targeted.

Knowledge themes

The four knowledge themes for the Domain Plan and the Research Strategy are:

- ▶ user behaviour and needs
- ▶ transport impacts
- ▶ system planning and management
- ▶ future funding and charging.

Outcome

The evident result or consequence of a plan of action.

Research

A range of activities that aim to fill knowledge gaps. These activities include data collection and basic research, experimental or theoretical research, applied or “blue skies” research.

The following are examples of activities that are not normally classed as research:

- ▶ Routine testing and analysis of materials
- ▶ Components and processes, [e.g. for the maintenance of national standards, as distinct from the development of new analytical techniques]
- ▶ Feasibility studies [where it is not an integral part of an overall research project]
- ▶ Routine software development
- ▶ General purpose data collection
- ▶ “Designing a new product is not a research output but writing up the innovative process used and submitting the paper for publication and review would be. Providing a policy submission to a Select Committee is not a research output, but a publication that reflects on the process of policy debate or theories from it would be” [Source: Frascati Manual OECD].

Research community

The individuals, agencies and entities that have an interest in research as producers, purchasers or end users.

Research gap

A missing area of knowledge required to answer research questions.

Research topic

A clearly defined area of enquiry.

Strategy

An overall approach or collection of approaches designed to achieve a long-term or overall aim.

Transport knowledge hubs

A means by which members of the transport research community connect and co-ordinate with others with similar interests to broaden research, evidence, analysis and modelling knowledge, and sector capacity and capability.

Transport sector

All those agencies and entities that are involved in the business of moving people and goods within New Zealand as well as to and from New Zealand. Transport covers all modes: maritime, land and air transport.

Transport system

A system for moving people or goods and comprises of the assets [including conveyance, vehicle and infrastructure], services, operations, institutional and funding systems [policies, procedures, regulations, rules, schedules or timetables] and the transport sector.

Triple-4 framework

An analytical tool to assist members of the research community to develop and prioritise research and knowledge needs. This framework was developed as part of the *New Zealand Transport Research Strategy 2016-2020*.



APPENDIX 2: LIST OF CONTRIBUTING STAKEHOLDERS

Development of this Research Strategy required knowledge from a wide range of subject matter experts.

The following organisations have participated in various stages of development of the Research Strategy. The engagement activities included stakeholder meetings and information sessions, formal submissions, feedback and a sector-wide workshop held on 16 March 2016. The inputs from these organisations are gratefully acknowledged.

Abley Transportation Consultants Limited
Accident Compensation Corporation
AECOM
Auckland Council
Auckland Transport
CCS Disability Action
Civil Aviation Authority
Customs New Zealand
Energy Efficiency and Conservation Authority
Greater Wellington Regional Council
Hastings District Council
Horizons District Council
Institution of Professional Engineers New Zealand
Land Information New Zealand
Local Government New Zealand
Maritime New Zealand
Ministry for Primary Industries
Ministry for the Environment
Ministry of Business, Innovation and Employment
Ministry of Education
Ministry of Foreign Affairs and Trade
Ministry of Health
Ministry of Justice
Ministry of Social Development
MWH Global
New Zealand Automobile Association
New Zealand Police
New Zealand Transport Agency
New Zealand Treasury
Opus Research
Productivity Commission
Ruapehu District Council
Sustainable Cities
Transport Accident Investigation Commission
University of Auckland
University of Canterbury
University of Otago
University of Waikato
Waikato Regional Council
Wellington City Council



1.

2.

3*

Related documents

Read this Research Strategy in conjunction with:

1. New Zealand Transport Domain Plan
Online PDF at: www.transport.govt.nz/transport-domain-plan.pdf
2. Full List of Recommendations
Online PDF at: www.transport.govt.nz/full-list-recommendations.pdf
3. New Zealand Transport Information Strategy and Architecture
* Under development, to be published in 2017/18

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Disclaimers

All reasonable care has been taken in the preparation of this publication. However, no assurances are given as to its accuracy, completeness or fitness for any particular purpose.

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