Future Demand
Scoping paper
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Ministry of Transport
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Ensuring our transport system helps New Zealand thrive

New Zealand Government

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This scoping paper was a work in progress during March 2014 that sought to capture the accumulated background thinking and intentions for a piece of Ministry-led work to examine future demand in an uncertain world. The document combines the thinking of the strategy director, charged with taking forward the project, with insights from a great deal of interaction with Ministry colleagues and others.

This finalised version of the paper has been prepared as the Future Demand project reaches its end (and turns to dissemination and engagement activities concerning its results). It constitutes a record of the initial considerations that shaped the work now undertaken.

Summary

Motivated by attention to questions surrounding future investment in transport, the principal consideration of this project has been addressing uncertainty of future demand in the face of a changing society. The focal question defined at the outset was: “How could or should our transport system evolve in order to support personal mobility in the future?”. The project’s core element was identified as a scenario planning exercise in which four plausible but divergent scenarios would be developed for the 2042 horizon. The narratives for these scenarios were intended to then be used as a platform for articulating drivers of future demand and a number of the principles and issues that prevail in terms of how transport policy and investment should address future demand.

The project was not designed to commit to depicting the most likely future or to prescribing a policy response. It was expected, however, to set out some **key recommendations regarding how policy options should be examined in terms of accounting for future demand**. To inform the scenario planning it was determined that the following should be undertaken: (i) an international review of scenario planning and of trends in travel demand; and (ii) a synthesis of existing national evidence on drivers of, and trends in, demand. **A participatory process was intended for the project in order to strongly engage Ministry of Transport colleagues and external stakeholders**. The scenario planning process and its outputs were also intended to interact with and help inform future demand modelling. It was emphasised at the outset that the principal outcome of the project was not to be the scenarios themselves but the sector-wide thinking that would be provoked through, or extended by, the project.

Project rationale – why was it needed?

Demand assumptions are driving investment decisions, including substantial investment in roading capacity. Return on investment in terms of supporting a thriving New Zealand is an imperative. We face contestable assumptions about future demand, including potential for vehicle kilometres travelled (vkt) per capita growth, decline or saturation. There is a need in this climate for the Ministry and its stakeholders to embrace uncertainty when considering future investment.

Project objectives and what success should look like

The proposed objectives for the project were agreed as follows:

- to promote informed and critical thinking amongst Ministry staff and external stakeholders regarding future transport demand
- to develop a set of plausible future scenarios for New Zealand in a way that can inform examination of future demand and be used to test robustness of policy
- to identify principal considerations for transport policy and investment in the face of uncertain demand futures.

Correspondingly, it was suggested that the project's success would be reflected by:

- evidence that the scenarios and related principles for policy and investment are embedded in the psyche of the Ministry
- use of, and reference to, the scenarios in other Ministry projects and by external stakeholders
- greater acknowledgement and account of drivers of future demand (beyond population, employment and income) in policy papers.

Key considerations for the project

The paper now sets out a series of key considerations for shaping the project's approach, reinforcing its rationale and helping establish some principles of thinking:

1. which demand are we talking about?
2. what time horizon(s) are we considering?
3. accessibility versus mobility
4. changing travel demand
5. a mentality of transport serving society versus a mentality of transport shaping and supporting society
6. forecasting or scenario planning
7. three hypotheses in the peak car debate
8. the digital age and the motor age collide
9. young mobiles
10. unintended consequences

Which demand are we talking about?

From a policy and investment perspective, it is aggregate demand (and its distribution) on the network(s) that is ultimately important. Different elements comprise the aggregate. Elements include: passenger demand versus freight demand; domestic versus international; urban versus rural. Another element relates to journey purpose and different socioeconomic/demographic groups.

It was agreed that the project focus upon **domestic personal mobility**, especially in an urban context, where the need to understand future demand is most pressing. However, account also had to be taken of **how demand may redistribute over time**, thus requiring that the project not solely fixate on the major existing settlements.

The increases in per capita driving occurring in some less densely populated areas in contrast to recent declines in major urban areas had to be noted. The principal focus was agreed to **be land transport,** but noting the possibility to consider **domestic aviation** in terms of its implications for land transport demand. For instance, while the majority of New Zealand trips are within zone or into neighbouring zones, greater use of aviation in relation to being able to live in one area (at weekends) and work in another (during the week) could suppress recreational car travel or displace it geographically.

While the focus was to be on passenger demand the project might also give some attention to the (unintended) consequences of changes in passenger demand for goods movements. For instance, changes in how people are shopping and purchasing goods may reduce shopping trips but increase movements of light goods vehicles. Domestic passenger demand assumed that travel by international visitors to New Zealand in terms of tourism and business would not be (substantially) addressed. The National Freight Demand Study was viewed as a 'sister project' and likewise the demand modelling

capability being developed in the Ministry was considered pertinent to this project. Personal mobility appropriately encompasses virtual mobility — access to people, goods, services and opportunities through use of information and communications technologies (ICTs).

What time horizon(s) are we considering?

There may have been a temptation to focus upon the short term horizon of two to three political cycles in relation to imperatives to address economic activity in particular. However, in light of the Performance Improvement Framework (PIF) Review[1] and the need for strategic thinking and challenge, the farther horizon was important to consider as well or instead. It was agreed that the **Project focus upon the 2042 time horizon.** This aligned with the Freight Demand Study (and with Auckland's Integrated Transport Programme to 2041). The Ministry's demand modelling capability would also be able to adjust to address this specific time horizon. This would take us 28 years into the future covering a time span in which policy and investment decisions could bring about significant consequences for the transport system and in which society would change in possibly quite profound ways. At the same time, the project would not neglect the shorter term, not least as an important means to inform the longer term. There are **puzzling recent changes in demand** and underlying factors such as driving licence acquisition that are not unique to New Zealand and considering these factors (see 'Peak Car' below) was expected to inform how the project would examine the 2042 horizon.

Accessibility versus mobility

Notwithstanding more recent interest in the realities that travel can be more than a means to an end (associated with worthwhile travel experience or use of travel time[2]), travel is fundamentally seen in transport planning as a derived demand - it is derived from a need or desire to participate in activities at different locations.

With this in mind**, it is our ability to access[3] people, goods, services and opportunities that underpins economic activity and social participation and wellbeing.** Physical mobility is just one means of realising such access but increasingly in the digital age it is not the only means.

Future demand would therefore need to recognise the importance of ICTs and the different ways in

[1] The Ministry of Transport's progress towards its goals has been assessed in a Performance Improvement Framework (PIF) report, released by the State Services Commission. PIF evaluates the Ministry on its own goals, looking at whether it is on track to achieve them, and able to make the contribution that New Zealand needs. The report finds that the Ministry has experienced "a sharp uplift of performance, culture and capability" over the last few years, but needs to find another gear to achieve its goals. It provides specific challenges to lift the Ministry's strategic focus, engage more effectively with stakeholders and improve the quality and consistency of its policy advice.

[2] While travel has traditionally been seen as the disutility associated with reaching destinations in order to participate in activities, there is a growing body of literature highlighting that travel itself can also have positive utility: there can be pleasure in the experience of travel itself and, more significantly from an economic appraisal perspective, productive use of travel time can be made. The UK Department for Transport has recently begun examining the implications of travel time use for valuing travel time savings attributable to transport investment – see http://www.gov.uk/government/uploads/system/uploads/attachment_data/file/251997/vtts_for_business_main_report-dft-005.pdf

[3] 'Access' here is taken to mean 'reaching' rather than the more specific connotation in terms of physical access to the transport system which may affect those with impairments.

which they can affect the nature of access and in turn physical mobility. It is notable in a UK context that the change from increasing to reducing road traffic intensity of economic activity[4] occurred in the mid-1990s, at the same time as the invention of the Web (though also at the same time as growth in domestic aviation which could offer an alternative or additional explanation). One can conceive of a changing total amount of travel but also a redistribution of travel by mode. The project was expected to **embrace the centrality of accessibility** while acknowledging the Ministry's primary responsibility for physical mobility.

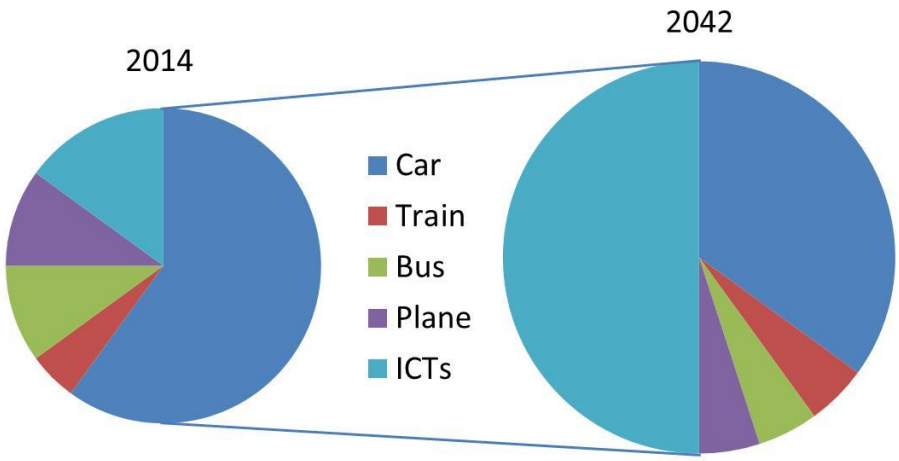

Figure 1: Change in the total amount of access over time and in the 'modal' shares of access (illustrative only)

The pie charts above (Figure 1)[5] illustrate how, by broadening from modes of transport to include ICTs as a mode of *access*, it becomes possible to contemplate how total demand for access might increase but with a much greater share of access accounted for through ICTs. (However, there are particular challenges in how one measures accessibility rather than mobility (hence why the pie charts reflect proportions but do not clarify what the proportions are of).

[4] Road traffic intensity refers to how much road traffic (measured in vehicle or passenger kilometres) is associated with a unit change in GDP.

[5] A concept illustrated in Mokhtarian, P.L. 2003. Telecommunications and Travel – The Case for Complementarity. *Journal of Industrial Ecology,* 6(2) – E-commerce, the Internet and the Environment: 43-57.

Changing travel demand

The future is not predetermined but is ours to shape. 'Changing' can be an adjective or a verb[6]. In other words, looking to future travel demand can be through the lens of attempting to assess how it might be changing over time; or it can be through the lens of examining the extent to which and how travel demand can be changed (e.g. through policy measures). **Whether intentionally or unintentionally, policy measures do influence demand**. This has been epitomised by the 'predict and provide' era of transport policy that prevailed in the UK for a number of decades. By attempting to estimate future levels of demand, efforts were then concentrated on the provision of adequate capacity to accommodate that demand. However, what emerged was that providing new capacity unlocked latent demand and induced new demand; thus travel demand was changed, unintentionally in this case, by the policymakers. It is noted that the National Freight Demand Study has principally focused upon changing in the adjective sense. While changing as *both* an adjective and a verb will always prevail to greater or lesser extents, it seems reasonable to assume that from a Ministry perspective, changing in the adjective sense would apply to parts of the transport system that are not subject to future or anticipated levels of demand that would lead to congestion and unacceptable delay. Meanwhile, **changing in the verb sense must certainly be considered in the more heavily used or depended upon parts of the system.**

A mentality of transport serving society versus a mentality of transport shaping and supporting society

This issue builds upon the previous consideration of changing travel demand. Traditionally the transport profession and transport policy has tended towards a mentality of **transport *serving* society**, epitomised by the era of 'predict and provide'. In reality what we do in **transport *shapes* society**. What then emerges is that **we should have a transport system that *supports* society**. In other words, we should be providing a transport system that is compatible with the sort of society we want to live in socially, economically and environmentally (notwithstanding that society itself is evolving). Our transport system can enhance or erode the public realm of our urban environments; it strongly interacts with our land use system to either positive or negative effect. Our transport system, through where we live and the activities we engage in and our means of access, influences our health and wellbeing. 'Systems thinking' demands that we recognise the inter-dependencies between what might be seen as the sub-systems of transport and the wider system of society. It is convenient to adopt the 'serve' mentality in the short term from a policy perspective but if the Ministry and its stakeholders truly wish to "ensure our transport system helps New Zealand thrive" then we must at least acknowledge that policy and investment decisions will be shaping not merely serving New Zealand. The big question becomes, what sort of society does New Zealand wish to preserve, evolve towards or create? Transport policy and investment can then respond to this.

[6] As noted previously by Goodwin – see Goodwin, P.; Cairns, S.; Dargay, J.; Hanly, M.; Parkhurst, G.; Stokes, G.; Vythoulkas, P.; (2004) Changing travel behaviour. Presented at: ESRC Transport Studies Unit Final Conference, UK.

In addressing this question, it is recognised there are different **options** about the society we want as well as **preferences** at the level of individuals. Back in 2000, Professor John Adams prepared a report for the OECD[7] that examined this issue of choice and its interpretation in a democratic society where any government intervention might be seen as an affront of freedom and choice. He suggested that, in relation to the latter, it was **a matter of how choice was presented to the public**. He expressed this through three different opinion poll questions: (i) "Would you like a car, unlimited air miles and Bill Gate's level of access to all the electronic modes of travel?"; (ii) "Would you like to live in the sort of world that would result if **everyone's** wish were granted?"; and (iii) "Would you like to live in a cleaner, safer, healthier, friendlier, more beautiful, more democratic, sustainable world in which you know your neighbours and it is safe for your children to play in the street?" He suggested the answer to (i) would be 'overwhelmingly 'YES!'; and to (ii) would (if phrased to have its implications properly understood) be 'NO'. He suggested most people would vote for (iii), "especially if the consequences spelled out in Opinion Poll 2 were seen as the alternative".

Forecasting or scenario planning

Future demand has traditionally been seen as something to address through forecasting using transport (and land use) models that project forward and whose outcome estimates of demand can be affected by different scenarios for certain key exogenous variables such as population, income and energy prices. However, use of the term 'scenarios' here can be somewhat misleading when compared to the use of the term in relation to *scenario planning*. **Scenario planning concerns developing distinctive, divergent depictions of the future, based on different assumptions about key influences**. As has been noted by the Government of Queensland, when studying or predicting the future, **to start with certainties is to end with doubts**. The Government of Queensland also provides a helpful comparison of forecasting and scenario planning[8]: forecasting focuses on certainties and disguises uncertainties while scenario planning focuses on and legitimises recognition of uncertainties; forecasting conceals risk while scenario planning clarifies risk; forecasting results in single point projections while scenario planning results in adaptive understanding; forecasting is more quantitative than qualitative while scenario planning is more qualitative than quantitative. There is some experience in the UK of attempting to combine scenario planning with use of the National Transport Model to obtain quantifications in transport terms of the travel demands and distributions associated with the scenario narratives[9].

[7] See http://john-adams.co.uk/wp-content/uploads/2006/hypermobilityforRSA.pdf

[8] See http://www.tmr.qld.gov.au/~/media/communityandenvironment/Planning%20for%20the%20future/Scenario%20planning%204seeable%20futures/4seeable_1.pdf

[9] See Chatterjee, K. and Gordon, A. (2006). Planning for an unpredictable future: Transport in Great Britain in 2030. *Transport Policy,* 13, 254–264.

It was decided that the project would have, as its central focus**, a scenario planning approach that would involve the development of four plausible scenarios for 2042**. For an overview of scenario planning please see http://www.journalofaccountancy.com/Issues/2011/Mar/20103483.htm or http://en.wikipedia.org/wiki/Scenario_planning. To view the outcome of an extensive previous scenario planning exercise for transport futures in the UK, please see https://www.gov.uk/government/publications/intelligent-infrastructure-futures.

Once scenario planning is embraced, what is implicitly acknowledged is that the future is uncertain; there is an infinity of possible futures. It then **becomes important to be able to develop the most appropriate set of scenarios that suit the policy considerations of the Ministry and its key stakeholders**. A set of scenarios would emerge from a process such as the following. A deliberative process engaging stakeholders and experts identifies a long list of drivers of change in future travel demand. These drivers are examined to both identify what are seen to be the key drivers (looking to a future horizon of 2042) and also what are the critical uncertainties that apply. Critical uncertainties are driving forces of change pertinent to the focal question and deemed unpredictable and important. These critical uncertainties become axes. A scenario is then developed for each of the four quadrants depicted by the axes. Each scenario is a narrative of a **plausible** future which accounts for the key drivers. The resulting scenarios are a product of the deliberative process. They stand as **a reminder of future uncertainty and the risk of denying that uncertainty**. However, it is the deliberative process itself and subsequent use of the scenarios in policy making and decision making processes that offers important value from the scenario planning approach.

It was identified that the project should ensure its own scenario planning exercise was well informed by existing understandings of trends in demand for New Zealand and associated drivers of demand and also by previous scenario planning exercises that have been conducted around the world. The latter includes work that the New Zealand Transport Agency (NZTA) completed at the end of 2012 which used scenario planning for ‘Assessing future demands on Transport Infrastructure’.

Central to the success of the Project would be that there should be substantial engagement of Ministry staff and external transport stakeholders in the scenario planning process such that the scenarios are widely ‘owned’. The Project timing coincided with demand modelling work that was also being taken forward by the Ministry. It was envisaged that the two projects would interact, each informing the other. The intention was that the Future Demand project would inform requirements for (further) development of the Ministry’s demand analysis capability.

Three hypotheses in the peak car debate

Professor Phil Goodwin has been at the forefront of articulating the issues within the so-called peak car debate. International empirical evidence (in relation to a number of developed countries) suggests that travel demand or at least **demand for car use (on average per person nationally) may be reaching a peak**. The problem here is that this phenomenon has arisen at around the same time as the global recession which (given the historical coupling between transport and economic activity) suggests that as economic recovery emerges so might a continued upward trend in demand. Three 'peak car hypotheses' are in play[10]: **'interrupted growth'** (present figures reflect a blip in an otherwise upward growth trend); **'saturation'** (demand is at a plateau such that levels of car traffic have become more or less stable); and **'peak car'** (car use per head is peaking or has peaked and in turn is in decline (only countered at the aggregate by population growth). It can be suggested that to varying extends all three hypotheses may prove correct, but for different segments of the population, geographic areas or types of travel. Consideration of peak car is of international interest. It was considered that it would undoubtedly form an important part of the thinking in the Future Demand project.

To coincide with Andrew Jackson (Deputy Chief Executive of the Ministry of Transport and project sponsor) being in Europe for the International Transport Forum, a roundtable workshop to address the three hypotheses was arranged in the UK on 20 May. This was chaired by Professor Goodwin and brought together some of the key commentators on peak car in the UK and enabled considerations for the New Zealand context to be explored to feed into the project. Professor Goodwin has observed that it is no longer sufficient to appraise policy options based on examination of statistical uncertainty associated with future projection. He suggests 'contested futures' must now be accounted for in options appraisal.

The digital age and the motor age collide

There may be something even more fundamental at work than the possible peaking of car travel which is in essence the symptom (albeit a substantial one). Work by Professor Frank Geels and other colleagues[11] has examined the concept of 'regime transition' in relation to what they have referred to as the 'automobility regime'. The world functions at different scales under incumbent regimes (ways of thinking and doing that fundamentally define the nature and operation of systems). Many countries for several decades have existed within the automobility regime also characterised by labels such as car dependence, the love affair with the car and the motor age. The regime has profoundly shaped our land use patterns and lifestyles and many people (including many professionals) have lived so much of their lives within the regime that it is difficult to conceive of things being any different fundamentally. There are also strong vested interests in preserving the regime. Nevertheless**, history shows us that regimes do not last forever and that transitions from one regime to another occur**. These are

[10] See paper by Goodwin: http://www.internationaltransportforum.org/jtrc/DiscussionPapers/DP201213.pdf

[11] Geels, F., Kemp, R., Dudley, G. and Lyons, G. (Eds.) 2012. *Automobility in Transition? A Socio-Technical Analysis of Sustainable Transport.* Routledge, New York.

seldom instantaneous but arise from an accumulation and momentum of niche developments that first perturb, then reshape and then supersede the incumbent regime creating a new regime. The digital age has moved rapidly from a fledgling existence to transforming our communications and behaviours. Yet many of us will not have quite appreciated how profound this accumulation of changes has been. **The digital age is co-existing with the motor age and is likely to continue to do so, but the 'balance of power' is arguable changing to the extent that we are transitioning from the automobility regime into something new (**just as society transitioned from horse-drawn transport into motorisation over a period of decades). If this is the case, then the new regime will not necessarily see an end to the car but will see the car overshadowed in relation to its former primacy. Regime transition was considered something that the project should consider very carefully and indeed this is compatible with the scenario planning approach which allows for the incumbent regime to endure as well as for it to be superseded.

Young mobiles

Building upon the previous point, it is important to acknowledge that **all of us are limited to some extent in our thinking by our own lived experiences**. Many transport professionals are middle-class, middle-aged and male. Both in terms of the horizon of 2042 and the pathway to that future, we need to embrace viewpoints shaped by different lived experiences as part of our strategic thinking. A demographic that is notably hard to reach is young people. A label that could be loosely used here is 'young mobiles' – people who have never known a world before the Web or increasingly before smartphones and tablet PCs. It was determined that the project would aim to engage 17-25 year olds as part of its process of developing and interpreting scenarios.

Unintended consequences

Athens in Greece had a serious problem of air pollution from traffic levels. To address this, it introduced a measure which only allowed individual cars to enter the city on alternate days according to the number plate. Sure enough, the traffic levels reduced and pollution was eased. However, people then looked for means to overcome this obstacle to car use and the result was purchase of second cars with the right number plates to allow people to drive into the city every day. New car purchase was very expensive in Greece so the second cars purchased tended to be second-hand and more highly polluting. The net effect of the policy was to increase traffic levels because of higher levels of car ownership and to increase pollution. This is just one example of **the law of unintended consequences at work**. The project would aim to be mindful of this phenomenon in terms of how it examined the determinants of future demand.

Project team

A core Ministry project team was to be identified to take forward the work. Specific input was also anticipated from other Ministry colleagues. Beyond the delivery team, the project would be a 'whole of Ministry' undertaking, the success of which would be reliant upon wider involvement of colleagues, and of stakeholders outside the Ministry, in the project's deliberative process.

Project process considerations

The envisaged process for the project at the stage of its formulation was as follows.

Establishment of a steering group

This was to be a project whose process needed to be widely engaged with and guided by key parties. It was proposed to establish a Steering Group made up of senior figures from key stakeholder organisations who could support engagement with and the direction of the project. The intention was that this would be chaired by a senior figure outside the Ministry.

Synthesis of background information

The project would undertake a review of examples internationally of scenario planning and a review of 'peak car' debates and evidence. It would assemble a picture of past travel demand trends and developments in New Zealand and identify key determinants of travel demand. This work was intended, in particular, to inform subsequent examination of the drivers of future travel demand for New Zealand. This work would draw upon a number of existing documents from the Ministry and its stakeholders.

UK brainstorming events

As noted earlier, Andrew Jackson was in Europe for the Leipzig International Transport Forum in May. He made a two-day visit to the UK where two events were set up to allow this project to benefit from wider UK expert opinion: (i) 'Determinants and prospects for growth in cycling' – a workshop with members of the Centre for Transport & Society at UWE Bristol and others; and (ii) the roundtable meeting involving Professor Phil Goodwin and other key commentators on 'Peak Car'.

Establishing the two axes of uncertainty

Selection of two critical uncertainties would set the axes for the scenario planning exercise whereby a scenario could then be developed in each quadrant. This would need to be derived from a deliberative process with Ministry colleagues and stakeholders.

Developing scenario narratives

Scenarios are principally narratives that attempt to depict a future world and which can harness the key characteristics of that world in a meaningful way in relation to determinants of and ultimately patterns and levels of travel. It is also common to develop one or more visualisations of each scenario. Scenario development would need to involve facilitated workshop activity involving broad representation from within the Ministry and across its external stakeholders.

Determining travel demand estimates

It is possible to use the narrative of each scenario to estimate the input parameter values used in the Ministry's demand modelling capability. In turn the model would be able to provide some quantified estimates of demand that could then be associated with each scenario. Beyond demand estimates the project would also examine whether the scenarios could be attributed with other quantifications.

So what?

The completed scenarios would be a means to an end — not an end in themselves. A significant element of the project would be to use the scenarios in order to develop a response to the focal question and beyond this to set out key messages that could inform policy thinking and decision making (without presenting policy solutions). It was felt that consideration should also be given to how the scenarios might have a longer lasting relevance and use, beyond the project, for the Ministry and its stakeholders. This was envisaged as perhaps being through finding ways to make the scenarios themselves interactive in some way so that they could be used as a tool to help inform thinking and debate in specific policy areas.