2015 National Guidelines for Transport System Management in Australia

Problem Identification, Assessment and Prioritisation [F2]
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Step 2: Problem identification, assessment and prioritisation

At a glance

- Step 2 of the Framework provides guidance on identifying, assessing and prioritising the problems that are preventing (or are likely to prevent) the goals and objectives defined in step 1 from being achieved.

- The purpose of this step is to:
  - Identify current and emerging problems
  - Demonstrate that these problems are a constraint on the achievement of the stated goals and objectives, and that reducing the problem results in benefits
  - Provide data rich evidence of the problems, their scale and extent, their cause and effect, and their associated economic, social and environmental costs
  - Determine the priority of problems.

- This step should result in clear statements of problems, and documented evidence of their scale, extent, costs, causes and priority.
1. **Problem identification, assessment and prioritisation**

Step 1 of the Framework provides guidance on setting a clear set of goals and objectives.

Step 2 explains how to identify, assess and prioritise the problems that are preventing (or are likely to prevent) these goals and objectives from being achieved.

In step 3, any options generated should address these identified problems. In practice, the process of problem identification establishes the platform from which a broad range of interventions are investigated and assessed. This means that it is critical for this step of the Framework to look not only at current problems but also at future or emerging issues.

Step 2 can be broken down into 3 distinct stages: problem identification, problem assessment, problem prioritisation. These stages are depicted in the diagram below.

**Figure 1: Step 2 of the Framework**

**Stage 1: Problem identification**
- Identify current and emerging problems
- Identify problems for each planning level
- ‘Cast the net wide’ to identify the full range of economic, social and environmental factors

At the end of this stage, practitioners will have developed a clear statement of the problems that prevent the achievement of the stated goals and objectives.

**Stage 2: Problem assessment**
- Provide data-rich evidence of the scale and extent of the problem
- Identify the causes of the problem
- Assess the implications of current and emerging problems
- Demonstrate that problems are a constraint on achieving defined goals and objectives

At the end of this stage, practitioners will have evidence of the scale, costs, causes and effects of the problem.

**Stage 3: Problem prioritisation**
- Compare quantitative and qualitative information to identify the most urgent or biggest problem

At the end of this stage, practitioners will have identified the problems to which priority should be given (based on data and evidence).
Importantly, the use of the term ‘problem’ should not be interpreted to mean there is a focus on negatives. The term ‘problem’ is used throughout these guidelines for clarity, but should be interpreted to cover a range of issues, deficiencies and challenges. Problems can also be expressed as constraints on opportunities.

The completion of this step of the Framework should result in clear statements of problems and documented evidence of their scale and extent, causes and effects, the cost of the problem and priority.

Problem identification and assessment is grounded in the goals and objectives identified in step 1. Practitioners should refer back to the goals and objectives from the previous step to ensure that the problem analysis focuses on the problems that are preventing the goals and objectives from being achieved.

Problems identified in this step should continue to be tested and refined in subsequent steps of the Framework, recognising that:

- Problems and priorities may change overtime and/or in light of other developments. For example, the development of a transport initiative on another part of the network or the introduction of road tolls may reduce the extent and scale of a problem. Similarly, unexpected population changes over time or a new housing development may increase the scale of the problem and require problems to be reprioritised.
- Problem assessment may reveal additional problems not identified in the problem identification stage.
- Problem prioritisation may require further problem assessment to support evidence-based priority setting.
- Problem identification and assessment is an iterative process that will cycle through:
  - identifying the problem as it is currently understood
  - identifying and collecting all relevant data and evidence
  - analysing the available data and refining the problem statement (validating, rejecting or redefining the problem).

**Avoiding the pitfalls**

Common pitfalls in problem identification, assessment and prioritisation include:

- Only seeing part of the problem
- Lack of evidence to demonstrate the problem
- Failure to prioritise problems
- Failing to see that there are other related problems
- Dealing with effects rather than causes
- Lack of evidence to support problem prioritisation
- Viewing the problem through the lens of the chosen solution.
2. **Stage 1: Problem identification**

The aim of this stage of the Framework is to identify and describe the problems that are preventing the goals and objectives defined in the previous step from being achieved.

Problem identification provides the platform for investigating a broad range of interventions and generating options. Initiatives developed in subsequent steps of the Framework should address the problems identified here.

The process of problem identification involves the development of clear, straightforward problem statements that can be linked directly with the specific goals and objectives already identified in step 1. These statements should clarify how the problem might prevent the achievement of these goals and objectives.

Problem statements are tested and refined through more detailed analysis undertaken as part of problem assessment and prioritisation (see sections 2 and 3 below).

When identifying problems, the following should be taken into account:

- Problems prevent the goals and objectives identified in the previous step from being achieved. This should include the full range of objectives identified in the previous step – including objectives for different levels of planning and markets (see F1 section 3.1).
- Problem identification should consider not only ‘problems’ or ‘challenges’, but also constraints on opportunities that are preventing the goals and objectives from being achieved.
- Identification should be based on empirical observations, such as data and information obtained from surveys, demand modelling, interviews and studies from a wide range of sources.

Problem identification should result in problem statements that describe the nature of the problem facing the transport system and its components.

### 2.1 Scoping the problem

When scoping problems, the following should be taken into account:

- The scope of a problem should be defined by what is preventing the achievement of the objectives.
- Problem identification should not be confined to existing situations or issues. Emerging and potential future problems should also be considered.
- Problems can be different for the various planning levels. For example, achieving a goal of reducing road crashes may require a specific engineering ‘fix’ at the link level (such as safety barriers or road widening), a series of rest areas at the corridor level and safety education initiatives at the network level.
Problems should be seen as multidimensional. It is important to 'cast the net wide' when identifying problems. This means considering the full range of economic, social and environmental factors and canvassing a broad spectrum of potential problems, such as accessibility, business needs, availability, prices/cost, capacity, emissions and safety.
3. Stage 2: Problem assessment

This stage involves assessing the scale and extent of the problem, as well as its cause and effect. It aims to answer the question: to what extent does (or will) the problem impact upon the goals and objectives set out in Step 1, and what causes the problem?

Problem assessment should primarily be in the form of quantified estimates to demonstrate the scale and extent of key problems and issues. Qualitative descriptions will also play an important role, especially where problems are not quantifiable due to a lack of quality information and data.

Problem assessment focuses on examining and validating the problem statements identified in Stage 1 of the analysis.

3.1 Why is problem assessment important?

Developing a sound understanding of the extent, scale, cause and effect of problems provides a strong evidence-based foundation for developing options. Failure to do this may result in a mismatch of problems and solutions and/or solutions that don’t adequately or effectively alleviate the problem in the long term.

Understanding the nature of the problems facing the transport system will also enable practitioners to prioritise the worst problems first.

Without a sound understanding of the problem, practitioners will be limited in their ability to fully explore possible solutions and identify the most appropriate solution. Completing problem identification and assessment is critical before proceeding to the options generation and assessment step.

3.2 Key steps in problem assessment

It’s critical that practitioners develop a sound understanding of multifaceted transport problems. Figure 2 illustrates the dimensions of problems that need to be considered by practitioners in undertaking this step of work.
3.3 Cause and effect of the problem

Once the problem statements have been developed, identifying and validating the cause and effect of the problem is required. Effective action can only be taken once the underlying cause and effect of a problem has been diagnosed.

The critical element at this stage is to understand cause and effect: that is, to probe the causes or explanations behind the observed problem and to identify the fundamental causes rather than the symptoms of the problems. Assessing a problem in terms of its symptoms obscures the real cause and leads to solutions that fail to correct the basic issues and conditions.

Practitioners should be able to demonstrate an understanding of why the problem has arisen or will occur and directly link this understanding to the identification of potential solutions in the next step of the framework.

Possible causes for transport-related problems may include a market failure of some kind, a government failure in terms of planning, incorrect pricing, a lack of investment signals or poor governance arrangements.

It is important to identify the fundamental causes of the problem with as much precision as possible. For example:

- The root cause of road congestion should not be identified broadly as a ‘lack of capacity’. Further investigation is needed to determine what has caused the lack of capacity. It may be a demand/supply mismatch caused by incorrect pricing and excess demand or a lack of supply side investment due to the absence of price signals or targeted revenue streams.
• When shop owners in a suburban shopping centre complain about inadequate parking for their customers, the root causes may be broader than insufficient parking supply. The problem may also be defined as too many vehicles at certain times of the day, inefficient management of available spaces, land use planning that has permitted too many car-dependent businesses to locate together or a lack of adequate public transport or active transport offerings.

Accurate identification of the cause and effect of the problem is crucial to developing well-targeted solutions.

Consideration should also be given to the nature of the cause of the problem and whether, on balance, it is a positive or negative development. This will affect the way in which a problem is addressed. For example, economic growth—generally a positive development—may have caused an increased demand for freight movements along a transport corridor, placing road and rail links under unexpected pressure. In this instance, the solution is unlikely to involve limiting economic growth; rather, the emphasis will be on managing the transport system to respond to the growth.

Considering the cause and effect of problems will often lead to identifying interdependencies between problems. More guidance on interdependencies is considered in chapter F3.

### 3.4 Scale, extent and cost of the problem

Once the cause and effect has been identified, systematic mapping is required to understand the scale and extent of the problem, and its cost. Qualitative and quantitative data should be used to estimate the social, economic and environmental costs of current and future problems. In effect, this analysis aims to answer the question: how much does the problem matter?

Mapping the scale, extent and cost of the problem should be an objective, data-rich and transparent exercise. Many specific datasets are available to support this exercise. For example:

- Transport for NSW provides comprehensive statistics and datasets for a range of topics, including Journey to Work data, travel and population forecasts, and information about rail, bus and ferry modes.

- The ABS provides nationwide statistics and data on travel to work or study, number of registered vehicles, road traffic accidents and motor vehicle use.

- BITRE produces monthly and annual statistics related to road deaths, road trauma, heavy vehicle crashes and international road safety comparisons.

- Other state transport bodies such as the Victorian Department of Transport, Planning and Local Infrastructure, the Queensland Department of Transport and Main Roads and the Western Australian Office of Road Safety collect and publish road statistics in their respective jurisdictions.
3.5 Current and future problems

Current problems and their context should be described accurately. This should not be limited to problems but also examine constraints on opportunities. This requires the systematic mapping and quantification of problems. It should include an objective identification of deficiencies in the condition and operation of infrastructure networks and the services they support (see the System Planning chapter for discussion of network deficiency assessment). Generally, this will involve analysing and explaining data obtained through studies on development trends, demographic forecasts, land use requirements, infrastructure systems, feasibility studies and other aspects.

Problem identification should not be confined to existing situations or issues. Given the scale and long asset life of many transport investments, it is important to consider whether a problem today will become a larger problem in future. This means that the full range of factors (or ‘drivers’) that may shape the future should be considered. Failure to explore these drivers may lead to poorly considered transport decisions and investments that do not stand the test of time.

Depending on the interplay between these drivers, current problems may persist and become more difficult in the future, or they may diminish. Other problems may arise, even though they do not exist at present. For example, current or previous strategic land use plans may create mismatches between population and employment growth that will require future investment in transport infrastructure.

Best practice planning requires these future drivers – and the links and interplay between them – to be identified and analysed to understand their influence on the nominated goals and objectives over the longer term.

While the drivers that influence transport problems will be unique to each problem, some potential drivers to consider are:

- Socio-demographic change – total population, population mix (especially age profile), population distribution, values
- Economic change – size and mix of the economy, growth, globalisation, labour markets
- Land use planning – the allocation of growth across the city/region will influence transport demand
- Energy prices – particularly the potential mix and cost of energy sources for various sectors of the economy
- Climate change – the impact of change in climate patterns such as temperature, run-off projections, sea level rise and storm surge probabilities on the demand for infrastructure and the maintenance of existing infrastructure networks
- Technological change – whether change in technology will reduce or increase the demand for certain transport systems, create entirely new demands and/or change the way infrastructure systems are built, managed and operated
- Governance change – changes in the wider system of government that may shape the demand for services and/or the way in which government responds to those demands.
### 3.6 Analytical tools

A number of analytical tools are available to support practitioners in problem identification and assessment. Some of these are shown below.

<table>
<thead>
<tr>
<th>Scenario analysis</th>
<th>Deficiency analysis</th>
<th>Data and modelling</th>
<th>Gap analysis</th>
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| There are limited precedents for the use of this tool in Australia. Sources on scenario analysis include:  
  - US Federal Highway Administration, *Scenario Planning Guidebook*  
  - Oregon Sustainable Transportation Initiative (OSTI), *Scenario Planning Guidelines*  
  - Infrastructure Australia, *Better Infrastructure Decision-Making* | This analysis compares a network and its components with specified benchmarks such as average vehicle speed, level of service, track availability, transit times and crash rates. Examples of sources of data for deficiency analysis include:  
  - State/Territory transport agencies  
  - ABS  
  - BITRE  
  - OECD | Transport modelling may yield useful data (such as travel times, origins and destinations of trips, vehicle operating costs and choice of travel mode). Modelling tools include surveys, the conventional four step trip generation model, network models and integrated land use and transport modelling. Example transport models that may be used include:  
  - SIDRA  
  - TRANST  
  - AIMSUN | Gap analysis may be a helpful tool to establish the degree to which actual outcomes (measured by performance indicators) short fall of desired outcomes (measured by performance targets). This gap comparison can be undertaken for the present year, and for any future year. |

Infrastructure Australia notes in its Reform and Investment Framework (RIF) that policy and investment decisions should be made having regard to potential views of the future and that scenario analysis provides a strong platform for robust decision making and the realisation of goals and outcomes. Through the RIF, Infrastructure Australia looks to the proponents of initiatives to assess whether the problems identified are likely to be enduring and significant under a range of scenarios. Infrastructure Australia expects proponents to present some scenario analysis at the problem identification/assessment stage of the RIF.
Scenario analysis

Although there are limited precedents for the use of this tool in Australia, scenario analysis is an important tool that can help to identify transport problems and assess their implications.

**What is scenario analysis?** – Scenario analysis is a structured way to think about the future. It has been described as ‘stories that can help us to recognise and adapt to changing aspects of our environment’. It provides an assessment of the links and interactions between various drivers of change and the future impacts on transport infrastructure and networks.

**How is it achieved?** – Usually, the drivers of change are applied to establish three or four alternate views (scenarios) of the future. Using data-rich information about forecasts, these drivers are clustered and ranked to identify those that are most important for the goals and objectives defined during Step 1. A range of ‘shocks’ (scenario attributes) is set against these drivers to test the scenarios through quantitative and qualitative approaches that look for ‘tipping points’, which can then be compared with the defined goals and objectives.

**What scenarios should be explored?** – Scenarios should be plausible and varied. Importantly, they should not be restricted to minor variations to a central ‘business as usual’ scenario: futures where the drivers of change operate in a materially different way to that used for the ‘most likely’ or ‘business as usual’ scenario should also be explored.

**What timeframes should be used?** – Strategic planning should take a long-term view. In developing scenarios, the time horizon for analysis should reflect the nature of the problems and challenges likely to prevent the achievement of the defined goals and objectives. For example, some challenges, such as those associated with climate change and the availability and cost of various energy sources, have long-term implications that extend beyond 25 years. Transport networks also tend to have long lives. For these reasons, scenario analysis frequently involves an assessment of the future beyond the next 20, 30 or 40 years. However, it should be noted that medium-term horizons (of five to 10 years) are generally considered more plausible and certain than longer term horizons.

**What are the limitations of scenario analysis?** – The most significant practical limitation in undertaking scenario analysis is likely to be the resource implications of testing numerous quantitative scenarios. Where resources are constrained, practitioners may need to very carefully consider the number, nature and scope of scenarios to be tested. There may also be difficulties in establishing a planning baseline against which alternative scenarios can be tested: in some instances, this may render scenarios analysis a largely pointless exercise and make other forms of data collection more useful.
4. Stage 3: Problem prioritisation

This stage allocates priority to the identified problems. This determines which problems should be tackled first.

Transport planning involves making decisions about the allocation of resources. Limited funding and competing transport system needs and trade-offs mean that governments and society generally cannot afford to address all the problems identified. This means that setting priorities is an important element in identifying and assessing problems.

Problems should be prioritised with reference to the goals and objectives identified in step 1. For example:

- The problem that presents the greatest obstacle to achieving the goals and objectives may be given priority.
- As objectives can also be prioritised, the problem presenting the most important objective from being achieved may be given priority.

The urgency of resolving the problem should always be linked back to the goals and objectives identified in step 1.

A sound evidence base is important in determining why a particular problem should be prioritised ahead of others. A comparison of quantitative and qualitative information gathered during the problem assessment stage will help to identify the most urgent or most significant problem. However, it is important to appreciate that this may not be an entirely objective process as input from stakeholders will be largely subjective.

Several factors may be considered in prioritising problems, including:

- Current or forecast levels of demand
- The scale or extent of the problem, and hence the potential benefits of addressing the problem
- Government priorities and policies.
5. Engaging stakeholders

Transport planning is conducted in a complex environment in which the views of government and community stakeholders need to be understood. Engaging stakeholders and listening to their concerns is a key component of best practice transport planning.

Engaging stakeholders and the community in problem identification, assessment and prioritisation leads to a more comprehensive process. It may identify new problems or cast new light on known problems. It can improve access to data and information and help to fill gaps in knowledge regarding community concerns and expectations.

A planning process that does not engage more broadly with stakeholders runs the risk of identifying only the best known or most acute problems. It is also more likely to address problems in isolation rather than within a broader strategic context.

The purpose of engagement during this step of the Framework is to ensure that all potential problems are identified and understood, across all planning levels. For example, a government department or agency may have a broad perspective on the problems that are impeding transport, such as regulatory barriers or funding constraints. Local residents may be much more focused in their assessment, nominating very specific problems on a particular stretch of road or intersection as compromising safety.

Where appropriate and practical, community engagement around problem identification and prioritisation can also help to develop trust in the early stages of a transport plan or initiative and create networks and structures to identify, prevent and solve problems on an ongoing basis.
Tools for engagement

Many tools can be used to identify and engage stakeholders, and ensure their views and experiences are considered in identifying and assessing problems. These include:

- **Stakeholder mapping** – to identify all key stakeholders with an interest in a particular problem and the data or information they may hold
- **Strategic workshops with government stakeholders** – to identify problems in a broader strategic context and understand government preferences and priorities
- **Scenario analysis with stakeholders** – to identify future drivers for change and develop best and worst case scenarios that consider the interests of community, private and public sector stakeholders
- **Real time feedback from transport system users** – to identify current problems and constraints that reflect the experiences and concerns of users
- **Surveys, community forums, online engagement and social media** – to better understand how the broader community views particular problems and issues.

The extent to which any engagement tool is used will depend on many factors, including the requirements of government, the nature of the particular problems being assessed and the time allocated to this step of the Framework.

Checklist for practitioners

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<tbody>
<tr>
<td>What is the current or future problem?</td>
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<td>How is the problem preventing achievement of the goals/transport system objectives?</td>
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<tr>
<td>Can the effects of the problem be measured?</td>
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<td>What are the drivers that influence the problem?</td>
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<td>How will the drivers of the problem change over time?</td>
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<td>Will the problem increase gradually or will there be a step change increase?</td>
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<td>What are the symptoms of the problem?</td>
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<tr>
<td>What are the causes of the problem?</td>
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<tr>
<td>Are there dependencies between this problem and others? Are there any other initiatives (including land use planning) under development that influence the problem?</td>
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</table>
References and resources


