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F0.1 Policy Choices and System Planning

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The contributions of the following people are acknowedged:

ATAP project team: Peter Tisato, Mark Harvey

Reviewers of drafts

Members of the ATAP Steering Committee during the update of this report: Mark Harvey, Andreas Bleich, Belinda Sachse and Paula Stagg (Australian Government), Atiqur Rahman, Paul Stanley and David Tucker (Infrastructure Australia), Alban Pinz (QLD), Robert Smith and Matthew Jones (NSW), Justinieta Balberona (ACT), Ed McGeehan (VIC), Arun Kendall (TAS), Scott Cooper and Aaron Bell (SA), Des Lock (WA), Brett Clifford (NT), Sandy Fong (NZ), Richard Delplace (Austroads), Peter Tisato (Technical Coordinator).

Contact us

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ATAP Steering Committee Secretariat

Australian Transport Assessment and Planning Guidelines

Department of Infrastructure, Transport, Regional Development and Communications

GPO Box 594

Canberra ACT 2601

Australia

Email: atap@infrastructure.gov.au

Website: atap.gov.au

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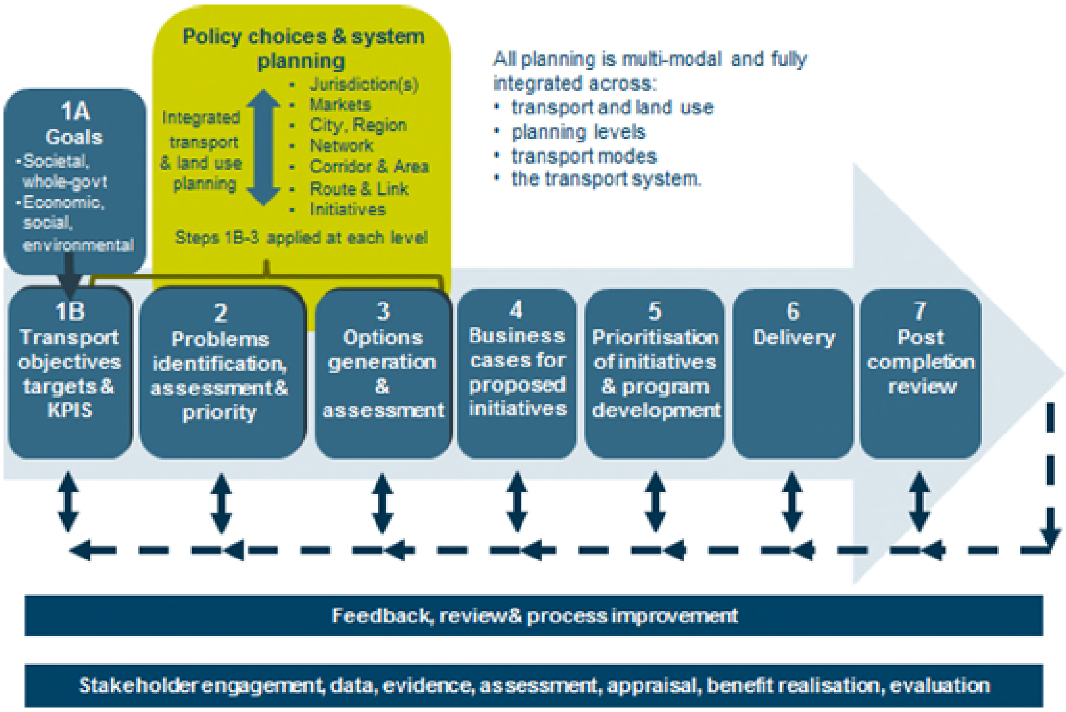


At a glance

- Policy Choices and System Planning is a critical up-front phase of the ATAP Guidelines Framework. Along with the setting of goals and transport system objectives (Step 1, see F1), this phase provides the direction-setting guidance for all major transport system decisions.
- The Policy Choices and System Planning phase involves repeated application of the 'objective-problem-option' focus (Steps 1B to 3). System planning involves developing integrated strategies and plans for a hierarchy of planning levels: jurisdiction(s) (including national), markets, city and region, network, corridor and area, route and link. The resulting suite of integrated strategies, policies and plans provide a big-picture, top-down view of the direction of transport development. From these flow 'identified ideas' for transport initiatives, to be further investigated in subsequent steps.
- Strategic transport policy choices made by governments can be either an output of, or an input to, systems planning, or both. Which of these apply can vary with the different institutional settings between jurisdictions.
- Planning needs to be multi-modal, and consistent and integrated within and across the planning levels. Integration of transport and land use is a critical requirement at all levels of planning.
- The network strategy is shaped within the context of multi-modal options, capital investment and non-capital solutions and funding settings. Over time, it facilitates consistency of approach across the corridors or areas and transport modes that comprise the network.
- System planning is undertaken through a combination of studies and stakeholder engagement. Data collection and analysis provide essential input into strategy development. Network, corridor and area assessments generate key information on factors such as land use and economic activity. These factors in turn drive transport demand, traffic composition, demand forecasts and the condition of the existing system.
- Consultation with stakeholders and between different levels of government is fundamental in policy choices and system planning. It also provides 'bottom-up' information to inform 'top-down' thinking.

1. Introduction

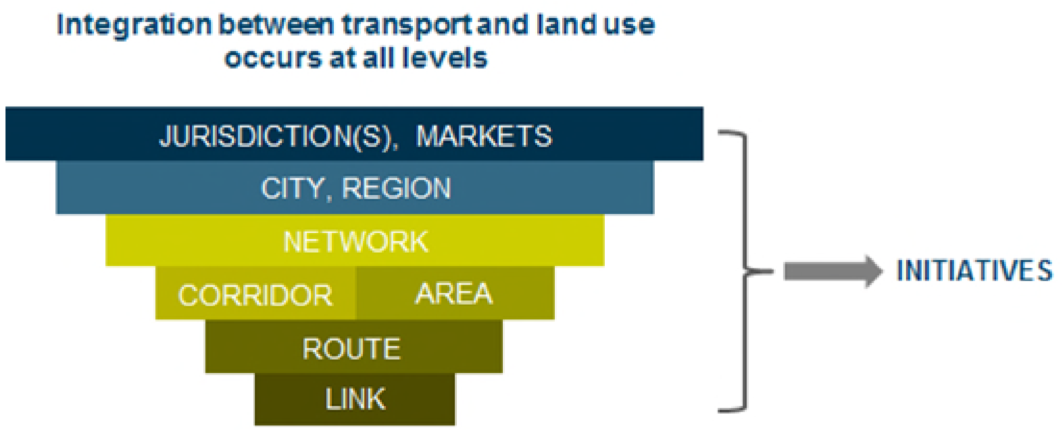
The ATAP Framework is an infrastructure planning and decision-making framework, applied to transport. It provides a systematic process for achieving transport system objectives[1] and targets identified in Step 1. As used in this context, the scope of the term 'planning' is very broad; it may be applied differently by individual jurisdictions.

This section discusses the role of 'Policy Choices and System Planning'[2] as a phase of the Framework. This phase is a primary strategic activity at the front end of the Framework. Along with Step 1 (Goals, Objectives and Targets), it provides the direction-setting guidance for all major transport system decisions. Like other parts of the Framework, it should be based on sound evidence-based assessment and stakeholder engagement wherever possible.

This phase of the Framework involves repeated application of the 'objective-problem-option' focus (Steps 1B to 3) across a hierarchy of integrated planning levels.

The hierarchy (shown below) was introduced in the Overview (Part A1). It consists of the following planning levels: jurisdiction(s) (including national), markets, city and region; network; corridor and area; route and link.[3]

Figure 1 Hierarchy of Integrated System Planning Levels



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[1] As noted in Part F1, land use objectives are as important as transport system objectives. For convenience, the Guidelines refer mainly to transport system objectives; however, in each case the importance of both land use and transport objectives is implicitly inferred at the same time.

[2] Policy choices and system planning are grouped together here. In the 2006 Guidelines, they were presented as separate phases. Some jurisdictions may prefer to continue with that interpretation.

[3] Refer to the Glossary for definitions

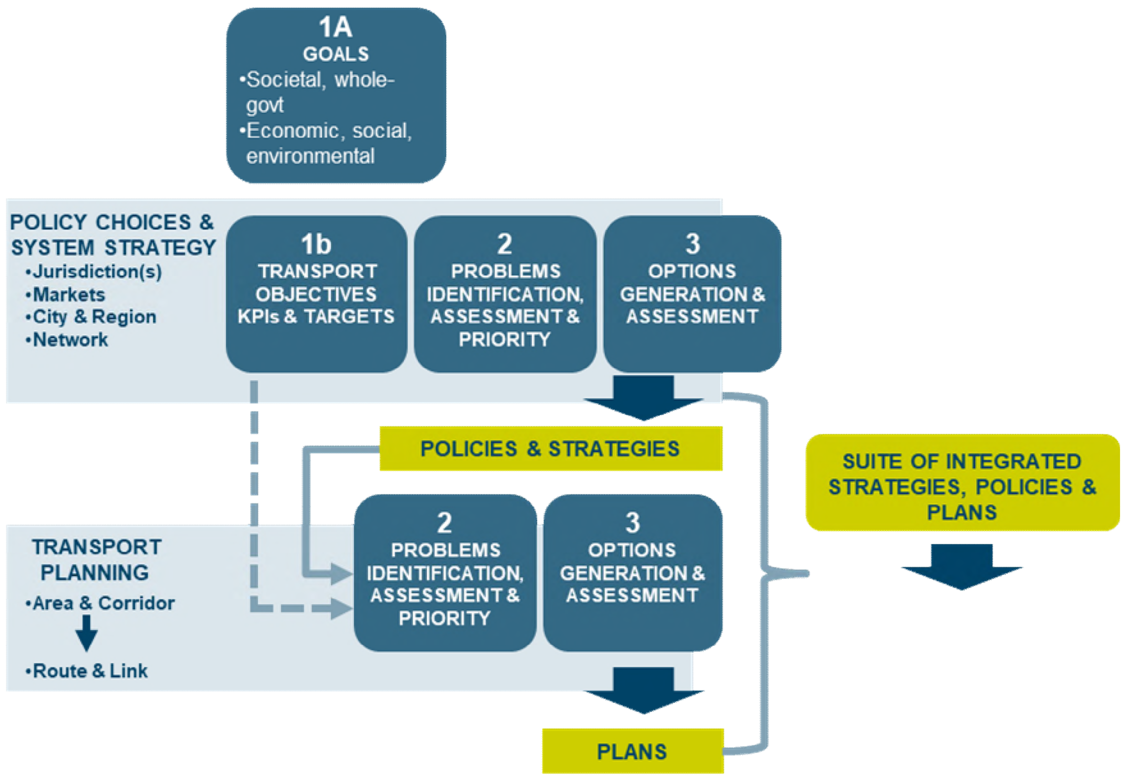
Planning needs to be:

- Consistent and integrated within and across these planning levels
- Integrated between transport and land use at all planning levels. This allows the critical inter-relationship between transport and land use to be recognised in both a strategic direction-setting manner from the outset, as well as in more detailed planning.

Figure 2 below is an extract from Figure 3 in the Overview. It shows:

- The repeated cycle of the 'objectives-problems-options' focus
- Strategies, policies and plans as outputs of the system planning process
- Processes to develop integrated and multi-modal planning outputs for the various planning levels: jurisdiction(s), markets, city-region, area, corridor, route and link
- A resulting suite of integrated strategies, policies and plans that provide a big-picture, top-down view of the direction of transport development. From these flow 'identified ideas' for transport initiatives, to be further investigated in subsequent framework steps.

Figure 2 Strategies, policies, plans, programs and initiative ideas as outputs in system planning



As mentioned in the Overview, it is acknowledged that there is no unique sequence of activities for applying the activities shown in Figure 2 in all circumstances or settings. The activities must be applied in the complex environment of government decision-making. This means the process may not be strictly sequential as shown. Examples are:

- Whether policy choices are inputs to, or outputs from, planning (discussed in Chapter 2 below)
- Whether network planning precedes corridor and area planning. It could precede as shown in Figure 2. An equally acceptable approach is to start with corridor and area planning, base network planning on the collective results and then iterate between the two.

Whatever the sequencing of activities, the planning outputs must be consistent and integrated.

The process:

- Is dynamic and iterative. Feedback between planning levels means that results at each planning level can be adjusted over time to reflect developments at other levels. An iterative process is also required between corridor and area planning and route and link planning.
- Should make good use of quantitative assessments (see Chapter 7 below).
- Should have a consistent focus on objectives, problems and options (see F1, F2 and F3).
- Should include appropriate stakeholder engagement.

2. Policy choices or settings

Governments make high level strategic policy choices (both transport and non-transport) as direction-setting decisions. They are made at senior levels of government, involving the minister(s) with responsibility for transport, but typically include other ministers and cabinet.

Chapter 1 flagged the question of whether policy choices are inputs or outputs. It is proposed here that they can be both.

Non-transport policy choices made by governments are clearly inputs to the transport infrastructure planning process: for example, government policy choices related to the economy. However, transport considerations can be important inputs to non-transport policy and planning processes.

Once a focus on the planning for transport is adopted, several situations can arise. Figure 2 above shows transport policy choices as an ‘output’ of the highest level of planning for transport. In that process, the ‘objectives-problems-options’ focus means that policy choices, like other outcomes in the ATAP Framework, will be aimed at pursuing the goals and objectives identified in Step 1, and will be based on sound evidence-based assessment.

Such a structured approach, with policies as outputs, may not always be feasible. In many cases, policies are already set by government (policy settings) and are therefore ‘inputs’ to the system planning process.

In practice, both of these situations can apply. For example, policy choices may be fixed when a government is first elected. However, as time passes, the government may revise its policy choices based on stakeholder engagement and strategic advice resulting from the planning process.

Like goals and objectives, policy settings often change when there is a change of government.

Policy choices often address systematic issues that occur repeatedly across the system, such as road congestion. Key high level strategic transport policy choices or settings can include:

- The relative roles of land use initiatives and transport initiatives
- The relative roles of different modes (e.g. preference for greater use of public transport in urban areas, or an increased share of freight to be moved on rail where feasible)
- The relative roles of transport capital investment solutions and alternative less costly non-investment solutions (see F3, O6 and O7)
- The relative role of making best use of existing infrastructure (e.g. traffic management) and building new infrastructure
- The priority of initiatives in particular locations (e.g. regional and remote locations)
- The relative emphasis on maintenance and rehabilitation compared to new capital works
- Adopting whole-of-life asset management principles
- Total funding for transport and aspects of its allocation (e.g. pools of funds by purpose, category or program; priority funding for particular locations or outcomes; funding for specific issues or types of initiatives)

- The roles of the public and private sectors (e.g. in the finance, design, construction, ownership and operation of motorways)
- Positions on partnering arrangements (e.g. processes, alliances, public private partnerships) between different levels of government and between government and the private sector.

Policy choices can influence the assessment of individual transport proposals. The ATAP guidelines has a three stage assessment process (see ATAP F3):

1. Consideration of strategic alignment with jurisdictional goals, transport system objectives, targets, policies, strategies and plans
2. Rapid appraisal
3. Detailed appraisal

Consideration of the influence of policy choices, or policy objectives, occurs in the first stage, when strategic alignment is considered.

Agencies and transport organisations also make lower level ‘operational policy’ decisions (e.g. the rostering of bus drivers). Those decisions should be consistent with, and in the context of, the strategic policies. Operational policy is not considered further here.

3. Integrated transport and land use planning

As discussed above, integration of transport and land use is a central feature of good planning, and should occur at all planning levels (see Figure 1).

To help achieve this, the guidelines have:

- Included integrated transport and land use planning as a central element of System Planning in the ATAP Framework
- Developed guidance for integrated transport and land use planning. The guidance can be found in Part F0.2 of the guidelines.

In dealing with the transport and land use planning integration challenge, a touchstone is continued application of the '*goals – problems – options/solutions'* logic which underpins the ATAP (ATAP steps 1 to 3 and is repeated at each planning level):

- The formulation of spatial plans is led by the definition of jurisdiction goals plus integrated and consistent urban development and transport system objectives.
- The identified goals and transport system objectives form a basis for identifying problems to be addressed through integrated transport and land use planning and management.
- The 'problem-solutions' logic of steps 2 and 3 of the ATAP framework come into play in a numbers of ways:
  - When considering how town planning strategies – such as astute location of employment concentrations and higher density housing – it improves transport performance while also delivering more liveable towns and cities.
  - In the formulation of spatial plans, particularly at the city and corridor levels, it is applied in the assessment and appraisal of prospective city shaping investments alongside other potential strategies to deliver the desired urban development outcomes in question. When applied rigorously, this integrated assessment process may see the endorsement of strategic road, public transport and other transport initiatives as 'business case worthy'.
  - Improved transport performance is sought by considering all possible solutions to identified problems of congestion, connectivity or safety. These can include pricing, governance and behaviour change strategies as well as investment in new transport assets.

4. Multi-modal network planning

A network incorporates all routes that provide inter-connected pathways between multiple locations for similar traffics. Networks can be multi-modal or uni-modal—a multi-modal network typically comprises several uni-modal networks (see examples in Box 4 Transport System Elements in the Overview and in the Glossary).

Network planning in many jurisdictions has traditionally focused on planning for individual modes. The philosophy underlying the ATAP Guidelines is that this modal planning should be replaced, or preceded, by integrated multi-modal network planning. If modal network strategies are developed, they should be inferred from, and guided by, multi-modal network strategies (and preferably by multi- modal corridor and area strategies).

Network planning involves developing a longer term vision of how the transport network should be performing in the future (e.g. anything from 20 to 50 years ahead). The vision must be consistent with the transport system objectives and performance targets and any other government policy choices. The vision should be embodied in a multi-modal network strategy document.

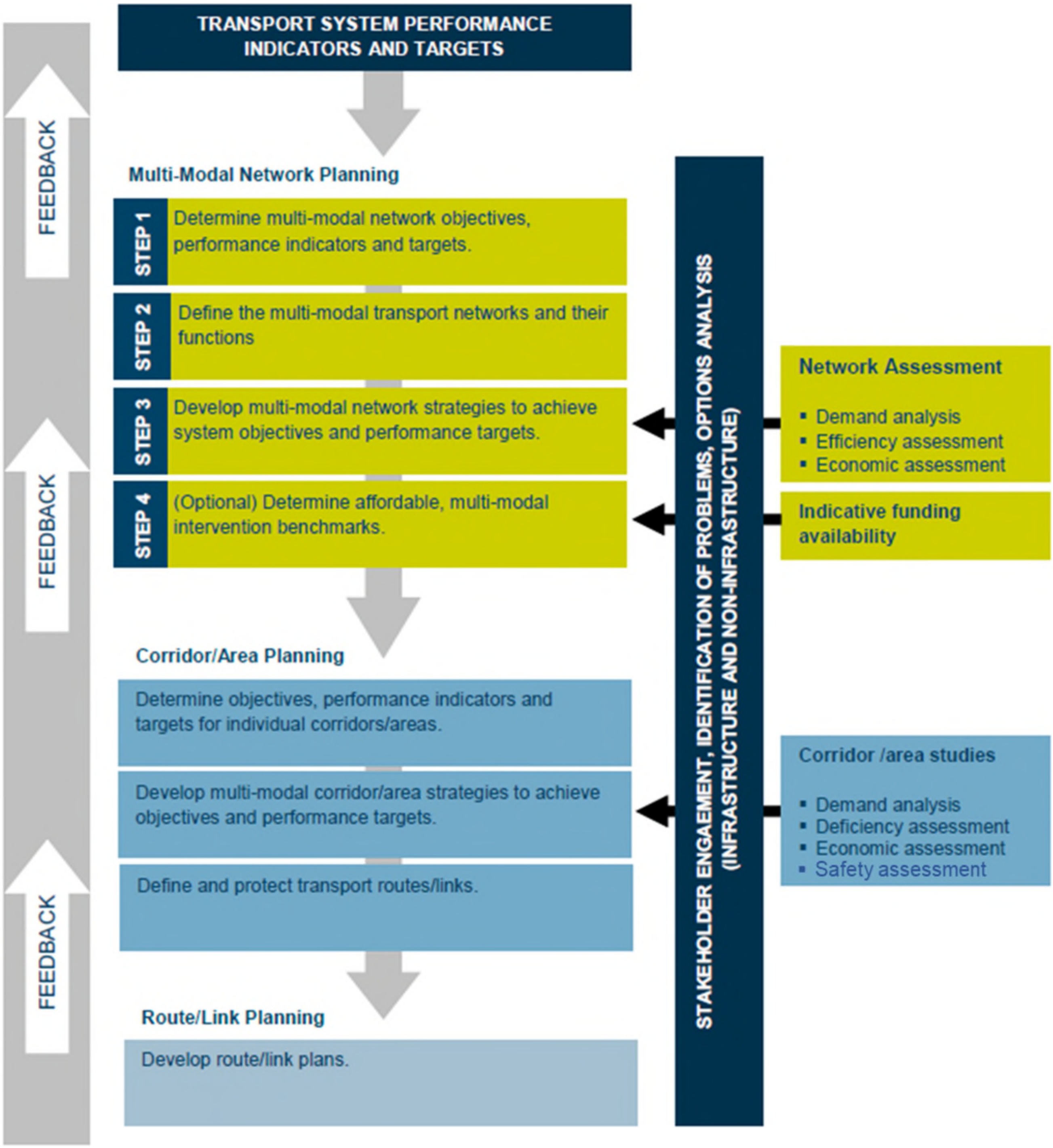
The multi-modal network strategy can include consideration of funding mechanisms including likely current and future government funding levels. Explicit consideration of funding can help to manage stakeholder expectations and ensure consistency in the treatment of corridors and areas in subsequent planning and program development.

There is also a role in network planning for the identification of current system issues for shorter term resolution, consistent with the longer terms strategy.

4.1 Steps in multi-modal network planning

Figure 3 illustrates the process of multi-modal network planning, as well as the links to network assessments, funding availability, corridor and area planning, and route and link planning. Note that in applying Figure 3, the sequencing of individual steps will not be strictly linear. Some jurisdictions may also find it more useful to alter the sequence of steps. The feedback loops, and therefore the iterative nature of the process, further confirms that progression through the process won’t be simply linear. The same point applies in both corridor and area planning, and route and link planning.

Figure 3 Flowchart of system planning



There are four steps in multi-modal network planning:

1. Determine multi-modal network objectives, performance indicators and targets
2. Define the multi-modal transport networks and their functions
3. Develop multi-modal network strategies to achieve system objectives and performance targets. These should take into account the analysis contained in network assessments and any government policy settings
4. Determine affordable, multi-modal intervention benchmarks (or standards) for infrastructure investment, ensuring that the benchmarks are consistent with system objectives and strategies. This is an optional step.

4.1.1 Step 1: Determine multi-modal network objectives, performance indicators and targets

Network objectives provide a top-down view of how the multi-modal network should perform in the longer term future (e.g. from 20 to 50 years ahead) in order to achieve transport system objectives. They incorporate expectations about how the network should perform in order to meet the demands placed on it.

Network performance indicators and targets should be based on the same principles used to develop transport system indicators and targets (see F1). Where targets are set, they should be consistent with policy choices made, be cognisant of available funding mechanisms and achievable from a total network perspective.

Examples of long-term multi-modal network performance targets include:

- Annual level of fatal and serious injuries in rural transport to decline by 30 per cent by 2030
- Rural travel times not to increase until 2025
- No more than 10 per cent variability in travel times on major interstate freight routes
- Multi-modal interchange transfer times to be reduced by 10% within 3 years
- Noise levels for residents along major urban transport routes not to increase by more than 2dB(A) before 2030
- Emissions from transport vehicles not to increase beyond a future target year.

Although the vision for the network covers a 15 to 20 year horizon, in the interim it may also be necessary to specify performance targets and deliverables for shorter periods (typically 5 years) to support funding and forward programs. For example, interim targets may be used for equity reasons, to bring the entire network to a specified minimum level of performance at an earlier date. Achieving this minimum level consistently across the network may also provide better network performance than having isolated network sections with varying levels of performance.

Multi-modal network performance targets also guide the development of multi-modal network, corridor and area strategies, and route and link plans, on a consistent basis. This top-down perspective increases the likelihood that the performance of corridors, areas, routes and links will support the achievement of multi-modal network objectives and targets.

However, not all corridors and areas will have the same multi-modal objectives and performance targets. Variations are needed to reflect local circumstances revealed in detailed corridor and area analyses. For example, the targets for a corridor or area with a poor safety record may require a certain percentage reduction in annual fatal and serious injuries by a given future year, whereas a smaller percentage reduction may be specified for a better-performing corridor or area.

4.1.2Step 2: Define the multi-modal networks and their functions

Identifying the multi-modal networks to which funding will be directed is the next step of network planning. Networks should be specified on the basis of achieving the best overall match with transport system objectives; they should be determined from a big-picture perspective to maximise delivery of overall transport system objectives.

The National Land Transport Network is an example of multi-modal network. It is a single integrated network of land transport links of strategic national importance. It is based on specified corridors and connections that together are of critical importance to national and regional economic growth, development and connectivity. It incorporates:

- National and inter-regional transport corridors, including connections through urban areas
- Connections to ports and airports
- Other rail and road inter-modal connections.

Different networks perform different functions. For example, the National Land Transport Network primarily focuses on long distance passenger and freight movements of national significance. An intrastate land transport network (i.e. the rural arterial road and regional rail networks) facilitates long distance movements of freight and passengers within a state or territory. In contrast, a transport network in a major city (urban arterial road, public transport, cycle path networks, etc) focuses on moving people to and from work and recreational activities, facilitating business activity and moving urban freight.

The relative importance of individual modes in a multi-modal network will vary across the network in response to differences in the primary function of each part of the network.

4.1.3Step 3: Develop multi-modal network strategies

The third step in multi-modal network planning is developing multi-modal network strategies. These strategies incorporate a top-down view of how the transport network should desirably develop into the future. The strategies indicate the actions needed to contribute to achieving network objectives and performance targets.

Multi-modal network strategies should contain a description of the strategy in generic terms to enable the broad features to be clear. They may also include location-specific aspects, which are also specified in corridor and area strategies and in route and link plans. However, network strategies may make a distinction between urban and non-urban initiatives to reflect different transport contexts. For example, strategies to address congestion and transport noise are more relevant in an urban context than in a non-urban context.

Network planning can either precede corridor and area planning or be developed from the collective results of corridor and area planning and quantitative network assessments. Feedback between these two levels of planning is critical, enabling multi-modal network strategies to be reviewed and adjusted over time.

Network strategies typically incorporate a mixture of capital investment and non-capital initiatives (see Parts F3 and O6). These strategies will need to reflect policy choices made by governments and may include a mixture of strategies that apply to all modes and strategies that are mode-specific. It is important that any associated development of modal plans reflects the multi-modal network strategies.

4.1.4 Step 4: Determine affordable, multi-modal intervention benchmarks (optional)

This is an optional step[4] in which intervention benchmarks identify specific circumstances that act as ‘warrants’ or ‘triggers’ for investment designed to achieve a particular performance standard. The circumstances usually relate to road or rail track conditions and traffic volumes. Box 1 provides examples of these benchmarks.

Benchmarks determined at the network level may subsequently need to be modified in corridor and area plans to reflect local circumstances. However, network and corridor or area intervention levels should be consistent. It may be desirable to develop interim benchmarks that align with interim objectives for the network.

Austroads has developed a comprehensive set of guides and procedures that is generally accepted as providing national benchmarks for best practice in network operations, network operations planning, design, construction, maintenance and user aspects of the Australian road system (www.austroads.com.au). These guides and procedures provide suitable guidance for intervention strategies. For rail, the Australasian Railway Association produces the National Code of Practice.

As intervention benchmarks apply across the entire network, they must be cognisant of likely funding mechanisms and levels from a network perspective; that is, they should be within current and expected future funding. Setting affordable benchmarks covering 15 to 20 years for a network plan can be difficult given future funding uncertainties. It may be necessary to develop different funding scenarios with different sets of benchmarks. The steps to achieve affordable benchmarks include:

[4] Use of this step will depend on each jurisdiction’s view on the usefulness of using benchmarks or standards in planning.

- Understanding the configuration of the existing network
- Understanding how alternative configurations and conditions of a future network could achieve desired performance targets
- Estimating the costs to achieve the alternative configurations and network conditions
- Forecasting future funding levels
- Determining the configuration that optimises outcomes in terms of the performance indicators, within funding constraints.

Box 1 Examples of intervention benchmarks

- Road widening on rural two-lane roads to 10 metres to be considered when high volume of traffic is reached (e.g. >1 000 annual average daily traffic (AADT)) or where there is a significant volume of heavy traffic (e.g. 20 per cent for 500 AADT and 5 per cent for 2 000 AADT)
- Road duplication for rural roads to be considered when traffic volumes exceed 10 000 AADT or where there is a significant component of heavy vehicles interacting with tourism traffic
- More, and longer, passing loops and eventually track duplication when train delays or unreliability exceed the standard accepted by the market
- Resealing of roads to depend on a number of factors but, as a general guide, a frequency of between seven and 10 years being likely for surface seals (depending on the climatic zone) and around 14 years for thin asphalt seals
- Pavement rehabilitation to be an option where pavement has deteriorated to a point where it no longer meets serviceability requirements such as roughness and rutting or where it is structurally inadequate for current or expected loadings, with consideration of whether a pavement is still functioning well after reaching its design life to determine the intervention time
- Implementing initiatives to reduce transit times for rail and road when they exceed certain levels
- Implementing initiatives to reduce fatalities and serious injuries consistent with meeting national targets
- Rail track upgrading when the deterioration and safety risks become uneconomic or exceed acceptable levels
- Bridge rehabilitation or replacement to be determined by structural integrity and performance of the bridge, with the time of intervention related to safety risk analyses and the score the structure receives, with the safety of the public to be paramount at all times when prioritising bridge maintenance
- Bridge strengthening works to support policy directions in relation to desired function of the corridor, e.g. to accommodate heavy freight vehicles in identified key freight routes.

5. Corridor and area planning

Corridor and area planning aim to identify options and priorities for initiatives consistent with the network strategy and policy choices. The output is a corridor or area strategy that, among other things, can provide guidance for the corridor or area on issues such as the relative priority of investment versus maintenance, the balance between investment/infrastructure and reform/non-infrastructure solutions and the type and mix of initiatives.

A corridor or area strategy is a cooperative long-term plan identifying the transport problems within a corridor or area and the potential initiatives and priorities to address those problems. Figure 3 indicates that corridor and area planning involves three main activities:

- Setting corridor or area objectives and performance indicators and targets
- Developing multi-modal corridor or area strategies
- Defining and protecting the routes and links in the corridor or area.

The objectives and targets for the corridor or area strategy should be consistent with the transport system objectives and targets.

A 15 to 20 year corridor or area strategy should stipulate a multi-modal approach to achieve objectives and performance targets. As with the network strategy, the corridor or area strategy may contain interim performance objectives and targets for equity or operational reasons.

A corridor or area strategy should be tailored to the circumstances of the corridor or area, taking into account the results of studies and stakeholder engagement. The strategy will also be affected by transport demand and capacity within the corridor or area, and should accommodate the network strategy and policy choices made by government. Other corridor and area considerations such as land use patterns, environmental issues and freight logistics should be taken into account.

It is important to check for consistency in strategies across various corridors and areas. It is essential to have a high level of consistency across strategic plans of related corridors and areas. Within that, some variation may sometimes be required to reflect the influence of local and regional circumstances.

Take, as an example, the Melbourne–Sydney and Sydney–Brisbane corridors. If there were a strong pro-rail strategy for one corridor but a strong pro-road strategy for the other corridor, the difference in strategies could have significant implications for inter-modal transfers in Sydney.

The last step in corridor and area planning is to define and protect routes and links to facilitate potential future development. Most routes will already be established and contain transport infrastructure. However, routes that could potentially be developed in future may be incomplete (i.e. missing certain sections) or only at the concept stage. In corridor and area planning, these missing routes or links are usually identified as areas or lines on a map. This approach recognises that detailed route or link planning and necessary land acquisitions are yet to occur.

As a final task, the network strategy should be re-visited to see if it needs to be refined to reflect the outcomes of corridor and area planning. This is one of several iterations that should occur to ensure consistency and integration.

At the local area level, the concept of ‘place’ also becomes important. Planning with place ensures that liveability at the local level is taken into account. Readers are directed to sections 2.3 to 2.5 of ATAP Part O3 (Liveability and urban amenity), where the ‘link-place’ concept is discussed and the important role of urban design is stressed. Readers are also directed to the Austroads (2020) Guide to Traffic Management for complementary guidance.

6. Route and link planning

6.1 Guiding principles

Route and link planning should be undertaken in the context of corridor and area strategies. Where a new or modified route is required, route planning will involve the consideration of demand, alignment options and detailed planning for the preferred alignment. This will lead to the purchase of land for future development of the new or modified route.

A link plan should contain a statement of intent broadly indicating expectations about the future function of the link and likely future initiatives (e.g. duplicate link by 2020). There will be link-specific performance indicators and targets, supported by strategies and intervention priorities that reflect local needs but are within the context of the corridor or area strategy and route plan.

A link plan is not usually as complex as a route plan or corridor or area strategy, unless there are major contentious issues (e.g. a road widening program that requires property acquisitions or threatens a fauna species). In some cases, the size or complexity of a corridor or area may require the development of discrete route or link plans to effectively plan and manage infrastructure within the corridor or area.

As a link plan will typically cover 15 to 20 years, it may contain interim performance targets aimed at bringing the link to a minimum appropriate performance level within the planning horizon. Priority links are usually nominated for initial attention due to funding limitations.

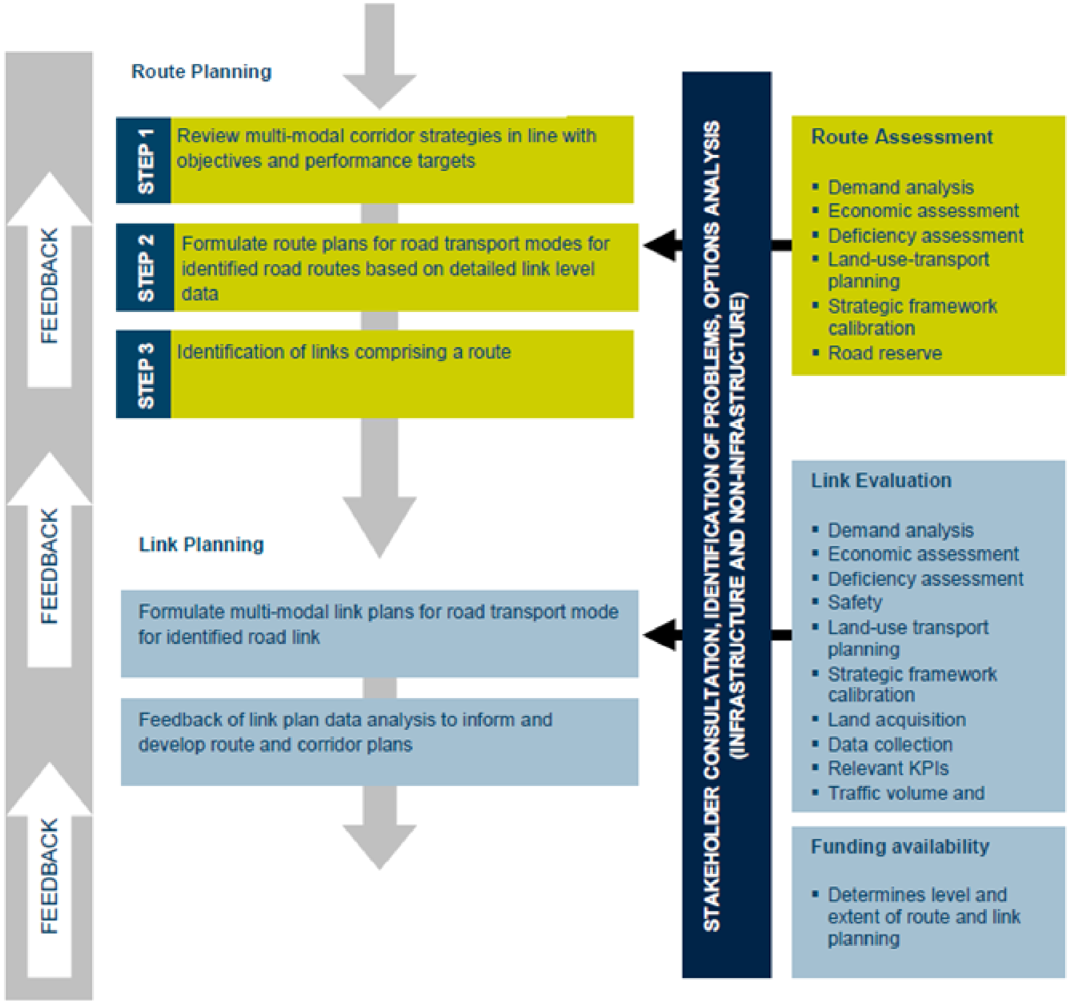
Because transport initiatives are closely related to links, it is often desirable for link plans to provide a basis for planning and designing initiatives.

6.2 Road specific planning

This section discusses road route and link planning (using material drawn from Austroads (2009)). It examines the interface between the top-down nature of strategic planning and the bottom-up influence mostly determining planning at the route and link level. Australian practice was identified via a survey of jurisdictions and their associated departments/agencies, and ‘mapped’ against a set of best practice principles derived from an extensive review of international and Australasian literature.

Figure 4 shows the proposed road route and link planning process, complementing Figure 3. It includes elements of best practice principles, as well as the importance of feedback mechanisms that enable the road planning process to not only be top-down (route→link), but also bottom-up (feedback loop, so that, link planning informs not only route but also corridor plans and objectives).

Figure 4 Flowchart of road route and link planning



Source: Adapted from Austroads (2009)

Planning at road route and link level is a key 'barometer' of how well top-down plans and objectives have been identified and developed. It is at the forefront and strongly influenced by three very important best practice principles:

- Increasing need for land-use and transport planning integration
- Balanced and integrated multimodal development, and
- Greater demand-based planning.

These three elements have always been important but, over recent times, have been gaining urgency by the growing environmental and social impacts of road networks and motor vehicle use. The jurisdiction survey results acknowledged serious efforts made to recognise the importance of these key principles in road planning, but authorities are also aware of a number of serious legal and institutional constraints which impede implementation.

All agencies interviewed noted that road route and link level planning is undertaken; however, the degrees of this can differ according to the particular agency interviewed. Planning functions are allocated across a range of different organisations and sometimes parts of the same organisation.

However, most jurisdictions have noted that road transport planning at the route and link level should be integrated with land use and higher levels of transport planning, and other aspects of the transport system.

Austroads also found that their survey results and international experience suggested that the traditional approach to planning at the route and link level was not conducive to promoting environmentally and socially sustainable transport outcomes. Austroads argued that planning practice appeared to be lenient, mostly not backed by consistent legislation and influenced by political developments. However, it noted that New Zealand and a number of Australian jurisdictions had taken serious steps towards developing procedures and guidelines aimed at improving aspects of practice.

Austroads (2009) suggested that more is needed for planning at route and link level in terms of processes and mechanisms that help to pursue transport system objectives that support environmentally and socially sustainable outcomes, on a consistent basis across the country. It suggested that the route and link level planning guidelines presented here should assist practitioners who endeavour to overcome deficiencies in existing legal and institutional structures.

The role and importance of legislation in the road planning process was highlighted in the survey of jurisdictions, where it became apparent that it was necessary to ensure that road planning takes place to a level of detail and in a form consistent across jurisdictions and specific aspects (e.g. stakeholder and community consultation). Otherwise, road planning, especially at route and link level, is bound to vary across authorities in the same jurisdiction.

Stakeholder and community consultation was acknowledged to be important, and does occur in some form across all jurisdictions. However, it was not clear to what extent it occurs as part of the route and link level planning process. It was apparent that consultation practices vary substantially across jurisdictions in terms of how and when they occur. There was a feeling that consultation needs to be a legislated requirement to ensure that it takes place and to ensure consistency across jurisdictions and projects. It needs to occur as early in the planning process as possible, and needs to be ‘bottom-up’ in terms of occurring with road users and the public affected by the route/link road projects. However, there are barriers to effective community consultation that constrain the important role the community can play in land use and transport planning decisions at the route and link level. More innovative approaches and techniques are needed to allow effective community input in route and link level transport planning decisions.

In terms of road route and link level planning, practitioners should therefore note the following:

- Evidence-based planning[5] means that route and link level planning must occur taking into account the evidence, situation or needs of road transport on the routes and links comprising the networks and corridors because this will determine what ‘solutions’ or route and link level plans are actually formulated.

[5] This approach is also advocated elsewhere in the Guidelines for use across all planning levels.

- Route and link level road transport planning must be, or at least start, as bottom-up planning that occurs at a level of detail that not only enables rigorous analysis for that level of planning, but also properly feeds into higher levels of planning following the sequence of link → route → corridor → network.
- Route and link level planning would also be used to feed back the results of planning at these levels to inform network and corridor planning, as well as to provide a test for higher level transport planning and the associated national policy framework. A supportive national policy framework is of great importance in providing guidance to route and link level planning practitioners. However, it is equally important for this framework to effectively 'learn' from the bottom-up nature of route and link level planning (i.e. land-use and transport planning integration, multi-modal transport planning and demand-based planning principles).
- Key components of road route and link planning enabling practitioners to formulate route and link plans include: stakeholder (government agencies and public) consultation that occurs throughout the planning process starting from the beginning of the process in order for it to be bottom-up planning recognising user needs, demand analysis, need for integration of land-use and transport planning, and data requirements and analysis.
- Continuing to work within the existing legal and institutional planning framework presents major challenges and would require serious strengthening of current processes and procedures (e.g. much more effective application of most or all of the identified best practice principles). However, there are opportunities for making road transport planning more consistent both horizontally (across jurisdictions) and vertically (from national level objectives to local government level) by strengthening (and introducing new) legislative and institutional requirements of planning.
- Benchmarking best practice principles can be achieved by regularly reviewing the effectiveness of current processes and procedures, developing innovative public consultation techniques, linking transport funding arrangements[6] with requirements for land use and transport planning integration, reducing the number of transport departments/agencies/groups within governments and increasing coordination of planning entities, and strengthening feedback mechanisms for monitoring implementation of plans and auditing of project/program performance.

Readers are also directed to Austroads (2020) Guide to Traffic Management for complementary guidance.

6.3 Other modes

As indicated in ATC (2006), it is expected that rail organisations and bodies for other modes may in due course develop guidance for route and link planning for their own modes.

[6] Although funding arrangements may be an outcome of the process.

7. Network assessments and corridor/area studies

The system planning process emphasises the importance of a top-down, big-picture perspective, coupled with stakeholder engagement, for identifying transport strategies, plans and initiatives. It is important that such planning is also informed by complementary information such as the results of quantitative network assessments and corridor or area studies.

Quantitative analysis of data is a key input into the planning process. It can be used to draw out major conclusions, develop projections, test and compare the viability of options, and confirm or correct conclusions reached by intuition and dialogue alone.

7.1 Nature of assessments and studies

Network assessments and corridor and area studies analyse transport system performance at a broad, indicative level, sacrificing detail to gain breadth.[7] To be cost-effective and timely, loss of some detail is necessary, but the conclusions of broad studies are not substitutes for detailed assessments. It is preferable, although not essential, to undertake network assessments prior to component corridor and area studies.[8]

A network assessment can provide information to assist with:

- Identifying problems at a high level
- Categorising a network into sub-networks, including the corridors and routes to include in the network
- Selecting priority corridors, areas, routes or links for close attention
- Considering relationships between corridors and areas
- Comparing across corridors, and across areas, to ensure that the allocation of funds is broadly in line with transport system objectives and government policies.

A corridor or area study usually considers a single transport corridor or area and provides information to:

- Suggest capital investment and non-capital solutions for further investigation to develop into proposals for initiatives

[7] Obtaining complete knowledge of all potential initiatives would be an impossibly resource–intensive task. However, partial knowledge may result in failure to identify highly beneficial solutions and lead to wasteful allocation of resources to evaluate initiatives with poor prospects.

[8] As discussed above, system planning is an iterative process, with feedback between network planning and corridor/area planning. Provided that there is interaction, network assessments and corridor/area studies can proceed in any order or concurrently.

- Assist in formulating corridor or area objectives by testing the costs, benefits and effects of implementing different strategies, within various budget constraints
- Explore cross-modal and upstream–downstream relationships between initiatives, including identifying situations where initiatives should be bundled together (e.g. a program of lengthening passing loops)
- Provide data to assist analysts to estimate the costs and benefits of specific initiatives and to assist governments to check appraisals.

7.2 Data requirements

Network assessments and corridor or area studies are heavily based on quantitative analysis. Some potential data requirements are described in detail in ATC (2006) section 1.3. They include data on:

- Population
- Land use distribution – including existing and future areas and key centres designated for residential, commercial and industrial development and transport precincts
- Economic activity
- Transport infrastructure
- Vehicle numbers and traffic composition
- Flows of passengers and freight, including origin–destination estimates
- Environmental and heritage considerations
- Safety
- Social factors.

7.3 Demand analysis and forecasting

Information about current and future demand for transport services is a key component of network assessments, corridor and area studies, and assessment of initiatives. Approaches to forecasting can be considered in two categories:

- Extrapolation relating the forecast variable (e.g. traffic) to one or more explanatory variables (e.g. population, past trends, etc), usually through an econometric model.
- Judgment, including scenario analysis.

These methods are not mutually exclusive and can be used in combination. The choice of technique depends on data availability, resources and the validity of the extrapolation process.

Scenario analysis is a potentially useful tool when major change is occurring and the future is highly uncertain. Scenarios can describe a range of possible future circumstances and outcomes. In contrast, the traditional approach to forecasting focuses on a single forecast (typically based on one set of assumptions), which is unlikely to accurately predict 'the' future.

The purpose of scenario planning is to identify, and consider the potential impact of, several plausible 'futures'; for example, different population assumptions. The alternative futures will typically involve significantly different challenges, risks and opportunities for individual activities and organisations. Scenario analysis helps transport practitioners and decision-makers to avoid the trap of thinking (and planning on the assumption) that the future is going to be just like the present, only a little bit more.

Scenario analysis makes the assumptions used in transport planning more explicit and facilitates better management of risk. It can contribute to improved understanding of factors likely to significantly affect transport and the interplay between these factors. Transport practitioners can then more effectively consider the implications for transport planning, increasing the likelihood that resulting strategies will effectively address future demands on the transport system.

Demand forecasting is discussed in greater detail: in T1 for passenger travel; M1, M2,M3 and M4 for public transport, road, rail freight and active travel; chapter 4 of T2 and section 2.4 of ATC (2006) in relation to cost-benefit analysis.

7.4 Deficiency assessment

Deficiency assessment involves comparing the network and its components with specified benchmarks. It is a relatively simple way of obtaining an initial indication of possible problems in a network, corridor, area, or on a route or link.

The deficiency assessment may focus on how transport system performance compares with performance benchmarks or on how the physical infrastructure compares with physical benchmarks.

Examples of performance benchmarks include:

- Roads: vehicle numbers per lane per day, average vehicle speed, level of service, crash rates and accessibility indices[9]
- Rail: transit times, contracted train paths, above-rail delays, below-rail delays, incidents, track availability and temporary speed restrictions.

The 2001 mainline rail infrastructure audit provides an example of a performance-based deficiency assessment (ARTC, 2001). ATC endorsed draft performance targets for the mainline rail network

[9] Accessibility indices can provide benchmarks for comparing the relative disadvantages of different locations. These indices can also be used to compare initiatives in terms of the extent to which they promote accessibility. Estimation of accessibility indices for medical centres, educational facilities and centres of employment can assist with the investigation of social issues. ATC (2006) illustrates a simple accessibility index. Social indicators may also be helpful.

to identify potentially worthwhile upgrading investments. These targets are presented in Table 1.

Table 1 ATC draft performance targets for inter-modal trains

Corridor	On-time reliability[a] (per cent)	Transit time[b] (hrs)	Train length[c] (metres)	Double stack (conventional containers)
Melbourne-Sydney	75[d]	10.5	1500	No
Sydney-Brisbane	75[d]	17.5	1500	No
Melbourne-Brisbane	75[d]	29.5	1500	No
Melbourne-Adelaide	80	11.5	1500	No
Melbourne-Perth	80 80	56.0 56.0	1500 Adelaide east 1800 Adelaide west	No Yes
Sydney-Perth	80 80	65.0 65.0	1500 Parkes east 1800 Parkes west	No Yes
Adelaide-Perth	80	41.0	1800	Yes
Adelaide-Sydney	75[d] 75[d]	26.0 26.0	1500 Parkes east 1800 Parkes west	No Yes

a. Percentage of inter-modal freight services (21-tonne axle loads and capable of a maximum speed of 115 kilometres per hour) arriving not more than 15 minutes after their scheduled destination time.

b. Average scheduled transit time for all inter-modal freight services (21-tonne axle loads and capable of a maximum speed of 115 kilometres per hour) on the corridor, i.e. terminal-to-terminal time making no adjustment for time zones.

c. Unrestricted length for interstate services, i.e. the train length up to which operators can operate any scheduled interstate services without reference to the track manager.

d. On-time reliability for these corridors is expected to be lower in the short term as significant investment is required to improve performance. Note: The term inter-modal trains refers to high performance trains in direct competition with road transport.

Examples of physical infrastructure benchmarks include:

- Roads: load limits, lane widths, shoulder widths, design speeds, curvatures, gradients, intersections per kilometre and flood immunity
- Rail: rail weights, speed limits, gradients, lengths of passing loops and height restrictions.

Deficiency analysis based on physical standards has an obvious role to play where the objective is to provide infrastructure at, or above, a certain minimum standard for equity reasons or network connectivity.

Deficiency assessment has several advantages. It is relatively straightforward to implement and can provide a preliminary indication of possible initiatives that may warrant more detailed investigation. The main limitation of deficiency assessment is that it does not take direct account of the economic worth of remedying a deficiency, which is driven primarily by costs and demand.[10]

Therefore, if the aim is to use deficiency assessment to help initial identification of initiatives that have economic worth (i.e. that are economically justified/warranted), benchmarks should be set at levels where intervention is likely to yield an acceptable CBA result. These benchmarks can be set on the basis of experience using the results of past appraisals of proposed initiatives carried out using CBA.[11]

7.5 Economic assessment

Deficiency assessment, using economically warranted justified/benchmarks (as discussed above), provides a very high-level indication of funding across the whole network that might be economically justified. It also highlights parts of the network, corridor or area where there is potential for economically advantageous new initiatives.

The next step in the assessment process is to specify the scope of these potential initiatives in hypothetical broad-brush terms[12] and subject them to conventional economic assessment (i.e. CBA). This can be undertaken at the network level, the corridor or area level, or at both these levels. Because a corridor or area is less extensive than a network, the CBAs in corridor and area studies can be undertaken at more detailed levels than the CBAs in network assessments. This additional level of detail makes it possible to use ‘what if’ scenarios to explore a wide range of options on both the supply and demand sides.

The level of detail of CBAs at network, corridor or area levels is, however, superficial and considerably less than that of the rapid CBAs undertaken in the rapid appraisal of individual options and initiatives in Step 3 (see F3).

Undertaking superficial CBAs for a large number of potential initiatives on a network, corridor or area basis provides a more refined picture of likely future investment needs than deficiency assessment.

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[10] For example, a deficiency that is expensive to remedy could generate an initiative with a disappointing CBA result. Conversely, a deficiency that is cheap to remedy, and economically warranted, might be missed. With respect to demand, deficiency assessments based purely on the physical infrastructure simply ignore demand considerations. Performance benchmarks related to volume–capacity ratio do take account of demand, but not the economic value of demand. A deficiency on part of the network having low utilisation might not be worth addressing, while an identical deficiency on a highly trafficked section of infrastructure could give rise to a worthwhile initiative.

[11] Lower benchmarks might be set for more highly utilised parts of the network and vice versa. This is particularly relevant if a categorisation system is in place for a network, and the category levels are strongly correlated with usage.

[12] Such as duplicating particular lengths of two-lane road or lengthening rail passing loops.

In undertaking these assessments, it is important to recognise the potential contribution of alternatives to large investments, such as demand management, changes in land use policies, and improvements in freight logistics. These solutions can be integrated into economic assessments (and superficial CBAs) by estimating the effects on transport demand and implementation costs, where these are significant. Parts O7 and O8 of the ATAP guidelines provides guidance on assessing such initiatives.

The optimal timing of interventions is another key consideration in these assessments. The Bureau of Infrastructure Transport and Regional Economics (BITRE) has undertaken economic assessment of networks using an optimal timing criterion to identify potential investment needs where there is no budget constraint (see section 1.4 in ATC (2006) and Harvey (1995)). This methodology shows that a new construction initiative is justified if its economically optimal implementation time occurs in the past. The economically optimal time for an initiative to come online is the first year when the benefits forgone by delaying the initiative by one year exceed the saving in capital costs. At this time, the benefit–cost ratio (BCR) will be at least 1.0.[13]

With demand projections and potential initiatives, a preliminary time profile of economically warranted initiatives can be developed. Applying the optimal timing methodology usually reveals a backlog of initiatives that are immediately warranted, as their economically optimal times are in the past. The analysis can also be taken a stage further by specifying budget constraints, in the form of funding levels over long periods of time. The timing and mix of initiatives can be adjusted accordingly.

Network assessment and corridor or area studies also provide a framework to assess whether performance targets are feasible given technical, behavioural and other constraints. The studies can also indicate whether performance targets are achievable at an acceptable cost in terms of other objectives sacrificed. The feasibility of performance targets can be tested using the superficial CBA methodology with back-calculation.

The steps are to:

1. Set a (quantitative) performance target
2. Estimate the benefits from meeting that target
3. Specify an acceptable cut-off BCR
4. Divide the benefits by the BCR to obtain the maximum capital cost of an initiative that will be acceptable to meet the target.

Knowing the acceptable limits for initiative costs, planners can develop options that are more likely to pass detailed CBAs in Step 4 (see F4).

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[13] For more information on optimal timing of initiatives, see the discussion of first-year rate of return in ATC (2006).

The results of this style of economic assessment will of course need to be considered alongside other important considerations, such as social policy objectives and targets. This balance between economic and social policy objectives is particularly important to ensure rural and remote areas are treated fairly alongside urban areas.

The results of the economic assessments outlined above will not be the only driver of budgetary decisions and the planning of individual initiatives, including options generation. However, they provide an important in the planning process, to be considered alongside all the considerations taken into account by planners and decision-makers.

Finally, it should be noted that maintenance initiatives raise unique issues as they are difficult to put into a CBA framework. Section 1.5 in ATC (2006) provides information about deficiency assessment and economic assessment for maintenance initiatives.

Appendix A Supporting material

Data for system planning

See ATC 2006, section 1.3

Economic assessment of networks

See ATC 2006, section 1.4

Harvey M, 1995

Maintenance assessment at network level

See ATC 2006, section 1.5

References

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