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Navigating the regulatory interface between transport and land use

Report prepared for the Ministry of Transport

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Executive Summary

It is well understood that land use affects transport policy and vice versa. Land use regulation can affect the demand for travel, which may create pressure for new transport investment or demand management. Transport policies, meanwhile, have an impact on the accessibility of land, which may also alter travel patterns and create pressure for regulatory changes. The two regulatory systems are intertwined in a profound way.

Despite this, we consider that the two regulatory systems in New Zealand have been set up relatively independently of each other. Compromise between the two regimes does occur, but it is often ad hoc rather than deliberate or systematic. We consider there are a number of barriers that inhibit successful coordination, including:

- ▶ independent legal structures
- ▶ different policy drivers and value judgements
- ▶ a lack of clarity around the respective roles of central and local government
- ▶ pragmatic difficulties to achieving alignment.

There is a need to better address these challenges even as they stand. However, addressing these challenges is likely to become increasingly difficult over the next decade.

Technological innovation and changing social trends have already 'disrupted' segments of the transport sector, challenging prevailing market dynamics and regulatory settings.

Table 1: Summary of technological and social trends

Emerging technological innovation	Significant social trends
Intelligent transport systems	Demographic changes
Autonomous vehicles and driver assistance	Shift towards greater asset sharing
New sources of energy	Emphasis on consumer choice
Non-transport (e.g., communications) technology	Economic change (e.g., shift to high value, 'weightless' services)

While we do not purport to be able to make firm predictions as to the technology and social changes that will shape the future transport environment, there are clear indications that the overall potential for change is significant. This places new pressures on the regulatory system, requiring regulation that is sophisticated, flexible and responsive.

Overall, we consider that the transport regulatory regime has the potential to accommodate expected changes. However, the interface with land use regulation and the barriers we have identified are causes for concern. The technology and social changes that are likely to emerge in the future will largely emphasise these differences.

In particular, decisions based on land use regulation are often long-term and in practical terms difficult to reverse. Associated investment is often sunk, with no economically feasible alternative use. This suggests a degree of rigidity and path dependency in respect of questions of land use. The risk is that the entwined nature of the transport and land use regulation results in a delay of the adoption of new technologies and approaches that add to the economic, social and environmental value over the long term.

Table 2: System level tensions

Transport policy		Technology/social change	Land use regulation	
Centrally planned	↔	Market driven	↔	Devolved decision-making
Nationally focused	↔	Customer focused	↔	Regional and local
Outcome driven	↔	Demand led	↔	Consultative and balanced
Informed by analysis	↔	Consumer preferences	↔	Informed by values
Potentially responsive	↔	Responsive but often blunt	↔	Less responsive but sustainable

Because the future policy environment is still evolving and uncertain, it is appropriate to structure further debate rather than offer firm conclusions. With this goal in mind, we have included a number of key policy questions in an Appendix to this report. We hope this will provide a useful framework for further debate and analysis.

Box 1: Summary of key themes

- ▶ The transport and land use regulatory regimes are structured to be very different. The technology and social changes that are likely to emerge in the medium term will potentially emphasise the differences.
- ▶ Decisions and investment supported by land use regulation are often long-term and difficult to reverse. While technology and social change promotes (or necessitates) more responsive transport policy, the interface with land use regulation may inhibit the implementation of transport policy initiatives.
- ▶ The interface between transport and land use has been premised on high levels of private car ownership and use, but New Zealand is now following international trends towards a new paradigm. While change will continue to occur, any future paradigm is difficult to predict because of the range of technological and social trends in play. This environment requires regulatory regimes that are sophisticated, flexible and responsive.

Interface between transport and land use regulation

In this first section, we summarise the current interface between transport and land use regulation in New Zealand. There are several principles and frameworks that can be applied to understand this interface. In this report, we focus primarily on integration between the two regulatory regimes with the aim of better understand how the two regimes interact and impact each other.

Both regulatory systems have been set up independently of each other given quite different and historical policy drivers. For example, land use policy has been applied as society's way of managing the externalities of development, whereas key land transport policy is typically focussed on the externalities of vehicle use and achieving maximum value from land transport providers.

We consider that in practice this has resulted in a number of barriers to meaningful integration at a systemic level, including the use of independent legal structures, different policy drivers and value judgements, a lack of clarity around the respective roles of central and local government, and technical and pragmatic difficulties to achieving alignment.

In spite of these formal and substantive barriers to integration, the two regimes are required to interact and accommodate each other regularly. In practice, this results in a kind of compromise that can be viewed as ad hoc rather than systematic. The focus appears to be on addressing specific issues rather than resolving the underlying tensions between the two regimes.

It is important to note that any division identified may also reflect an inherent tension between the development and regulatory aspects of key legislative provisions. As such, the tension may also be viewed as a necessary and important aspect of regulatory design and a deliberate attempt to safeguard both against the overriding of environmental protections by developers, and the driving of investment policy by planners based on an overly narrow environmental perspective.

Land transport regulation

Land transport regulation is designed to improve access to transport and facilitate mobility, while also ensuring that certain health, safety and environmental standards are met. In New Zealand, the two main statutes governing land transport regulation are:

- ▶ the Land Transport Management Act 2003 (**LTMA**); and
- ▶ the Land Transport Act 1998 (**LTA**).

Land Transport Management Act

The LTMA's purpose is to contribute to the aim of achieving an effective, efficient and safe land transport system. It provides for the allocation of transport funding and requires the preparation of various land transport planning documents.

- ▶ The Minister of Transport is responsible for issuing a government policy statement (GPS), which sets out the Government's strategic and policy goals for land transport, as well as the funding direction necessary to achieve them.¹
- ▶ Regional councils must prepare regional land transport plans that set out the transport goals for their region.² These high-level plans provide a strategic link between transport activities at a national level and those at a local level.
- ▶ The New Zealand Transport Agency must prepare and adopt a national land transport programme that takes into account any relevant national or regional policy statements or plans that are in force under the RMA.³

Land Transport Act

The purpose of the LTA is to promote safe road user behaviour and vehicle safety. It sets out the regulatory requirements for participants in the land transport system. These requirements include:

- ▶ responsibilities of participants in the land transport system
- ▶ driver licensing
- ▶ transport service licensing
- ▶ offences related to driving and
- ▶ vehicle registration.

The LTA provides the detail governing use of the transport system in practice. It allows participants to make use of the transport system in a safe and responsible way.

Land use regulation

Land use regulation involves managing the way in which spaces are used and developed. It encompasses spatial elements, such as the physical design and layout of cities, as well as strategic considerations such as how land use affects social, economic, cultural and environmental interests. In an urban environment, for instance, there may be a focus on containing urban sprawl, preserving green belts and maintaining the integrity of infrastructure.

In New Zealand there are two main statutes governing land use. These statutes are:

- ▶ the Local Government Act 2002 (**LGA**) and
- ▶ the Resource Management Act 1991 (**RMA**).

1 Land Transport Management Act 2003, ss 66-71.

2 Land Transport Management Act 2003, ss 13-16.

3 Land Transport Management Act 2003, s 19A.

Local Government Act

The purpose of the LGA is to provide for democratic and effective local government. It sets out a particular investment process intended to safeguard ratepayer interests. It also establishes a framework for local decision-making, requiring the development of long-term community plans. Generally, long-term plans will determine funding and delivery programmes for infrastructure (including local transport), land development, and any other policies or programmes that a local authority believes will contribute to meeting desired community outcomes.

The LGA provides flexibility for local government planning and prioritising, with a focus on community asset and activity management. The LGA provides planners with some alternative routes to address cumulative problems, for instance, through integrated decision-making under long-term community plans.

Resource Management Act

The RMA is the key statute governing land use in New Zealand. Its purpose is to promote the sustainable management of natural and physical resources. Under the RMA, land use is primarily controlled through policy statements and regional and district plans prepared by local councils. The RMA also provides for national policy statements and national environmental standards to be prepared by the Minister for the Environment. There are currently five national environmental standards in place concerning a variety of matters, including air quality and the management of contaminants in soil. National environmental standards and national policy statements allow for central government control over local decisions. Regional policy statements, regional plans and district plans are all required to give effect to national policy statements.

The RMA contains provisions that assist in defining the relationship between land use and transport. The Act specifies that regional councils are responsible for “the strategic integration of infrastructure with land use through objectives, policies, and methods”.⁴ This responsibility was introduced in 2005 in an attempt to clarify the role of regional councils in relation to the mandates of district and city councils⁵ (within the RMA context of managing effects, rather than making investment decisions). Another amendment introduced in 2005 specifies that district and regional plans must “give effect to” regional policy statements.⁶ These amendments place additional responsibilities on regional councils to ensure integration between land use and transport. Such responsibilities provide a basis for initiating a conversation between city planners and infrastructure investors about emerging land use issues and the infrastructure that needs to be included in plans.

The current RMA system can also be seen as incorporating quite sophisticated systems that provide checks and balances on the activities of both city planners and transport developers. For example, the designation process allows developers to impose necessary infrastructure provision if the planners are not sufficiently responsive.

4 Resource Management Act 1991, s 30(1)(gb).

5 Land Transport New Zealand “Integrating land use and transport planning” (Research Report 333 November 2007) at 26.

6 Resource Management Act 1991, ss 67 and 75.

The need for an integrated policy approach

It is well understood that land use affects transport policy and vice versa. Land use regulation can affect the demand for travel, which may create pressure for new transport investment or demand management. For example, regulations designed to support high density development as well as a mixture of land uses for both social and economic activities, are assumed to result in shorter journey lengths and a lower percentage of trips. Conversely, regulations that promote low-density development and large road areas are likely to lead to an increase in trip lengths and a higher share of journeys.

Land use regulations can also affect various aspects of the transport system indirectly, including across the following dimensions.

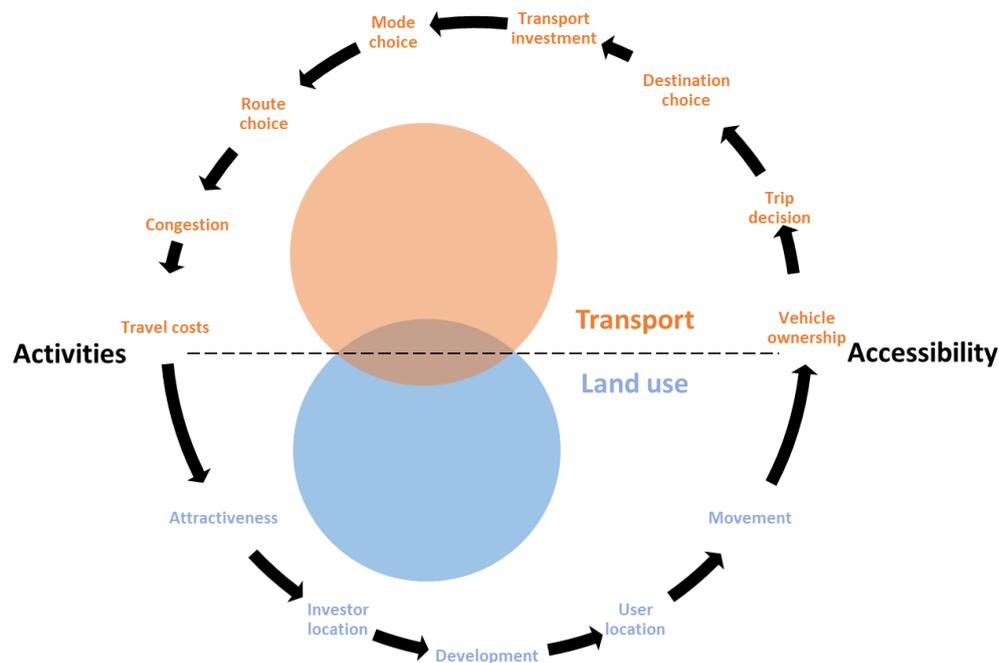
- ▶ **Safety.** The way in which land is developed can affect traffic flow, vehicle visibility and speed limits.
- ▶ **Efficiency.** In areas where land use regulation promotes high-density residential development, there may be increased pressure to lower speed limits and develop pedestrian areas. This might reduce the efficiency of through routes by increasing travel time and congestion.
- ▶ **Effectiveness.** Urban development may lead to increased traffic volumes, which could affect driving, turning and parking capacity.
- ▶ **Integration.** Locating residential activities or other sensitive land uses close to busy transport routes may result in new residents complaining about the noise and pollution from established uses. This may lead to pressure for operational limitations to be placed on prior transport uses, potentially reducing viability.

Transport policies, meanwhile, have an impact on the accessibility of land, which may also alter travel patterns and create pressure for regulatory changes. Transport decisions can have a direct impact on land use by changing the amount, location and type of land used for transport infrastructure.

Transport policies may also have an indirect impact on land use, by changing the extent to which land is accessible. For example, a new motorway system may encourage urban sprawl by improving access to the outer edges of a city. Conversely, transport policies that make public transport more efficient and reliable may encourage land development around public transport hubs in the inner city.

There is a two-way interaction between transport and land-use policies, with the potential for each to support or undermine the other. This two-way interaction is the result of individual use decisions impacting on the entire interface between the two regulatory systems. We describe this interface in Figure 1 below, which is adapted from Wegener and Fürst.

Figure 1: Land use/transport interface⁷



The relationships described in Figure 1 also indicate the potential for significant feedback effects. As individual choices influence other aspects of the land use/transport system, those choices are reaffirmed as the system adjusts to better accommodate them.

These complex interactions suggest the need for an integrated policy approach. Addressing transport and land use regulation separately risks inconsistencies between complementary policy initiatives, ineffectiveness where isolated policy decisions are frustrated by systemic trends, and unforeseen consequences as the system as a whole adapts. A well-designed and implemented policy framework that integrates the two regulatory regimes should prove more effective and resilient over the long term.

New Zealand’s policy approach in practice

There are a number of challenges that regulators may face in moving towards an integrated policy approach in New Zealand. These challenges arise from a combination of factors including independent legal structures, different policy drivers and value judgements, a lack of clarity around the role of central and local government, and pragmatic difficulties. While we consider that the transport regulatory regime has the potential to accommodate expected changes, difficulties emerge in respect of transport’s interface with land use regulation. As a result, where provision is made for interaction between the two regimes, it is exceptional and ad hoc rather than being fully integrated in a systematic way.

⁷ Adapted from Michael Wegener and Franz Fürst “Land-Use Transport Interaction: State of the Art” (1999) Deliverable 2a of the project TRANSLAND (Integration of Transport and Land Use Planning).

Independent legal structures

While some attempts have been made to link the legal frameworks that govern the two regulatory regimes, transport and land use regulation are largely governed by independent statutory instruments. This contributes to an approach that views the two regimes as being conceptually separate rather than integrated.

We note that the regime is certainly flexible enough to adopt an integrated approach in practice. The RMA in particular sets out a framework for considering all relevant issues, and devolves responsibility for addressing these issues to those who are most directly affected. For example, the RMA requires district plans prepared by regional authorities to have regard to strategies prepared under other Acts (such as the LTA and LTMA) and to “give effect” to regional policy statements.⁸ This appears to provide significant scope for regional councils, through their transport and land-use planning roles, to ensure integration occurs. The challenge, however, is that regional councils themselves only raise a small proportion of the transport expenditure in a region and therefore could be viewed as poorly placed to make investment decisions on behalf of taxpayers and ratepayers.

However, in line with this flexible, devolved philosophy, there is no mandated requirement for transport issues to be considered let alone afforded meaningful weight.⁹ For example, one issue under the current regulatory regime is that transport planners tend to have relatively minimal involvement in the preparation of district plans, despite the district plan being a critical document for addressing issues of integration within the limits of its mandate. While the practice of having the process led primarily by city planners may be a capability issue with local government, rather than a characteristic of the regulatory framework itself, transport planners appear to have played a subsidiary role within the plan preparation process.¹⁰ Instead, the process is primarily led by city planners who weigh up transport and other considerations and make recommendations.¹¹

Different policy drivers and value judgements

Adding to the difficulty of reconciling the relatively independent statutory regimes, is the fact that the regulatory frameworks are designed to operate in very different ways. This can be demonstrated through a comparison of regulatory styles evidenced in the RMA and the LTA. Both statutes set out the core legislative framework within which regulatory policy is operationalised in their respective spheres of operation. The structure of these two statutes, their underlying policy drivers and the values they promote, are starkly different. The contrast between the different regimes is demonstrated in Table 3 below.

8 Resource Management Act 1991, s 54.

9 Similarly, there is no binding requirement for integration between transport planning and land use planning under either the Land Transport Act or Land Transport Management Act.

10 Land Transport New Zealand “Integrating land use and transport planning” (Research Report 333 November 2007) at 33.

11 Land Transport New Zealand “Integrating land use and transport planning” (Research Report 333 November 2007) at 33.

Table 3: Comparison of transport and land use statutes

Resource Management Act	Land Transport Act
Devolved decision-making	Centralised decision-making
Balancing competing interests (economic, social and environmental outcomes) in the context of development	Prescribed outcomes and rules (vehicle safety, use licensing, offences) typically not in the context of development
Regionally differentiated	Nationally standardised
Driven by collective values	Driven by close policy analysis
Principles based with statutory purpose statement	Rule based with no statutory purpose statement
Targeted at the framework level	Targeted at the operational level

Both statutes are obviously intended to achieve different outcomes, and the different philosophies that underpin the design of each statutory framework reflect this. The key point to our mind is that there is no obvious way of reconciling these two very different approaches where transport and land use regulation overlap (other than by ensuring that well-informed decision-making takes place in each sphere). Different arrangements and approaches entrench the mind-set that transport and land use regulation are two separate regimes and, in our view, underscore the challenges decision-makers may face when considering policy design and implementation in light of both frameworks.

Lack of clarity around the role of central and local government

The Productivity Commission’s recent inquiry into the regulatory performance of local government highlighted the state of the relationship with central government. The Commission drew attention to divergent views and understandings of the nature of the respective roles, obligations and accountabilities of the two spheres of government.¹² This lack of clarity around respective roles may lead to tension, with the risk that focus may be diverted away from suitable policy options towards ‘patch protection’ and politics.¹³

This is likely to impede the development of integrated land-transport strategies. There may be concerns that priorities and decisions agreed by regional councils will be subsequently changed by national policy decisions. Further, when regulatory responsibilities are allocated between different levels of government, decision-makers are likely to encounter problems in coordinating activity and ensuring there is reasonable accountability for outputs. A shared understanding of regulatory regimes would increase the likelihood of central and local government working together in a coordinated manner to address regulatory problems. It would also provide a basis for developing more robust performance frameworks and performance measures across government.

¹² New Zealand Productivity Commission *Towards Better Local Regulation* (May 2013) at 6.

¹³ New Zealand Productivity Commission *Towards Better Local Regulation* (May 2013) at 34.

Pragmatic difficulties

Pragmatic difficulties also exist under the current regime. Where the intention is to improve how these two systems interact, given the potential changes in each space over time, a number of factors may prevent this occurring in practice.

In our view, two key issues are:

- ▶ **Perceptions of legitimacy.** Different decision-makers may conceive of their responsibilities and mandate very differently. Local government may omit reference to transport because this is seen as the exclusive domain of central government, for example. Conversely, transport problems may not be addressed by central government if there is a perception that they are region-specific.
- ▶ **Funding.** Ultimately, funding will determine how particular issues are addressed in practice. For example, central government has significant financial resources, but may elect not to utilise those resources on regional projects. Limited integration may simply reflect self-imposed or external limits on financial resources.

Impact of technology and social change

In this second section, we describe some of the key technological innovations and social trends that are likely to influence transport policy and regulation over the medium term (the next 10 years or so). There is currently little consensus over the nature and extent of these potential developments, and we do not offer specific predictions. Rather, we advance a broader point that the potential for change is significant, and will likely affect transport policy in important but unpredictable ways.

The potential for change is as profound as the rise in popularity and affordability of the private car some 60 years ago. In this case, the broad trend that can be identified is a steady move away from high levels of private car ownership and use. Whereas the rise of the private car represented a single innovation and so had reasonably predictable effects,¹⁴ the shift away from car ownership is the result of a myriad of different social changes and technology innovations. This means that even the short-term effects of the current paradigm shift are difficult to predict with confidence.

What is clear, however, is that the change of paradigm will have an inevitable impact on the interface between transport and land use regulation. The rise of the private car was the key lens through which the transport/land use interface has been understood. The key statutory instruments in this area, for example, have all been developed within the private car paradigm, and may be unsuited to dealing with the consequences of current trends.

The nature of change in the transport sector

We divide the current changes occurring within the transport sector into two broad categories: emerging technologies and social trends. The division is useful because it highlights that transport is to a significant extent a socio-economic phenomenon. Technological innovation may promote or respond to particular social trends (or both), but is relevant only to the extent that it supports the reasons individuals use transport.

Emerging technologies

Technological change is ongoing. This paper does not exhaustively survey the innovations that have emerged in recent years or which may emerge in the future. However, we do highlight several areas of technological development that are indicative of the scope of potential change that may affect the transport sector. These are:

- ▶ **Intelligent transport systems.** These ‘smart’ transport systems overlay existing information technology and communications infrastructure. A wide range of applications fall under this class of technology, from traffic monitoring and real-time travel information to the installation of sensors to detect road weather conditions. A combination of low-cost and widespread sensors, a steep drop in data storage costs and the availability of new data processing algorithms has improved the ability of regulators to collect and analyse large amounts of data. ‘Big data’ may be used to develop new strategies in system design and accelerate safety improvements. The availability, collection, storage, distribution and use of big data is becoming an increasingly significant issue in the transportation industry.

¹⁴ See, for example, Ministry of Transport (UK) *Traffic in Towns* (1963).

- ▶ **Autonomous vehicle and driver assistance technology.** The emergence of autonomous vehicles and driver assistance has clear implications for transport safety and road capacity. In the short term, these technologies should improve safety and reduce the task load of drivers. Over the longer term, autonomous vehicles may revolutionise the freight industry by removing the need for drivers and allowing for continuous carriage.
- ▶ **New energy technology.** Solar power and electric battery technology have the potential to influence the way transport is powered, with important cost implications. These technologies may also impact on land use by reducing levels of noise and pollution, making traffic-dense areas more attractive for residential and commercial use.
- ▶ **Non-transport technology.** Advances in information technology and telecommunications may substitute for the need for transport capacity in some circumstances. Remote working and online shopping are two examples where the need for personal transport may be reduced. In other situations these technologies may augment or accelerate changes already occurring in the transport sector.

Changing social trends

As with technological innovation, there are a number of emerging social trends which are likely to be indicative of the future needs of the transport system:

- ▶ **Demographic changes.** Factors such as population growth and longer life expectancy may increase the demand for goods and services, including transport services. Transport demand may even be disproportionately affected in some cases, such as where the mobility needs of older generations increase, or where housing and lifestyle choices require greater flexibility from the transport system.
- ▶ **Shift towards asset sharing.** Ride sharing services (Uber) and asset sharing arrangements (Car2Go) allow multiple users to access individual vehicles. If ride-sharing arrangements, hire schemes and multi-modal transport services become increasingly available in the future, there is likely to be less emphasis on private car ownership than in the past.
- ▶ **Increased emphasis on consumer choice.** Societal changes may increase the various reasons why travellers prefer to travel by alternative modes. Options such as walking or cycling can be enjoyable and provide exercise, while using public transport can be less stressful and allows commuters to read, work or rest. These trends may crystallise further as environmental and/or health related considerations become increasingly significant.
- ▶ **Economic change.** A move towards high-value, information-based services may be a key step in New Zealand's future economic development. To the extent this occurs, telecommunications technology and infrastructure may displace the need for physical transport as knowledge-based services and internet-based businesses do not require the same physical presence.

The important point to take from these examples is not the likelihood that certain trends will emerge nor how soon change can be expected. Rather, the key point is that the potential for change from a range of factors is significant. However change emerges, it is likely to have a meaningful impact on transport policy, including the interface with land use regulation.

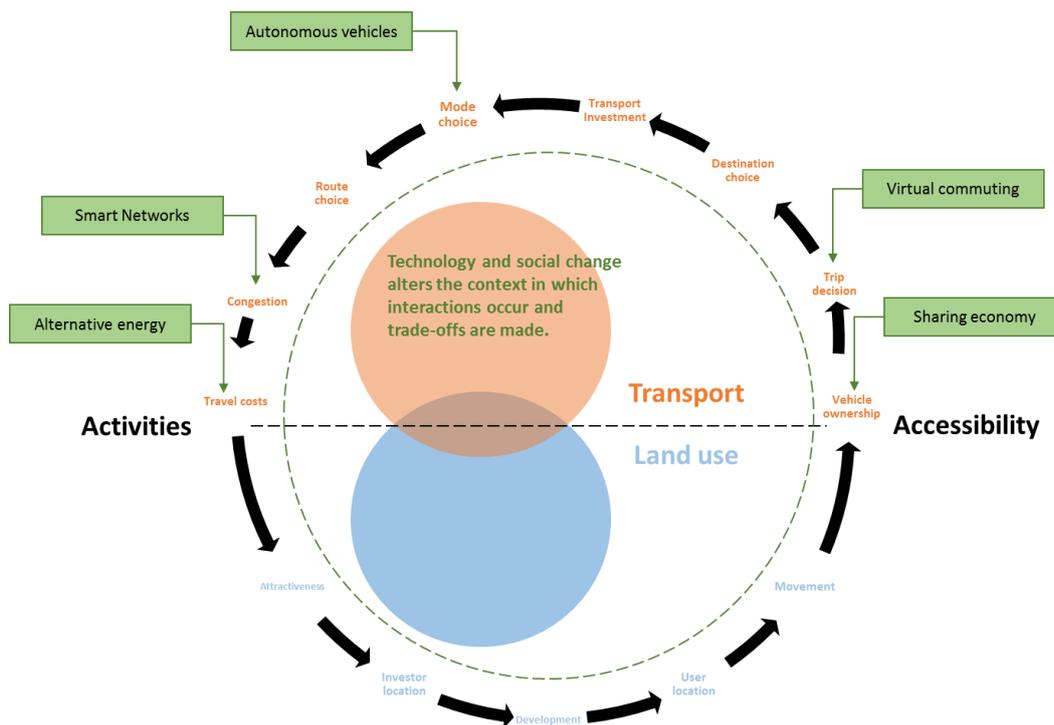
Potential impact on transport and land use regulation

While new innovations and emerging trends may seem small or isolated, many individual changes can have profound implications for the transport system as a whole. In the first section of this paper, the interface between transport and land use regulation was described in systemic terms. Individual choices and decisions regarding the transport network affect land use determinations and vice versa, because the two regimes form part of an integrated system.

The key point we wish to emphasise here is that a consequence of this inter-relationship is that individual innovations and social changes affecting transport policy will have a direct impact on land use decisions. Further, those impacts on land use will in turn alter the context in which transport decisions are made through feedback effects throughout the system. Technology and social changes therefore matter a great deal to the interface between the two regulatory regimes.

We have sought to demonstrate the significance of likely changes in the transport sector for the integrated system as a whole by extending the Wegener and Fürst diagram introduced in the first section in Figure 2 below.

Figure 2: Land use/transport interface in the presence of technological and social change



Again, the diagram is indicative only. However, what it does show is that individual impacts matter, and that collective impacts can matter a great deal. By changing the decision-making calculus of transport users, technological innovations and emerging social trends alter the entire context in which the interface between transport and land use regulation is understood.

Specific impacts on the transport/land use interface

While acknowledging that there are typically multiple variables to manage and observe in respect of any change, examples of specific developments anticipated in the sector may serve to demonstrate the overall impact of social and technological changes ():

- ▶ **Improved land use decisions.** The availability of more data should make it easier to understand the consequences for transport of certain land use decisions before they are implemented. This will increase the likelihood that land use decisions weigh competing priorities (including transport implications) appropriately and do not lead to significant unforeseen consequences. In this respect, technology may allow for the development of more resilient and efficient infrastructure, providing cost savings and reducing the environmental impact of transport.
- ▶ **Accommodating changing preferences.** Changing influences over where people live and work may be driven by increased accessibility and attractiveness of various transport options. In practice, this will have important consequences for land use decision-making. Land use policies promoting density may encourage greater reliance on public transport networks, whereas an easier commute may increase the extent of urban sprawl.
- ▶ **Increased network capacity.** Autonomous vehicles and associated technologies provide a good example of how technology may have consequences for different policy areas. While the introduction of these vehicles will initially influence vehicle ownership and mode choice, there would also be flow on effects for land use. For instance, people may choose to live further out from city centres and commute longer distances, as they may use their travel time for work or other activities without having to drive themselves. Further, personal transport may become more accessible with less need for licensed drivers. This may require increased network capacity, with implications for land use decisions, if other policy decisions or social influences do not have a counterbalancing effect.

Developments like these will likely emphasise the interface between transport and land use policy, by exposing ways in which the two regulatory regimes are intertwined. Regulators will need to address the challenges arising from social and technological changes in a way that does not inhibit the adoption of new technologies or present barriers against developing an integrated approach.

Specific opportunities for land transport regulation

While there will be challenges in ensuring New Zealand's regulatory regime is flexible enough to cope with new technologies as they emerge, there are also a number of opportunities that arise from innovations. At a high level, these may include:

- ▶ **Improved infrastructure capacity and incident management.** Smart cars, variable speed limit systems and traffic monitoring devices could be used to harmonise traffic flow and improve system efficiency and reliability. Smart vehicles, for instance, could be routed to avoid congestion and could travel close together to increase road capacity.
- ▶ **Enhanced safety.** Crash avoidance technologies and increased traveller information may reduce the number of injuries and fatalities that result from transport.

- ▶ **The ability to integrate different modes of transport.** Integrated fare payment systems, multimodal journey planners and real-time user information may help to promote sustainable modes of transport and competition between modes.
- ▶ **Reduced energy consumption and pollution.** Electric vehicles with zero-emissions and hybrid vehicles could significantly reduce emissions along travel corridors.
- ▶ **Improved availability and interoperability of transport data.** Information management systems could be used to analyse data from multiple sources and integrate both real-time and archived information for planning, efficiency and safety purposes.

Technological developments present vast opportunities. The key will be in developing a balanced approach that allows for the up-take of new innovations while limiting the degree of unforeseen disruption to each regulatory system.

New paradigm – beyond private car ownership and use

While we do not make firm predictions about specific future outcomes, we note that several trends point in a similar direction. For several decades the interface between transport and land use has been understood through the lens of an assumption of high levels of private car ownership and use. The trends suggest that New Zealand is moving towards a new paradigm where this assumption may no longer hold.

The rise in popularity and affordability of the private car completely changed the understanding of land use regulation and transport policy. The urban form in particular developed around the concept of private car ownership. We think it is worth noting that the key legislative instruments that we discussed in the first section have all been enacted in a period where individual car ownership was the dominant assumption. Often the scheme of these statutory instruments is sufficiently flexible to accommodate a change in policy priorities or consumer preferences. However, given the dominance of the car ownership assumption for such a long period of time, the implementation and operationalisation of these ostensibly flexible statutory instruments may have ossified in a manner that ingrains assumptions of private car ownership and use.

To the extent this assessment is true, it suggests that the transport and land use regulatory system may begin to face significant external challenges. These challenges add significantly to the complexity of the policy environment, and may augment the internal tensions already present between the two regimes. Whereas the rise of the private car represented a single innovation and so had reasonably predictable effects,¹⁵ the shift away from car ownership is the result of a myriad of different social changes and technology innovations. This means that even the short term effects of the current paradigm shift are difficult to predict with confidence. While change will continue to occur, future paradigms are difficult to predict because of the range of technological and social trends in play.

¹⁵ See, for example, Ministry of Transport (UK) *Traffic in Towns* (1963).

Regulatory Implications

In this third section we summarise some of the implications of our analysis for regulatory policy. We consider that technological innovation and social change is likely to provide new tools to address regulatory issues, particularly where market forces operate effectively. However, the policy environment is also set to become more complex and uncertain.

This environment requires a regulatory regime that are sophisticated, flexible and responsive. While transport policy is likely to be able to adjust to changing circumstances, land use regulation is likely to be more rigid. This rigidity within the regulatory system means that chronic tensions identified in the first section of this paper have the potential to continue to inhibit integration unless policy changes are made.

Additional complexity and opportunity

As an initial point, we note that a high-level impact of technological innovation and social change is that the regulatory policy environment becomes even more complex. While transport and land use regulation are each very different at a conceptual level and in their implementation, the scope and scale of technology and social change (and the uncertainty it brings) creates an additional area of concern that must be integrated into the governing policy framework.

We summarise some of the more obvious institutional tensions in Table 4 below.

Table 4: System level tensions

Transport policy		Technology/social change		Land use regulation
Centrally planned	↔	Market driven	↔	Devolved decision-making
Nationally focused	↔	Customer focused	↔	Regional and local
Outcome driven	↔	Demand led	↔	Consultative and balanced
Informed by analysis	↔	Consumer preferences	↔	Informed by values
Potentially responsive	↔	Responsive but often blunt	↔	Less responsive but sustainable

As a consequence of the overlay presented by technology and social change, it is likely that new policy tools will become available in some circumstances. In particular, more market-driven policy initiatives might be appropriate and/or successful in this new environment, for example. The difficulty of predicting future outcomes based on consumer preferences and technology availability (and the fact that technological innovations and social changes will inevitably outpace regulation in the sector) suggests that highly devolved, decentralised decision-making such as that involved with market-based mechanisms could be investigated.

However, the limits of these mechanisms also need to be borne in mind, and overall the more sophisticated use of a wide range of policy tools is likely to be needed. This suggests the need for a regulatory framework that is flexible and responsive.

New Zealand context generally supports responsiveness

There are a number of reasons to consider that the New Zealand regulatory environment has the potential to be sufficiently responsive and flexible to adjust to anticipated technological and social changes. The key attributes we would emphasise in this regard are:

- ▶ the small, accessible and responsive nature of government; and
- ▶ the overall centralised, consensus-based nature of government decision-making;
- ▶ ability to intervene selectively to target particular policy outcomes; and
- ▶ potential to become a fast follower, adopting technologies and trends quickly once their utility has been demonstrated in overseas jurisdictions and markets.

These features of New Zealand government are largely a product of the small size and power distances. They indicate that there are few meaningful institutional barriers to change (although issues such as inertia and constraints on Parliamentary time must be taken into account).

We believe that transport policy is largely set up to take advantage of these arrangements, which will be increasingly important as technology and social change intervenes. Land transport regulation usually has clear, universally applicable objectives (such as safety), is governed in many cases by primary legislation (which is relatively simple to change due to Parliamentary sovereignty) and is funded centrally. This points to the potential, at least, for a responsive regime that is able to adapt to technology and social change. The policy challenge is to extend the approach to the difficult area of the interface between transport and land use regulation.

Land use impacts on the responsiveness of transport policy

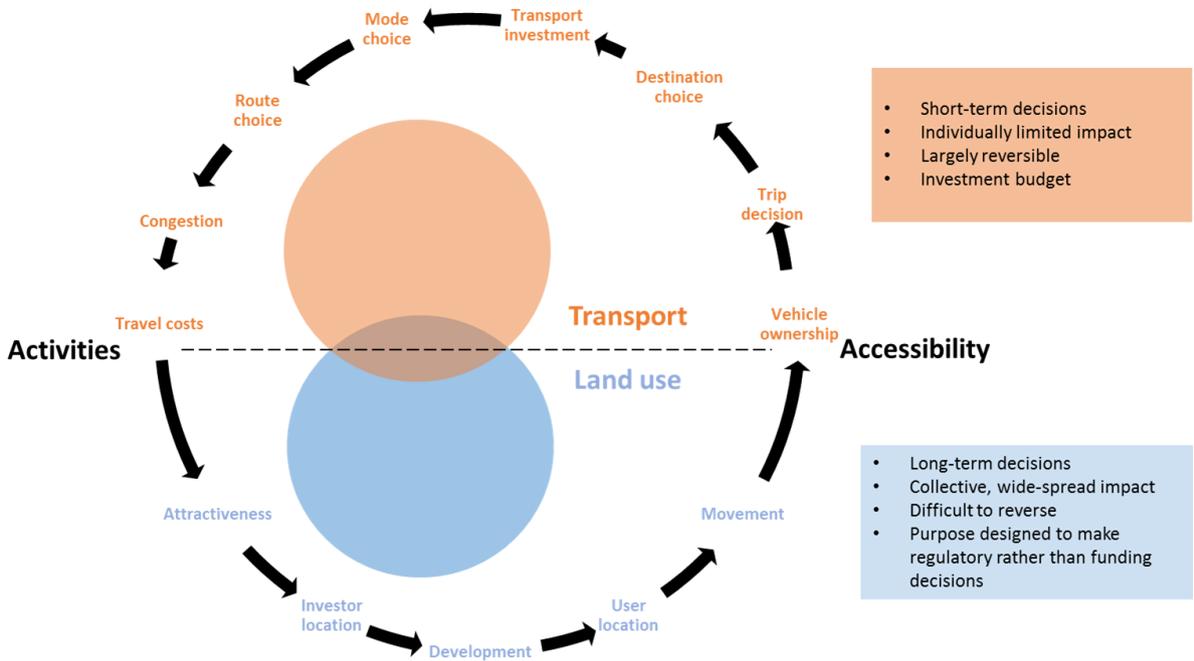
Where land use regulation intersects with transport policy we consider that there are significant challenges involved in adopting a more responsive regulatory approach. Land use regulation sets the conditions under which significant investment is made over the long term (albeit that a large part of transport investment is affected by existing land use and managing existing demand such as safety retrofits and maintenance). That investment is often sunk and difficult to reverse, creating the potential for path dependency issues for future investment and regulatory decisions. As a result, single land use decisions can dictate the direction of affected transport policy decisions, ultimately affecting the choice and value offered to users of transport networks.

In contrast, transport use decisions are usually personal and individual, and must be exercised in concert to put significant pressure to change back on decisions regarding land use. These small, individual decisions can evolve over time relatively quickly, if the wider regulatory regime is sufficiently responsive. To our mind, this highlights a risk that historical land use decisions may create a meaningful degree of rigidity and inertia to change that affects transport policy disproportionately over the long term. Ultimately, it appears that land use regulation and investment decisions reduce the responsiveness of the transport policy system.

This rigidity may also offer policy advantages in some circumstances. For example, Wegener and Fürst suggests while transport policies are more direct and efficient than land-use policies in effecting changes to the transport system, land use regulations are essential as an accompanying strategy for creating a more sustainable system in the long run.¹⁶ This suggests that where integration can be achieved, long-term policy change is more likely to be successful. This approach views the inertia associated with changing land use practices as a tool of transport policy as well as a challenge to be addressed.

We summarise in Figure 3 below the different levels of responsiveness between transport and land use regulation with reference to the Wegener and Fürst diagram from the first section of this paper.

Figure 3: Impacts of land use/transport interface on policy responsiveness



Capturing the benefits offered by new technologies and social trends requires a detailed understanding of the relative responsiveness and rigidities of the two regimes, and how regulatory policy can best manage the interface between the two.

¹⁶ Michael Wegener and Franz Fürst “Land-Use Transport Interaction: State of the Art” (1999) Deliverable 2a of the project TRANSLAND (Integration of Transport and Land Use Planning).

Insights from regulatory systems thinking

Finally, we draw on regulatory systems thinking to identify possible areas where new policy thinking might assist with understanding the interface between transport and land use regulation in the presence of significant uncertainty and change, and identifying strategies to deliver policy gains. While not exhaustive, our initial view is that it may prove fruitful to address the following:

- ▶ **Purpose of regulation and policy.** While private car ownership and use is not articulated within transport or land use regulation, it is an underlying assumption that is difficult to displace. If an alternative basis for considering transport policy is to be promoted, a change in underlying philosophy may need to be expressly signalled in governing legislation.
- ▶ **Cost-benefit analysis of funding/intervention.** We can see a trend towards more sophisticated cost-benefit analysis supporting transport policy. Overall, cost-benefit analysis is likely to become more qualitative, and alternative approaches (such as multi-criteria analysis) may be needed to ensure the robustness of decision-making and, in particular, clearly distinguish between welfare benefits that can be reasonably foreseen and those that are more speculative in nature. Two dimensions in particular warrant comment:
 - ▶ working assumptions around demand and usage may be impacted significantly by technology changes, promoting the need for new estimation and policy analysis techniques; and
 - ▶ wider considerations, such as the impact of historical and future land use decisions, ought to take a more express role in analysis.
- ▶ **Role clarity.** The respective roles of central and local government, and other relevant agencies, will need to be made particularly clear. The potential to avoid addressing considerations that are particularly complex or foregoing responsibility because of a perceived lack of mandate, only complicates an already difficult regulatory policy environment. Similarly, clarity in distinguishing between regulatory and investment functions will be important for all decision-makers. For example, while land use policy can enable or inhibit 'development', ultimately, with little or no investment budget, it is a regime designed to make regulatory rather than funding decisions.
- ▶ **Monitoring and assessment.** Assessment of the effectiveness of the transport regulatory regime is likely to become more difficult or at least more complex. The range of institutions that the central department must monitor will increase, and they will take on various forms (market-based, local government). There is also an opportunity for more useful two-way data flow, with central agencies assisting to coordinate between market signals and devolved decision-makers.
- ▶ **Cost implications.** More flexible regulatory structures suggest less upfront cost balanced by additional costs in implementation. The merits of this trade-off will have to be assessed carefully, particularly in light of the pressures at the interface with land use decisions that promote rigidity rather than responsiveness.

Appendix

Indicative policy questions

- ▶ What is the appropriate role of government policy where market developments and user preferences are subject to a high degree of future uncertainty?
- ▶ How can the path dependency associated with long-term land use decisions be balanced with the flexibility required to adapt to new social preferences?
- ▶ To what degree can the shaping of transport outcomes be left to the market and/or private sector investment?
- ▶ When do regional transport priorities warrant central government attention?
- ▶ Can different transport solutions be sustainably developed for different regions where there are different drivers of use (relative density, distances travelled, etc)?
- ▶ Should funding for transport be devolved to reflect regional and local priorities?
- ▶ Do transport decision-makers have adequate power to collect data on which to base their decisions, and to monitor outcomes ex post?
- ▶ To what extent will transport become a subset of land use considerations, rather than a stand-alone area of policy?
- ▶ Are there ways of actively incentivising greater compromise and collaboration between decision-makers who have responsibility under different regimes?
- ▶ To what extent does conventional economic appraisal of transport systems incorporate the consideration of wider potential benefits and detriments?
- ▶ Should foreseeable risks of climate change (eg floods and landslides) play a greater role in influencing transport and land use decision-making?
- ▶ How can minimum standards of access to transport be maintained or enhanced against the backdrop of an ageing population and rising energy prices?



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