This information paper was commissioned by the National Transport Commission (NTC) in January 2008 to provide background information and research on rail productivity issues within Australia. The findings do not necessarily represent the views of the NTC.

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Executive Summary

Australia’s rail industry has experienced an unprecedented period of upheaval and re-structuring over the past decade, starting with the break-up and privatisation of Australian National in 1996. With few exceptions, the institutional and ownership arrangements that had long characterised Australian railways until the early 1990’s are largely unrecognisable today.

This re-structuring, by and large, has been accompanied by very substantial improvements in rail labour productivity and asset utilisation over the past two decades. Despite this, much of the rail sector has continued to lag the road industry in innovation, the take-up of new technologies, further labour reform, marketing, its profile in the wider business sector and community and the way in which business is conducted in a highly-competitive environment.

As a result, the industry is operating well below its potential to achieve further productivity gains. It has also failed to provide consistently reliable service, at least in part due to inadequate capital investment. Substantial scope therefore remains for rail to achieve ongoing productivity and operational efficiency gains and to deliver much improved customer service for both the freight and public transport sectors.

Because of its high fixed cost structure and relatively low variable costs, the economics of rail transportation are heavily reliant upon economies of scale. As such, the most attractive path for the industry to achieve strong productivity gains will be through growth in freight and passenger demand (outputs) without a commensurate increase in either physical assets or labour inputs.

This report has examined the issues impacting productivity within the rail sector through a combination of extensive stakeholder consultation and literature research. The conclusions reached by this study are that the key areas impacting on productivity within the industry are:

- Lack of clear government policies and related action for rail, including issues for:
  - Productivity measurement and reporting
  - Regional networks
  - Metropolitan networks
  - Productive investment
  - Rail Safety Regulation
  - Harmonisation of Standards, Operating Rules and Systems

- Less than satisfactory asset utilisation;
- Unsatisfactory labour utilisation in some areas;
- Industry re-structuring;
- Education and training deficiencies;
- Inadequate business and operational systems;
- Slow technology take-up; and
- Sub-optimal intermodal interfaces.

Of the issues considered to be actionable, the study recommends several priority areas for attention. The recommendations fall into two broad areas – those that are deemed the responsibility of the industry and those that are considered appropriate for the NTC and/or government to take forward – the latter in suggested priority sequence. These are certainly not the only areas for improvement, but are considered the most important ones for the immediate future, within a manageable action plan.
In combination, the study recommendations represent a major opportunity for the rail industry to take a giant stride forward in productivity improvement and thus be a more competitive and profitable part of the transport sector and indeed benefit the overall economy and the environment. There are a number of significant challenges that must be overcome, many of which are a legacy of actions from over 100 years ago, however the sector must look forward to realise its potential.

The NTC, in its own right and through advice to government, has a major role to play in supporting the industry in reaching this potential. This study has identified a number of key actions for the NTC and/or governments to take forward. The recommendations are not an exhaustive list of actions for improving productivity, but presents a manageable list of actions that can be achieved over the next 2-3 years and provide a platform for tackling more issues into the future.
1. Background

Australia’s rail industry has experienced an unprecedented period of upheaval and re-structuring over the past decade, starting with creation of the National Rail Corporation in 1993 and the break-up and privatisation of Australian National in 1996. With few exceptions, the institutional and ownership arrangements that had long characterised Australian railways until the early 1990’s are largely unrecognisable today.

Alongside these major changes, there have been significant changes in the rail asset base and staffing, most notably a drastic reduction in the industry’s directly employed workforce to around one-third today of what it had been some 20 years earlier. Australian rail is no longer the labour intensive and completely unionised industry that it had traditionally been, with many functions outsourced to specialist providers and others having disappeared entirely. By and large, the industry can now be regarded as having become relatively capital intensive.

The nature of rail operations and the markets it serves (particularly in the freight sector) has also seen large scale rationalisation across the nation with extensive closures of branch lines, small stations, freight depots, shunting yards, locomotive and crew depots and workshops, together with considerable consolidation of rolling stock fleets. Most of these developments have been accompanied by very substantial improvements in rail labour productivity and asset utilisation over the past two decades, at least in part due to massive increases in the haulage of bulk commodities (mainly coal and minerals) on some networks.

Despite this, rail has continued to lag the road industry in innovation, the take-up of new technologies, further labour reform, effective marketing and the way in which business is conducted in a highly-competitive environment. It has also failed to provide consistently reliable service, at least in part due to inadequate capital investment.

Substantial scope thus remains for rail to achieve ongoing operational efficiency enhancement and to deliver much improved customer service for both the freight and public transport sectors. The consequential productivity gains will be reflected in better utilisation of labour, fleet, capital and systems together with improved operator financial performance.

More recently, the transition of the former National Road Transport Commission into the National Transport Commission (NTC) has been a potentially important initiative of government in broadening the scope of regulatory and operational reform into the wider land transport scene and intermodal interfaces. The reform process has been of considerable benefit to the commercial road transport industry through the facilitation of harmonised regulations, standards and processes that now apply much more uniformly across the country than had previously been the case.

NTC has recently commissioned a study to examine the issues impacting on productivity in the rail sector within Australia with a view to examining areas where it could assist in facilitating improved productivity, either directly through its regulatory and operational functions or through advice to Commonwealth and State governments.

This report presents the findings of the study that has examined the issues impacting productivity in the rail sector and documents priority areas for action, for the both the rail industry and the NTC and governments.
2. Study Context

2.1. Project Scope and Methodology

The scope of this study has encompassed heavy rail networks and operations throughout Australia, including metropolitan passenger rail systems. The scope has included intermodal terminals so far as they relate directly to rail operations (i.e. the loading and unloading of both freight and passenger trains) but it has not considered the operations of road-based transport or shipping.

This study has been conducted with a structured approach to research, analysis and consultation. The methodology is represented in Figure 1 below.

![Figure 1 Study Methodology](image)

2.2. Report Structure

The remainder of this report is structured as follows:

- Key issues affecting the rail industry are documented, segregated into those affecting the industry as a whole and those specifically relating to rail operators. Those issues considered to have the highest priority are considered in further detail;

- A discussion is provided on the identified key issues to provide an understanding of the context and significance of each, and to enable further consideration of matters considered to be actionable by the industry, NTC and/or government; and

- A series of recommendations are presented to guide further work in developing solutions for the priority issues that can be further considered by the NTC and/or government.

2.3. The Australian Rail Sector

The Australian rail sector forms an integral part of the total freight and logistics supply chain, predominantly tasked with the movement of export-oriented heavy bulk freight (coal, minerals and agricultural products) from source to port, together with significant flows of intermodal traffic (containerised commodities) between major capitals and from various inland terminals to ports. In addition to major interstate trunk routes, the Australian rail sector is characterised by an extensive network of secondary (regional) lines largely conveying grain for export and domestic consumption and to a lesser extent other commodities including fuel and cement.

Notwithstanding this network of trunk and regional routes, rail’s market share of the total domestic land freight task (with the exception of the Melbourne-Adelaide-Perth and Darwin corridors and between Brisbane and Cairns) is quite small. In particular, road transport remains the dominant
mode along most of the eastern seaboard. This can be attributed to a number of factors including protracted low levels of investment in rail infrastructure, inconsistent service quality, fierce competition from road, and to some extent a lack of entrepreneurial flair to aggressively market rail. Overall, with few exceptions, the privatised rail freight operators are yet to generally succeed in growing rail’s market share of contestable freight.

In most capital cities, rail also plays a significant role in the public transport system for both urban and longer distance commuter traffic. Rail has continued along a path of gradual incremental development, primarily directed at its base task of facilitating central business district (CBD) oriented journeys along radial networks. The pace of such development has been the prerogative of state governments, however recent rapid growth in patronage due to increasing fuel costs and road congestion has resulted in overcrowding and poor punctuality (leading to significant complaints and service quality decline) and highlighted the considerable challenge and cost of enhancing public transport infrastructure and service levels in most capital cities.

Of significant importance and the subject of this paper is the relative inadequacy of ongoing development and implementation of productivity improvement initiatives, both for and within the rail sector. This compounds the challenges for rail to be able to compete effectively in the total freight, logistics and public transport markets. It also inhibits rail from effectively realising its real potential for improving Australia’s overall transport and logistics efficiency, reducing urban congestion and making a serious contribution towards reductions in carbon emissions and Australia’s imported oil dependency.

Railway economics are largely driven by economies of scale. Larger trains that cover long distances with reduced cycle times can translate into significant productivity gains.

2.4. A Two-Level Approach for Analysing Rail Productivity

Productivity within the rail sector can be considered on two levels:

- ‘System Level’ – A high-level framework that facilitates the documentation and analysis of the range of elements and issues, as well as the relationships between those elements that affects productivity within the rail sector. This is shown in Figure 2; and

- ‘Operational Level’ – captures the various productivity issues described at the system level and demonstrates the impact on a typical rail operation involving either the movement of
commodities or the transport of passengers. This is shown in Figure 3.

In considering the system level framework for analysing the issues and elements, it is important to appreciate the general environment within which rail actually operates. Each of the elements within the system level (refer to Figure 1) are key factors in the overall rail operating environment and are often closely inter-related.

![Figure 2 Analysing Rail Productivity –System Level](image)

This framework highlights interactions within the system-level perspective of rail operations. For example, key inputs into processes of government policy/assets/labour/access, are also influenced by innovation.

### 2.5. Productivity

It is important to appropriately define productivity within the context of this study in order to provide a reference for understanding how the areas of improvement recommended in this paper should be measured. Numerous definitions and indicators of productivity were identified within the Australian and international literature reviewed for this study. A broad approach that addresses the relativity between industry outputs and inputs has therefore been adopted as a general proxy for an understanding of productivity impediments and deficiencies and the identification of areas where improvements can be pursued and measured.

Dodgson et al\(^1\) undertook a review of railway efficiency from around the globe, including Australia. This report referred to the Productivity Commission work within Australia from 1999 on railways (focusing on freight). The report indicated that productivity levels within the industry at that time were 70 per cent of those in North America (North America being considered best practice). However, it is apparent that the Australian productivity analysis was quite limited, focusing on only one output – freight net tonne kilometres.

The United Nations\(^2\) (UN) identified a series of indicators for productivity within the rail sector. The UN noted that productivity indicators varied considerably, depending upon the technical, economic, political and geographic framework within each country. This was further discussed through an examination of World Bank indicators for productivity within the rail sector.

A key finding from the UN paper was that more work was required to establish consistent productivity indicators, and it stressed that these should be measured over long-term trends, rather than year-to-year, given inherent fluctuations in data over the short-term. Similarly, Van Ark et al

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(1999) undertook research that demonstrated the variation in productivity measures across a range of sectors between countries, and stressed the importance of noting differences when trying to compare and develop such measures.\(^3\)

Various measures of productivity are provided in Appendix 1, illustrating the variety used throughout the world. A significant report was prepared by Bureau of Transport and Communications Economics (BTCE) in 1991 which examined productivity in Australian National Railways at that time. This report, delivered almost 20 years ago, documented the problems with obtaining quality data for measuring productivity at that time, labour productivity being a major indicator, using partial productivity indicators.

In 2004, the Australasian Railway Association prepared a Productivity Report for the industry.\(^4\) This report suggested that the key productivity indicators for rail included capital productivity (locomotives and wagons based net-tonne kilometres over total vehicles), efficiency, timeliness and track quality. This report did not consider labour productivity as a key measure, thus differing from other literature.

It is considered that NTC should undertake more detailed research to develop robust indicators for use within Australia, given the variability observed on an international scale. These should be then utilised to undertake an initial updated and more comprehensive appraisal of productivity within the rail industry followed by ongoing reviews at agreed intervals in order to develop clear trend lines.

The operational cycle illustrated in Figure 3 attempts to demonstrate that within any passenger or freight operation, productivity can impact almost every element of that operation. When productivity impacts one of those elements, it can lead to the overall cycle slowing and/or breaking down, which typically results in declining service, higher costs of operation, poor asset utilisation and lack of competitiveness – the classic vicious circle syndrome.

Conversely the operational cycle highlights that improved productivity for any element within the cycle and ideally, improvements in as many elements as is possible, will lead to overall productivity gains. These achieve as their end result consequential benefits for utilisation of labour, fleet, capital, systems, improved operator financial performance and ultimately a better total outcome for business, the community and environment.

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Figure 3  Analysing Rail Productivity – Operational Level
3. Issues Affecting Rail Productivity

3.1. Overview

A wide range of issues affecting rail productivity were identified during the preliminary research and analysis stage. The initially identified key areas impacting on rail productivity include:

- Government policy and plans (or lack thereof);
- Asset utilisation and management;
- Labour utilisation, education and training;
- Unsatisfactory service delivery
- Inadequate business and operational systems;
- Intermodal (terminal) interfaces;
- Institutional interfaces; and
- Slow technology take-up.

A full listing of the initially identified issues is presented in Appendix 2.

As noted, the system level view helps to examine the inter-relationships between the various issues and elements and there are a number of highly-correlated issues that impact on productivity. Examples include:

- Unreliability of train performance against schedule and degradation of regional rail infrastructure – these issues are highly correlated, as degraded networks lead to variable train speeds along corridors, resulting in unreliable train arrivals (particularly late trains due to speed restrictions) at terminals (whether freight or regional passenger services);

- Unreliability of train arrivals against schedule and inability/unwillingness of terminal operators to unload/load trains in a timely fashion – a logical follow-on from the previous point. Variable train arrivals are often the cause for terminals not unloading/loading trains in a timely fashion, as the late train may have resulted in terminal capacity being redeployed to other activities; and

- Degradation of regional rail infrastructure and excessive train cycle times – building on the first point above, regional rail networks that are degraded impose lower train speeds, which in turn impacts on cycle times as trains can take considerably longer to travel between terminals. This has flow-on effects for labour productivity and operating costs generally and also influences customer decisions about which mode to utilise for moving goods.

Given the foregoing, it is probably unsurprising that the rail share of contestable freight remains low in many areas due to a combination of these and other factors that directly lead to indifferent service quality. These factors are both the cause and effect of long-standing policy vacuums and inadequate investment. Nonetheless, there is a view within the industry that improved productivity and service reliability could lead to a tripling of business in some corridors, as many customers appear keen to grow their level of rail usage, given the right conditions and service levels.

The following section highlights the priority issues that were identified during comprehensive discussions with key industry representatives and other stakeholders who have considerable experience in working closely with the rail industry.

3.2. Priority Issues

An industry ‘round table’ workshop was conducted on January 23, 2008 at which the issues identified during the preliminary research were discussed. A number of those issues were expanded and additional issues added. The notes arising from the workshop are provided in Appendix 3.
A number of priority issues impacting rail productivity were identified during the workshop. These are detailed in Table 1 below.

Table 1 Priority Issues – Wider Rail Industry

<table>
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<tr>
<th>System Element</th>
<th>Issues</th>
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| Government Policy (Freight) | • Most governments do not want to run railways, especially “above rail” freight operations, preferring the private sector to do this. For other than large scale bulk operations that achieve full commercial viability, there seems to be a considerable disjoint between the return on investment expected by the private sector and what governments consider ‘value for money’. This results in a need for some form of subsidy by governments if services are to be sustained. There has been a tendency to set this subsidy below opportunity cost levels, i.e. that which private sector operators could make if funds were invested in other rail or transport ventures. An example is the threat to continued operation of regional grain networks, particularly in Victoria, NSW and parts of Western Australia. This represents the difference between the commercial and economic benefits.  
• Building on the above, there is a related issue of the role of government in financing or subsidising railway networks (e.g. regional) that may not provide a commercial return, but are seen as being in the community interest or in support of government policy objectives.  
• There are also high barriers to entry for new “above rail” players, due to a highly regulated environment. This impedes “above rail” competition, allows the emergence of “lazy” customer service and tends to defer productivity improvement as there is insufficient ‘market forces incentive’ to make the hard changes necessary to raise overall efficiency.  
• The above points raise key policy questions that should lead other decisions – do governments (at a federal and state level) really want sustainable rail services? If so, for which traffics, where, and to what extent? (For example, are regional grain services and/or metropolitan port container shuttles wanted and what should be rail’s target market share?). It is obvious that the market cannot resolve these issues and clear policy direction is required from government.  
• There are two related policy questions –  
  o Where does government want to see effective competition between rail operators? (e.g. long-haul interstate links; regional intrastate grain networks, metropolitan port shuttles, etc).  
  o Where does government want public or private investment?  
Without these key policies and mechanisms to give them effect, there can be no certainty for the private sector or other stakeholders. |
| Government Policy (Passenger) | • Urban congestion in Australian capital cities is now acknowledged as imposing serious costs on the overall economy as well as potentially constraining the growth and development of major cities. This supports the thinking that the Federal Government should start to play a major role in public transport investment.  
• State Governments are unlikely to have sufficient financial capacity to adequately invest in urban systems to the extent necessary to support future growth and/or make any impact on urban congestion, thus Federal and/or private sector support will be required. This should be structured around a policy framework and investment criteria designed to maximise modal shift in the context of enhanced network capacity and service attractiveness.  
• The inner city capacity of passenger rail networks in almost all Australian capital cities is practically exhausted. New schemes are urgently required to accommodate and induce continued demand growth. Additional rolling stock is
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<td>also required. Metro-style operations are also becoming necessary in order to better access city hearts and support more concentrated inner metropolitan development. This should also recognise increasing CBD residential populations and transit oriented development in major activity centres.</td>
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<td>The existing taxation system provides disincentives for public transport use, e.g. the FBT regime and tariff concessions for imported 4WD vehicles. These measures are long overdue for review.</td>
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<td>Accelerated investment in provision of new or extended passenger rail corridors targeting improved penetration of newer residential catchments of major cities is essential for rail to become a viable transport option for many commuters in these areas. Metropolitan fringe land banks are also necessary for additional train stabling and maintenance facilities necessary to support such extensions and increased density of rail services.</td>
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<td>Government Policy (Freight &amp; Passenger)</td>
<td>A supportive environment is required to support rail investment. Governments can now leverage increasing community and business concern regarding ‘peak oil’, carbon emissions, climate change, urban congestion and safety concerns regarding heavy vehicles in ways that encourage widespread attitudinal change towards rail. (It should be noted that overall community attitudes are already moving to become highly supportive of rail being a major freight and public transport mode).</td>
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<td>Uniformity of rail safety regulation remains a major issue notwithstanding finalisation of the model rail safety legislation initiative. It would appear that each jurisdiction will be adopting different positions toward what is supposed to be uniform legislation. There is also anecdotal evidence that the State regulators do not always work well together and that genuine “mutual recognition” remains elusive. Lack of a single national regulator wastes scarce resources and is an impediment to cross-border operation, overall rail competitiveness and efficiency.</td>
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<td>Despite significant effort by the ARA and some industry participants, inadequate progress has been achieved in the harmonisation of rail operating rules and systems across the various jurisdictions. There is a need for stronger national leadership and incentives to accelerate progress in this vital area.</td>
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<td>Assets (Freight)</td>
<td>There should be a push to extract more out of the infrastructure, strongly backed up with improved monitoring of asset condition. In particular, there is a need to carefully examine existing infrastructure limitations including potential increases in rail axle loads to leverage full capability of the infrastructure. The road industry has had the benefit of successive increases in permissible gross mass, but not enough has occurred on rail. This is historically where the industry has been conservative and risk adverse. A relatively small increase in axle load can result in marked improvement in productivity (e.g. a 4t increase in permissible axle load from 19t to 23t with a typical 2t increase in wagon tare weight can yield a 14t increase in product carry per wagon).</td>
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<td>Given the capital intensive nature of modern rail operation, there is a need for ongoing improvement in asset management practices, including maintenance practices designed to yield continuous improvement in asset availability and reliability. This is primarily a responsibility of the industry and it has the capability to do so.</td>
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<td>The potential for certain key assets (such as specialised maintenance plant) to be shared between competing operators should be maximised in parallel to those being used for competition. There needs to be a commercial incentive for both parties – North American railroads show considerable maturity in this regard where collaboration in asset utilisation is seen as mutually beneficial.</td>
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<td>System Element</td>
<td>Issues</td>
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| Assets                      | • Operational cycle times are a key determinant of rolling stock and labour utilisation and earning capacity. The industry needs to continually evaluate options for reducing train cycle times in conjunction with track and terminal managers.  
  • Introduction of new technologies in the form of ATP (Automatic Train Protection) and ATO (Automatic Train Operation) within metropolitan rail networks will be essential to safely accommodate higher traffic densities on existing infrastructure. Due to the significant cost of such systems, particularly when retro-fitted to older networks, a standardised approach would lower overall costs. National leadership and coordination could play a vital role in this regard.  
  • Achieving a proper wheel-rail interface is of critical importance, both in terms of safety and operating efficiency. Industry should work towards national standards and a much better understanding of the critical trade-offs. This is an obvious area for improved collaboration to the mutual benefit of above and below rail operators.                                                                 |
| Labour                      | • The industry still has numerous examples of unsatisfactory work practices that can be changed through application of appropriate technology and serious risk assessment. Examples include extended and efficient application of Driver Only Operation (DOO) and remote controlled shunting or train placement at terminals.  
  • The various State rail safety regulators appear to have adopted different positions in respect of DOO, thus adding to the complexity of advancing its application. A consistent risk-based process is needed for assessing and accrediting DOO.                                                                 |
| Labour                      | • Rail operators particularly in urban environments need to tackle union resistance to part-time working arrangements more vigorously. Urban operations in particular provide many opportunities for shorter working days and weeks spread amongst greater numbers of people. This is an ideal opportunity to recruit female train drivers. Similarly the aging of train drivers can be counted by offering more flexible employment options to enable them to work into their late 60’s or early 70’s as a supplement to retirement income.  
  • There is strong evidence of continued poor rostering and restrictive work practices on most passenger networks with resultant unsatisfactory productivity of train crew and other on-train staff. In part, this is due to train schedules being prepared independently of train crew rosters, thus eliminating opportunities for more efficient labour utilisation.  
  • Justification for the continued use of Guards on some urban systems was questioned, especially in the light of Melbourne and Perth’s successful Driver Only operation of metropolitan trains for over a decade.                                                                 |
| Project planning and delivery | • Insufficient medium and long term planning is undertaken in the industry to provide greater certainty for stimulating investment (e.g. protecting land for future corridors and terminals). This links to policy at a federal level. Significant role here for States.                                                                 |
| Business Systems             | • The introduction of smartcard ticketing systems is proving both costly and problematic in several capital cities. Nationally consistent smartcard platforms would significantly assist business and other travellers between major Australian cities as well as potentially lower overall development and maintenance costs. National leadership could assist in driving standardised approaches to smartcard technology development in order to avoid another long term “break of gauge” situation.  
  • Information transfer between above and below rail operators and between modes at terminals still requires considerable streamlining in many cases.                                                                 |

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Rail Productivity Information Paper
A series of ‘one on one’ meetings were conducted with senior industry representatives and operators at the Australasian Rail Association (ARA) Rail Safety Conference on Wednesday 27 February, 2008, at which the range of issues were explored in more detail. The notes arising from the workshop, including the list of attendees is provided in Appendix 4.

A number of priority issues impacting rail productivity were identified during these meetings. These priority issues are detailed in Table 2 below.

### Table 2 Priority Issues – Rail Operators

<table>
<thead>
<tr>
<th>System Element</th>
<th>Issues</th>
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| Government Policy    | • State Governments do not appear to have a clear policy for rail that establishes a vision for the sector. The Commonwealth also needs to have much greater involvement, particularly as interstate freight and export commodity flows are a national matter, and urban congestion impacts are now too great for States to solely bear. Without such a policy based on rail’s potential strengths, investment and improvements in productivity are significantly inhibited.  
• Government needs to determine whether or not it wants rail to provide services that cannot fully recover their costs from users and if so, what does it want to achieve? This leads to the issue that, for other than high volume bulk freight, railways do not provide sufficient return for private investment – thus Governments must look at mechanisms for supporting rail appropriately should the policy be that efficiently provided rail services are in the national interest and of overall economic benefit. |
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| **Assets** (Freight & Passenger) | • Maintenance systems and practices are well behind other industries. Significantly more could be gained from assets through better asset management practices, both fixed and moving. By extracting greater use out of older assets, productivity gains can be readily achieved.  
• The industry is too conservative in the management of its assets. Railways should be maintained to fit-for-purpose standards, not over-engineered as they currently are in many cases.  
• There is insufficient research/data available on the potential effects of increasing axle loads within Australia. More work is needed in this area. |
| **Labour** (Assets & Passenger) | • There is a significant cultural problem within the industry regarding education and training. Much of the learning in the industry is “on the job” and is thus passed on from one generation to the next. With constant changes in the industry, it is slipping behind other sectors in the economy with respect to innovative thinking and problem solving. More effort is needed to better educate and train a workforce beyond the traditional internal learning processes.  
• Unions still have too great an influence on the sector and often work to impede productivity initiatives. Greater transparency is necessary in understanding how productive the industry truly is and until this is done, it is more difficult to move forward and implement change. |
| **Business Systems** (Freight & Passenger) | • The rail industry is a long way behind other sectors in efficient systems for scheduling and timetabling of operations. Greater investment is required in systems to integrate the scheduling of trains and rostering staff. Greater productivity gains can be realised if staff could spend greater time optimising solutions rather than manually devising solutions. Operator estimates put this potential productivity gain at 10-15%. |
| **Innovation** (Freight & Passenger) | • The industry does not take up technology available to it sufficiently to facilitate productivity gains. An example is the inability of most operators to track individual client consignments (e.g. containers). |
| **Project planning and delivery** (Freight & Passenger) | • The industry typically operates in survival mode and does not look sufficiently far ahead to plan for the future.  
• Due to inadequate forward planning processes, rail projects generally take considerably longer to deliver than equivalent value road projects, are often over budget and the full benefits of the initiative can be compromised or not fully realised. |
### 3.3. Discussion

#### 3.3.1. Rail Productivity Overview

In the early 21st Century, Australia’s rail industry presents a picture of contrasts – world’s best practice by the purpose-built private sector owned iron ore railways in the Pilbara region of Western Australia with massive unit trains weighing over 50,000 tonnes consisting of 300 or more wagons with 40 tonne axle loads, and operated by a single driver on railways that no longer require lineside signalling – at the other end of the spectrum, poorly maintained State-owned grain branch lines with speeds limited to 25 km/h or less on uneven track and often still laid with extremely old lightweight rail which restricts locomotive power to old low powered units with axle loads of 16 tonnes or less.

Between these extremes, there are other rail operations that suggest very good productivity achievement, such as the operation of unit coal trains in Central Queensland and in NSW’s Hunter Valley and long trains conveying domestic freight in double-stacked containers between Adelaide and Perth. Also indicative of good productivity, at least on a relative basis, is Perth’s modern, high quality electrified metropolitan passenger network, particularly characterised by its excellent Northern suburbs railway and the recently completed Mandurah line.

More likely to be in the moderate productivity category, mainly by virtue of quite rapidly growing demand rather than a benefit of specific efficiency initiatives (and with clear potential for improvement) are the metropolitan rail passenger networks of Brisbane, Sydney and Melbourne. Probably in more or less the same category, but without necessarily the same evident demand growth, are some of the better grain and other bulk commodity haulage operations in most states and the operation of intermodal trains hauling both domestic and export containers on Australia’s east coast and from some regional centres.

Indicatively at the bottom end of the productivity scale are various grain, intermodal and general freight trains operating on secondary and branch lines, mainly in Victoria, NSW, Queensland and certain corridors in Western Australia. In the context of poorly or under-maintained infrastructure, slow operating speeds coupled with extended cycle times resulting in poor asset and labour productivity and highly variable customer service levels, these operations are almost certainly unsustainable in their present form.

There is no single explanation for the extent of this variability nor are there many quick or easy solutions to the major impediments to improved efficiency and customer service quality on significant parts of the Australian rail network. However, some of the underlying issues and others that must be addressed in order to overcome these deficiencies are discussed in more detail below. They include:

- Lack of clear government policies and related action for rail, including issues for:
  - Productivity measurement and reporting
  - Regional networks
  - Metropolitan networks, including passenger and freight conflicts
  - Productive investment
  - Rail Safety Regulation
o Harmanisation of Standards, Operating Rules and Systems

- Less than satisfactory asset utilisation;
- Unsatisfactory labour utilisation in some areas;
- Industry re-structuring;
- Education and training deficiencies;
- Inadequate business and operational systems;
- Slow technology take-up; and
- Sub-optimal intermodal interfaces.

A common factor on the rail productivity scale is that the fundamental economics of rail transportation are heavily reliant upon economies of scale, simply because the rail mode has a high fixed cost structure and relatively low variable costs. It is therefore unsurprising that the rail operations indicating the highest productivity levels are also those with high freight or passenger throughput on a reasonably consistent basis. The converse is also generally true.

As such, the most attractive path for the industry to achieve strong productivity gains will be to maximise the potential for, and realisation of, growth in freight and passenger demand (outputs) without a commensurate increase in either physical assets or labour inputs.

In reality, considerable investment is needed to overcome significant infrastructure deficiencies and to deploy appropriate technology and systems. To the extent that government (particularly the Commonwealth) provides support or facilitation for such investment, it should be conditional upon the achievement of real and enduring productivity gains. This should be a key element of future policies for rail.

3.3.2. Government Policy

Effective solutions to many of the key issues impacting productivity described above are unlikely to be achieved without clear policy direction from Commonwealth and State Governments on the future of rail. Railways suffer from a legacy issue stretching back to Federation, when the assignment of responsibility for railways to the Commonwealth was rejected by a single vote. Consequently, the rail industry has continued to develop according to State, rather than national, priorities, which has had a marked impact on development patterns, investment, operational standards and industry regulations.

Vertical separation, disaggregation and privatisation of substantial parts of the industry during the past decade have resulted in numerous institutional interfaces that have substantially increased the management task and added considerably to transaction costs. Productivity is directly impacted as the industry continues to expend effort in dealing with this complex environment instead of concentrating on the continuous improvement of operational performance and customer service.

Furthermore, railways have suffered from a strong policy bias towards road since World War II, although this is not a unique problem to Australia, with an obvious policy preference for road-based transportation evident in North America, but also in Europe since the end of the Second World War. In addition, the EU is still coming to terms with significant issues that impact transport productivity across Europe due to the unconnected development of railways within individual countries, and the consequential impediments to interoperability caused by differing standards and regulations.

The European problem continues to have strong parallels in Australia as evidenced by the continued difficulty in effectively progressing harmonisation of engineering standards, operating rules and

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6 Pelkmans, J & Di Pietrantonio, L. The Economics of EU Railway Reform, College of Europe, pp 3.
systems and in achieving genuine uniformity of rail safety regulation.

It is therefore unsurprising that community attitudes toward rail in Australia are ambivalent at best and do not even register as an issue with a considerable majority of the population for whom rail is irrelevant and unseen except for an occasional train seen passing at a level crossing. Nevertheless, there is increasing community support for an increased share of both passenger and freight movement to take place on rail infrastructure.

It can be reasonably assumed this is due to a growing awareness of global and localised environmental issues and a developing public consensus that rail has a potentially significantly increased role to play in reducing urban congestion, improving road safety, freight and logistics efficiency and in addressing energy demand and climate change.

Overall, no coherent vision or policy yet exists for rail at either Commonwealth or State level - either in its own right, or as an integral component of wider policies covering freight transport and logistics or for urban public transport and land use planning. Given the scale and urgency of the emerging challenges and the opportunities that now exist to address them, the time for eliminating this policy vacuum has arrived.

A visionary statement agreed between the Commonwealth and States for the future of rail which underlines its inherent strengths and seeks to explain how rail, in conjunction with other transport modes, can maximise its contribution to the economy, the environment and improve the lifestyle of Australia’s major cities, would provide a highly visible initial framework for moving the industry forward. This then needs to be translated into clear policies for action that are more specific in terms of investment and other strategies that can demonstrate economic, environmental and social benefits not readily achievable by other means.

To this end, it is almost certain that governments will have little choice but to adopt “affirmative action” policies that will help engender public support by projecting a new future for rail and progressively facilitating the delivery of more sustainable transport outcomes and productivity gains.

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**Australia needs an efficient 21st Century rail network that is developed and geared around the inherent strengths of the rail mode. This requires a vision and understanding of how rail, in conjunction with other transport modes, can maximise its contribution to the national economy, the environment and Australia’s urban lifestyle. In turn, the vision needs to be translated into clear policies for action. Left to market forces alone, not much will change. “Affirmative action” policies should project a new future for rail that will progressively deliver more sustainable transport outcomes and productivity gains.**

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### 3.3.3. Industry Structure

Considerable literature exists regarding re-structuring of the rail sector in many economies throughout the world. This re-structuring has occurred primarily with the stated aim of improving efficiency and quality of service. The re-structuring has varied in terms of the degree of vertical ‘unbundling’ (separation of above rail and below rail businesses) and degree of disaggregation and privatisation (public enterprises through to private firms) throughout different jurisdictions.

Within Australia, in most instances this has involved separation of the wheel-rail interface (vertical ‘unbundling’), with the track manager being differentiated from the above-rail operator and internal management interfaces replaced by negotiated contract instruments. Disaggregation of former publicly-owned vertically integrated rail organisations, including the outsourcing of many

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7 For example, in 1996, the State Rail Authority of NSW was broken into four separate authorities and corporations, one of which (FreightCorp) has since been privatised. In 1996-97, the Public Transport Corporation (PTC) of Victoria was broken into seven separate organisations – two new statutory corporations and five discrete passenger franchises in preparation for privatisation.
traditional in-house functions, resulted in considerable industry upheaval. Almost a decade later, and with further mergers and acquisitions still occurring, much of the industry is yet to stabilise.

There is anecdotal evidence that some of this re-structuring has resulted in productivity decline, primarily due to the loss of knowledge in the industry, additional transaction costs and mistrust towards government that developed within the industry during the privatisation processes. This further highlights the need for a clear, constructive vision for the future of rail and the need for governments to demonstrate strong leadership to provide the stimulus for ongoing productivity improvements in the industry.

### 3.3.4. Productivity Measurement and Reporting

Although there is considerable literature regarding productivity indicators and measurement for the rail industry worldwide, there appear to be no formal or publicly reported indicators in Australia. The development of a set of endorsed productivity indicators for rail within Australia in collaboration with the industry would enable ongoing quantification of industry performance, thus allowing both industry and governments to assess the success or otherwise of productivity oriented initiatives.

Such indicators should provide a focus on key aspects of industry performance that will significantly influence its future success or otherwise. In particular, the selected productivity indicators will need to quantify the utilisation and efficiency of both assets (rolling stock and infrastructure) and labour and highlight areas of opportunity for improvement that can be subsequently measured against plans or targets. Such measures can in fact become a powerful incentive for improvement, particularly once it becomes evident that actual performance is less than satisfactory. For example, a study of European rail freight productivity\(^8\) that estimated –

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\text{“the potential savings from better utilisation of rolling stock and staff including a potential to increase loads per wagon by 30%, to reduce maintenance costs per wagon by 40%, to increase locomotive productivity by 25% and to increase crew productivity by 15%”,}
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became of itself, one of the drivers for substantial improvement that has been measured over subsequent years by the UIC (International Union of Railways).

Once adopted, systematic measurement of those indicators should continue on an ongoing basis to provide trend line data for informing the updating of policies and action plans into the future.

The industry, including both private sector and publicly owned organisations, should have mandatory reporting requirements for a limited number of key productivity indicators, for example, to NTC. Respondents will need to be forthcoming with the developed indicators, with appropriate protection of commercial confidentiality. Examples of potential indicators are shown in Appendix 1.

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A limited number of key productivity indicators that highlight actionable areas for performance improvement should be established and reported on an ongoing basis to provide trend line data for informing policy development and action plans. Reporting should be a mandatory requirement for both private sector and publicly owned organisations.

### 3.3.5. Regional Networks

Regional rail lines in Australia, in particular regional grain lines, have suffered as a result of the abovementioned policy vacuum and a generally “hands-off” attitude by State governments. The result is that most of these lines now have a very substantial maintenance backlog and are rapidly reaching the stage where the only choices will be to either undertake substantial rehabilitation and/or

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upgrading, or closure.

To the extent that the lines remain operable, most exhibit unsatisfactory productivity and deny the grain industry and other potential users the opportunity to achieve the lowest practicable cost paths to export and domestic terminals. This is now a major issue in Victoria, New South Wales and Western Australia, as well as in parts of Queensland and South Australia. The underlying productivity performance of these lines results from excessive and highly variable train cycle times which diminish equipment and labour utilisation with consequent cost and service quality impacts.

A common characteristic of almost all regional lines which do not carry large volumes of coal or minerals is that they are not commercially viable. These lines are subject to considerable volatility of grain production due to seasonality and climatic conditions and opportunities for other incremental freight business are therefore difficult to realise. As such, these lines cannot achieve sufficient economies of scale for the fixed costs of infrastructure provision, coupled with the relative inefficiency of the above rail operation, to be covered by the maximum revenue achievable by rail operators in a contestable environment.

The unresolved question in most jurisdictions is the extent to which such lines are, or could be, of overall economic benefit to the grain industry and the wider community and, if so, what are the appropriate policies and mechanisms that would ensure their sustainability on an efficient basis? The recently completed “Victorian Rail Freight Network Review” examined these matters in detail and concluded:

“There are significant economic, social and environmental reasons to support the retention of a freight only rail network in Victoria. ……. The consequences of closure of much of the freight only rail network is an additional 100,000 truck trips per annum on the State’s regional roads with much of this concentrated between November and February because of the grain harvest. ……Expenditure on the regional rail freight network is an investment in a sustainable transport system and improved triple bottom line performance for the State.”

A policy framework is needed for assessing the overall costs and benefits of retaining key regional rail freight networks on an efficient and sustainable basis, having regard to national, state and regional impacts.

Opportunities exist for considerable improvement in the efficiency of regional grain networks.

Other aspects of the matter were also examined in detail by the Australian Government, House of Representatives, Standing Committee on Transport and Regional Services. In its comprehensive review, the Committee provided significant discussion on the problems affecting regional grain lines.

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The Committee documented the views of a Canadian expert on regional railways that provided the following commentary:\(^\text{10}\):

“...Canada has only one rail gauge. It does not have Australia’s difficulty of trying to mesh different gauges into a coherent system. Canada also has a government-owned, dedicated fleet of wagons for the grain shipments...so in the transportation of grain there is no car or ownership cost built into the freight rate...”

Importantly, the Committee describes the issue of standards for regional lines:

“...have seen tracks that you could be running heavier loads on...they are underloading the cars, which makes them very unproductive and inefficient...they (regional rail lines) have very high standards, and you do not need that on a short line or a branch line. If you had two standards or a different approach for the branch lines I think that would be really worthwhile...”

This confirms the issue raised in Table 1 – given the important pre-requisite of rehabilitation and/or modest upgrading followed by sustainable maintenance inputs, there is a need to extract more out of the existing infrastructure (without necessarily requiring additional major upgrading work), which can result in direct productivity improvements. Moreover, it further highlights the need to carefully examine standards and regulation in the industry.

Care is needed regarding amendments to standards – particularly on lines that mix freight and passenger transport. Passenger lines invariably require higher standards for reasons of safety, however a more flexible approach should be adopted to options for extracting more out of regional lines that do not carry passenger services. This would also assist in lowering the bar for the entry of new operators to service regional lines which have seen little or no effective “above rail” competition notwithstanding a decade of open access regimes. (It is clearly evident that where some element of competition exists, both rail’s market share and the consequent benefits to customers are improved). This approach is also likely to facilitate incremental freight flows for which rail would otherwise be uncompetitive.

A policy framework is urgently needed for assessing the overall costs and benefits of retaining key regional rail freight networks on an efficient and sustainable basis, having regard to national, state and regional impacts.

### 3.3.6. Productive Investment

This problem is further reinforced when examining the issue of returns on investment for the private sector. Publicly-owned rail infrastructure providers generally achieve rates of return less than the risk free rate for 10-year Government bonds\(^\text{11}\). Such results imply the need for subsidy to provide acceptable rates of return on investment, however there is no clear policy on the future of rail to provide confidence to the private sector to invest for the long term.

An opportunity now exists for the Commonwealth Government to provide leadership and direction for the future of rail, accompanied by instruments for improving productivity, such as productivity gain requirements tied to public investment, to provide both the private sector and State administrations with the confidence and incentive to pursue their own productivity gains.

Such a push is coming in North America, where it has been recommended that public funding for Amtrak be tied to demonstrated productivity improvements and reduced over time, which would

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\(^{10}\) Australian Government, House of Representatives – Standing Committee on Transport and Regional Services, *The Great Freight Task – Is Australia’s transport network up to the challenge?*, July 2007, pp 123-125

force management in Amtrak to take action\textsuperscript{12} to improve productivity.

The Railway Association of Canada stressed the need for increased Government spending and supportive policies to achieve further productivity gains in North America\textsuperscript{13}. This report has indicated some of the actions undertaken to improve productivity within the industry including advanced processing systems for more efficient locomotives; innovation in wagon design to increase carrying capacity – all driven by embracing technology improvements.

Community Rail (United Kingdom) presents a good example of clear policy on rail networks – one that provides confidence for investment in rail, and one that can foster productivity gains by requiring demonstrated improvements in productivity to access public funding (subsidy). Railways that are designated as Community Rail are local or branch lines that connect to the main rail network\textsuperscript{14}.

While Community Rail is focused on passenger services, a similar model could be considered as part of a community partnership for regional freight movements (and/or management of the “below rail” infrastructure) and one that encourages productivity gains.

For freight traffic that can be diverted from road to rail, the UK government has for many years provided funding support through a Freight Facilities Grants Scheme (FFG) and a more recent scheme known as the Rail Environmental Benefit Procurement Scheme (REPS). The FFG scheme helps rail or terminal operators or freight customers offset the capital cost of providing freight handling facilities whilst REPS assists companies with the operating costs of running rail freight transport instead of road where rail is more expensive than road\textsuperscript{15}.

“Taking freight off congested roads and moving it by rail can have environmental and wider social benefits. However, rail can sometimes be more expensive than road transportation. Schemes are available that are designed to facilitate the purchase of the environmental and social benefits that result from using rail transport instead of road”

A similar scheme has been recommended for adoption by the recent Victorian Rail Freight Network Review in the form of a Rail Freight Development Fund (RFDF)\textsuperscript{16}.

“To facilitate and support worthwhile rail freight opportunities, RFNR recommends the establishment of a Rail Freight Development Fund (RFDF) to facilitate rail freight opportunities via (seed) capital contributions, perhaps commensurate with the economic benefits captured by the community but not able to be captured commercially by the applicant. ...Examples could include rail loading facilities, new railway lines for significant tonnages or rail facilities supporting intermodal terminals or perhaps support for rolling stock initiatives generating greater efficiency.”

Similar schemes have been developed in recent years in several US states with a view to facilitating greater use of rail for freight movements, wherever practicable. Examples of such schemes which are presently active in seeking and/or providing grants to rail operators or users include those administered by the California Transport Commission\textsuperscript{17} and Ohio Rail Development Commission\textsuperscript{18}.

The administrative arrangements surrounding such a scheme need to be relatively straightforward but also provide some assurance for government that the risk of the intended outcomes being not achieved or under-achieved are minimised. The UK FFG scheme has various guidelines to this end\textsuperscript{19}:

\textsuperscript{12} Utt, Ronald, Congress Should Link Amtrak’s Generous Subsidy to Improved Performance, Backgrounder, The Heritage Foundation, September 2007.
\textsuperscript{14} www.networkrail.co.uk/aspx/2413.aspx
\textsuperscript{15} Rail Environmental Benefit Procurement Scheme (REPS), Department for Transport, London, 2006.
\textsuperscript{17} California Trade Corridor Improvement Fund, see www.catc.ca.gov/TCIF.
\textsuperscript{18} Ohio Rail Development Commission, see www.dot.state.oh.us/Ohiorail
\textsuperscript{19} Freight Facilities Grants Scheme (FFG), Department for Transport, London, 2006.
“Schemes will be evaluated on the basis of value for money. ………Schemes which deliver the greatest environmental benefit for the grant provided are most likely to succeed”.

“The Department can only pay FFG if it is satisfied that, if the facilities were not provided, the freight in question would go by road, and also that it is in the public interest for the freight to be carried by rail.”

“FFG is paid in the clear expectation that the freight facility will secure the removal of lorries from specific routes for a specified number of years. Applicants will therefore need to give a commitment to using the facility for a number of years.”

“FFG will not be paid when the freight facility can be justified commercially or would proceed in any case without FFG, or when the environmental benefits to be gained are insufficient to justify the grant.”

Such a scheme operated on a national basis could be directed at securing net economic benefits as well as improving rail productivity. The scheme would be directed at private sector applicants and would operate in parallel to the AusLink programme which currently supports government sponsored land transport projects.

Financial assistance for the private sector to facilitate rail freight opportunities that achieve worthwhile environmental benefits could include the development of efficient train loading facilities for bulk commodities to be moved by rail instead of road.

There is a strong case for government financial support for the private sector to facilitate rail freight opportunities that will improve rail productivity and where the wider economic benefits can be captured but are not able to be commercially captured by the applicant.
3.3.7. Metropolitan networks

As discussed in Table 1, congestion in major urban centres is resulting in increasing costs to the national economy, as cities approach the prospect of literally grinding to a halt. Metropolitan rail networks are also suffering under the stress of population growth and surging demand for services, particularly during peak periods. However, the inner city capacity of passenger rail networks in almost all Australian capital cities is practically exhausted. New schemes are urgently required to accommodate and induce continued demand growth, including increased track and signalling capacity and elimination of physical conflicts that sub-optimise existing track capacity utilisation.

Introduction of new signalling technologies such as ATP (Automatic Train Protection) and ATO (Automatic Train Operation) within metropolitan rail networks will also be essential to safely accommodate higher traffic densities on existing infrastructure. Due to the significant cost of such systems, particularly when retro-fitted to older networks, a standardised approach would lower overall costs. National leadership and coordination could play an important role in this regard.

The high peak period demand leads to productivity declines as services are disrupted and even cancelled due to the effects of overcrowding on the system. Increased dwell times at critical network locations also reduce network capacity and can dismantle the entire timetable, resulting in further overcrowding on subsequent services, delays and rising costs of operations. Improving the service planning/timetabling of urban passenger services to gain better utilisation of rolling stock in peak periods (so that very high cost capital can produce more than one cycle in each peak period) is an example of productivity opportunities that exist in this sector.

The highly-peaked nature of rail travel also results in lower productivity during off-peak periods, as demand is much lower for services employed. Productivity can be raised during these off-peak times by facilitating access to the rail system, which is severely restricted as almost all park and ride capacity is absorbed during peak periods.

Accelerated investment in provision of new or extended passenger rail corridors (including underground corridors) that target improved penetration of newer residential catchments of major cities is also essential for rail to become a viable transport option for many commuters in these areas. By their nature, current and proposed higher density transit oriented developments in key metropolitan nodes (e.g. at Parramatta, Chatswood, Dandenong and Footscray) are totally dependent for their success on very efficient high quality heavy rail links to CBD areas.

High productivity metro-style operations are also becoming necessary to better access city hearts and to support more concentrated inner metropolitan development and increasing CBD residential populations. Such projects also open up new opportunities for air rights based developments along complete corridors, above or contiguous to stations and having an appropriate mix of residential, commercial and retail development and efficient interchange with other public transport modes.

Greater effort is needed to link the rail network as part of an integrated transport system, such as facilitating better bus-rail transfers (through scheduling and infrastructure solutions), and by better land use planning decisions, by increasing walking catchments around the rail network (e.g. higher-density living, major retail located around rail hubs). Use of the rail system can be maximised through such planning and result in strong productivity gains during off-peak periods as well as reducing the environmental impacts of private vehicle use in major urban areas.

State Governments are unlikely to have sufficient financial capacity to adequately invest in urban public transport systems to the extent necessary to support future growth and/or make any impact on urban congestion, thus Federal and/or private sector support will be required. This should be structured around a policy framework and investment criteria designed to maximise modal shift in the context of enhanced network capacity and service attractiveness.

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The very significant congestion now being experienced in Australia’s major metropolitan areas is impacting on the national economy. There is an urgent need to develop guidelines for planning and facilitating integrated urban public transport systems and land use, with the overall objective of establishing a national approach to the urban congestion problem.
3.3.8. Rail Safety Regulation, Standards, Operating Rules and Systems

Despite significant effort by the ARA and some industry participants over several years, inadequate progress has been achieved in the harmonisation of engineering standards, rail operating rules and systems across the various jurisdictions. For example, rules and safe working systems in Queensland, NSW (RailCorp areas) and on the Westnet network in WA are all quite different.

Whilst it is recognised that physical uniformity of field hardware (e.g. signalling) will take many years to achieve, a great deal can still be done to harmonise rules and procedures, especially in dark territory (mainly regional corridors and branch lines) and on the main interstate corridors. There is a need for stronger national leadership and incentives to accelerate progress in this vital area.

Uniformity of rail safety regulation remains a major issue notwithstanding finalisation of the model rail safety legislation initiative. It would appear that each jurisdiction will be adopting different positions to what is supposed to be uniform legislation. For example, in 2008 all operators working into Victoria will need to be re-accredited to the 2006 Victorian Rail Safety Act, independently of the national model legislation. This is also hampering progress towards harmonisation. There is also anecdotal evidence that the State regulators do not always work well together and that genuine “mutual recognition” remains elusive.

Whilst there is little evidence to suggest that the current deficiencies directly impact rail safety performance, industry group representatives and operators highlighted both the administrative and cost burdens of having to be compliant for multiple jurisdictions. Elimination of unnecessary duplication in this area should allow rail operations management and staff to maintain a stronger focus on their primary role of ensuring there is continuous improvement in rail safety performance.

By far the predominant functions of Australia’s rail freight operations are to facilitate export commodity flows and provide interstate (and some intrastate) domestic freight services as an integral part of national logistics chains. Passenger operations primarily support urban public transport, the inadequacies of which are also rapidly becoming a national issue.

Nations with far larger and more intensively used rail networks than Australia have national rail regulation, the most obvious examples being the USA (administered by the Federal Railroad Administration) and Canada (Transport Canada), which also have both federal and state (or provincial) governments. In the UK, national regulatory functions are undertaken by the Office of Rail Regulation (ORR) whilst the development and application of standards and systems is the responsibility of the Rail Safety and Standards Board (RSSB). Similarly, uniform national regulation applies in the Australian aviation and maritime sectors.

Lack of a single national rail regulator, differing legislation between jurisdictions and minimal harmonisation of standards, operating rules, procedures and systems continues to waste scarce resources and is an impediment to cross-border operation, overall rail competitiveness and industry productivity.

The continuing policy uncertainty and unnecessary complexity created by differing State-based engineering standards, operating rules and systems and multiple safety regulation jurisdictions will continue to restrict efforts to maximise productivity gains in the industry as a whole. Commonwealth legislation for a national rail regulator would provide the impetus for achieving genuine uniformity of rail safety legislation across jurisdictions and for serious progress towards harmonisation of standards, operating rules and systems.
3.3.9. Industry Education and Training

Workforce downsizing, increasing age profiles and almost continuous change within the industry since the mid-1990’s has resulted in a significant problem regarding education and training. Much of the learning in the industry is still “on the job” and is thus passed from one generation to the next. With constant changes in the industry, it is slipping behind other sectors in the economy with respect to innovative thinking and problem solving. Uproar within the industry has also indirectly resulted in productivity declines due to the loss of experience, corporate memory and cross-skilling opportunities previously available in large government-owned diversified and vertically integrated rail organisations.

More effort is needed to better educate and train a workforce beyond the traditional internal learning processes. Symptomatic of this problem is the relatively slow pace of industry technology take-up which is a key impediment to the realisation of productivity gains.

The industry needs to develop a more comprehensive skills program to provide a wider pool of talented individuals who will bring improved skills to the industry and new ways of thinking – all of which can contribute to productivity improvements. A number of training initiatives are being progressed by the ARA’s Rail Skills and Careers Council and limited post-graduate programs have been developed and are now being implemented through the Rail CRC.

However, it is recommended that the industry work with Engineers Australia, tertiary institutions and other professional bodies to introduce rail-related subjects as part of undergraduate degrees and other courses within the various engineering and other relevant disciplines. This will lift the industry’s profile within the enormous undergraduate population and should provide it with a greater pool of talented individuals to take the rail sector forward over the next 30 years. A similar approach would be of great benefit for other staffing issues facing the rail industry such as the recruitment and retention of drivers and signalling technicians.

Also worthy of consideration is the development of staff exchange programmes, both within the industry (e.g. between above and below rail operators and/or rail industry suppliers) and between rail organisations and others in the transport and logistics sector to broaden the outlook and experience of rail people and give others a serious insight into rail. This would also tend to compensate for the loss of skill diversity and cross-skilling opportunities that were once a feature of lifetime careers in the large government-owned railways that mostly still existed until the 1990’s.

The rail industry is facing serious skill deficiencies and continues to place heavy reliance on “on the job” learning. This is a factor in the industry’s relatively slow pace of technology take-up. Notwithstanding existing initiatives, a more comprehensive skills program is badly needed which can contribute to productivity improvements. The industry should work with relevant professional bodies and tertiary institutions to introduce rail-related subjects as part of relevant undergraduate degrees and other courses.

3.3.10. Improving Business and Operational Systems

Unlike rail freight operators, passenger service providers generally operate intensive services with relatively stable timetables. In almost all jurisdictions, the scheduling, staff rostering and fleet deployment processes are still undertaken manually and involve long lead times in their development. As a result, the opportunity to integrate the above processes in ways that can maximise asset and labour productivity is generally lost and there is little ability to generate multiple iterations of each function, let alone develop fully integrated solutions, that seek to optimise the overall use of resources. Discussions with operators suggest that the potential for practical improvement in this area could be of the order of 10-15%.

Earlier experience with the attempted development of such systems tended to be unsatisfactory, largely because of computing limitations, “one-off” development and extremely long lead times and associated costs. However, the current situation is that a number of proprietary “off-the-shelf”
products are becoming available at relatively low cost. By way of contrast, the bus industry has embraced a range of business systems for scheduling, rostering and fleet management.

Opportunities also exist for providing a range of system applications for both passenger and freight businesses that facilitate improved exchange of information between track managers, train and terminal operators and customers and which can result in reduced terminal dwell times, labour cost savings and overall cycle time benefits. Other applications include trackside monitoring devices that can assist in tracking rolling stock and improve safety through monitoring of vehicle condition and loads. A pro-active approach by the industry to promote such applications will have win-win benefits for all parties.

A much more rapid take-up of modern business and operational systems by the industry will have significant productivity benefits in the form of increased asset and labour utilisation and improved customer service. Appropriate applications will also improve operational interfaces between above and below rail operators, terminals and customers.

### 3.3.11. Labour Productivity

There is strong evidence of continued restrictive work practices on most passenger networks that are reflected in inefficient rosters with resultant unsatisfactory productivity of train crew and other on-train staff. This compounds the ability of rail operators to flexibly respond to demand and unplanned events. These practices are also contributing to driver shortages on most systems leading to high levels of overtime and service cancellations.

Rail operators, particularly in urban environments, need to more vigorously tackle union resistance to a range of potential work practice changes, including part-time working arrangements. Urban operations in particular provide many opportunities for shorter working days and weeks spread amongst greater numbers of people. This is an ideal opportunity to recruit women train drivers. Similarly the aging of train drivers can be countered by offering more flexible employment options to enable them to work into their late 60’s or early 70’s as a supplement to retirement income.

Justification for the continued use of Guards on some urban systems was questioned, especially in the light of Melbourne, Adelaide and Perth’s successful Driver Only operation of metropolitan trains for over a decade.

The reasons for the continued existence of sub-optimal working arrangements for many staff on urban and regional passenger networks appear to be a combination of close industrial/political links between some State governments and relevant industrial organisations together with strong aversion on the part of governments to the risk of subjecting passengers to service disruption due to potential industrial disputation when efforts are made to change long-standing entrenched work practices.

These situations appear to still exist irrespective of whether the services concerned are operated by the private sector, as for the franchised arrangements in Melbourne, or directly by State authorities in other cities. Nonetheless, there are many examples where significant work practice changes have been introduced in Australian railways without serious service disruption.

Having regard to anticipated changes to federal industrial relations legislation, future Commonwealth funding of public sector rail projects, especially for urban passenger networks, should take account of further productivity gains that are potentially achievable from re-negotiation of existing labour agreements and working arrangements.

Opportunities still exist for significant improvements to labour productivity, particularly on urban passenger networks. In conjunction with potential Commonwealth Government initiatives to address urban congestion through public transport support and anticipated changes to industrial relations legislation, State governments should ensure that rail operators are obliged to progressively re-negotiate existing agreements and working arrangements.
3.3.12. Axle Loads and Other Infrastructure Constraints

There is a need to carefully examine the scope for increases in rail axle loads, adjustments to permissible speeds and review of other infrastructure constraints on freight networks to leverage full capability of the infrastructure, short of undertaking major upgrading projects. The road industry has had the benefit of successive increases in permissible gross mass, but other than on the dedicated coal and minerals lines, comparatively little has occurred on rail.

This is understandably an issue where the parts of the industry have been very conservative and risk averse. However, given the significant achievable benefits, there needs to be a push to extract more out of the infrastructure where feasible, but importantly, backed up with improved/increased monitoring of asset condition.

A relatively small increase in axle load can result in marked improvement in productivity (e.g. a 4t increase in permissible axle load from 19 tonne to 23 tonne with a typical 2 tonne increase in wagon tare weight can yield a 14 tonne increase in product carry per wagon.). Changes of this nature were introduced on most interstate corridors without discernable impacts soon after ARTC came into being, notwithstanding the disinclination of prior rail administrations to do likewise for many years previously. However, the changes made by ARTC at that time were made following detailed risk assessment and were accompanied by improved track condition surveillance.

Many types of existing wagons can be upgraded to accommodate increased axle loads, subject to structural assessment and strengthened bogie components. Major benefits can accrue on lines carrying bulk commodities as well as those conveying container traffic. In the latter case, increased axle loads will often make the difference between a typical 3-slot container wagon being able to carry 3 TEU instead of only 2 TEU.

Whilst trade-offs may be required in some instances between increased axle loads and permissible train speeds, there are other opportunities to improve average train speeds and hence end-to-end transit times. These include provision of “speed ramps” (short sections of line upgraded to permit higher speeds to negotiate gradients which otherwise impact both train speed and haulage capacity) and methods of operating multiple locomotives in ways make maximum use of kinetic energy whilst minimising energy consumption.

An opportunity exists to initiate a research project to examine the extent to which it is practicable, and if so by how much, to leverage full capability of the infrastructure by implementing higher axle loads (without involving costly upgrading) on existing freight lines, in conjunction with improved/increased monitoring of asset condition and appropriate risk assessment. The project should principally address technical and operational criteria, but also consider financial benefits (and how these might best be shared between above and below rail operators) and life cycle costs.

Modest increases in permissible axle loads and easing of other infrastructure constraints will have immediate and significant productivity benefits. This should be the subject of an early research project (probably involving the CRC for Rail Innovations) which should address technical and operational criteria, as well as financial benefits and life cycle costs.

3.3.13. Technology Take-up

A striking aspect of the worldwide railway equipment and supply industries has been the very substantial internationalisation that has occurred over the past decade. Much of this has been brought about by industry consolidation through numerous mergers and acquisitions of both Australian and foreign companies.

For example, three international companies (one Canadian, one German and one French-owned) between them hold over 50% market share of all passenger rolling stock manufactured worldwide, with a small number of companies based in Japan, China and India accounting for much of the
remainder. Similarly, two locomotive manufacturers (one based in the USA, the other in Canada) also have in excess of 50% market share of new locomotive builds and components, inclusive of manufacturers in many countries that are licensed to use and assemble their products. These and other very large multinational organisations invest large sums in research and development and tend to be at the forefront in product innovation.

Higher axle loads can facilitate considerably increased rail freight productivity including extended possibilities for operating double-stack container trains.

Potential certainly exists for localised rail technology innovation, and indeed research and development is ongoing through organisations such as the CRC for Rail Innovation and various tertiary institutions. However, the Australian rail industry’s relatively slow take-up of current technologies has little to do with its access to the latest information or the availability of appropriate technology applications. Much current rail technology is “off the shelf” with comparatively little customisation required nowadays to meet specific local needs.

There are numerous examples of readily available current rail technology applications including:

<table>
<thead>
<tr>
<th>Rolling Stock</th>
<th>Infrastructure</th>
<th>Systems</th>
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<tbody>
<tr>
<td>Wagon electronic braking</td>
<td>Automatic train protection</td>
<td>Integrated train control centres</td>
</tr>
<tr>
<td>Wagon health monitoring</td>
<td>Radio-based signalling</td>
<td>Energy and time optimisation</td>
</tr>
<tr>
<td>Train self-diagnostics</td>
<td>Wayside train defect detection</td>
<td>Schedule optimisation tools</td>
</tr>
<tr>
<td>Remote condition monitoring</td>
<td>Signalling remote defect reporting</td>
<td>Train performance simulators</td>
</tr>
<tr>
<td>On-board driver advisory data</td>
<td>High speed track tamping</td>
<td>Train driving simulators</td>
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<tr>
<td>Remote control train operation</td>
<td>Stoneblower tamping/levelling</td>
<td>GPS train and container tracking</td>
</tr>
<tr>
<td>In-cab signalling</td>
<td>Dynamic stabilisation machines</td>
<td>Smartcard ticketing</td>
</tr>
<tr>
<td>Electronic traction control</td>
<td>High speed rail grinding</td>
<td>WiFi equipped trains</td>
</tr>
<tr>
<td>Carriage self-levelling</td>
<td>Complete track renewal machines</td>
<td>Radio frequency wagon ID</td>
</tr>
<tr>
<td>Electrical energy re-generation</td>
<td>Automatic train routing</td>
<td>Reliability centred maintenance</td>
</tr>
<tr>
<td>Multi-voltage electric operation</td>
<td>40 tonne axle load capability</td>
<td>Remote train weighing</td>
</tr>
<tr>
<td>Hybrid diesel/battery power</td>
<td>Level crossing speed predictors</td>
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<tr>
<td>Distributed power systems</td>
<td>Tangential turnouts (points)</td>
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<tr>
<td>Multi-function couplers</td>
<td>Jointless track circuits</td>
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<tr>
<td>Automatic fuel saving devices</td>
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</table>

Australia’s world leading rail technology showcase can be seen in the Pilbara region of Western Australia where many of the above and other “leading edge” technologies are in use or planned, including the impending introduction of remotely controlled (driverless) trains.

By way of contrast, it is contended that a principal reason for the tardy technology take-up and
comparative scarcity of sophisticated technology applications on other Australian railways lies with uncertainty in the absence of a confidently predicted vision and direction for many parts of the industry and associated inadequate capital investment. Related factors include organisations exhibiting short term thinking and/or being in survival mode and the industry’s ongoing skills deficit (as described above) that tends to inhibit innovative thinking and effective problem solving.

Enunciation of a clear vision for the industry’s future and adoption of “affirmative action” policies that demonstrate confidence in rail’s ability to solidly contribute to sustainable transport outcomes will provide the encouragement and incentives needed for it to progressively apply appropriate technology solutions.

### 3.3.14. Metropolitan Rail Freight and Terminal Interfaces

The operational characteristics of rail passenger and freight services are generally incompatible, particularly in densely trafficked metropolitan areas where the demand for both types of service often tends to conflict during peak commuting periods. In Sydney, to a lesser extent in Brisbane and in future potentially also in parts of Melbourne, the use of common infrastructure to serve both functions results in extended freight curfews that impact heavily on rail efficiency and the suitability of rail freight from a customer perspective. It is therefore of critical importance that urgent action is taken to separate passenger and freight infrastructure in metropolitan areas wherever feasible.

A closely related issue is the increasing problem of truck congestion in capital city port precincts and the growing community backlash from ever increasing heavy vehicle movements through residential areas. To this end, most States have established targets\(^{20}\) for the rail share of containers conveyed from and to port precincts, in the main linked to intermodal terminals or hubs already established or proposed in metropolitan regions that can act as the centre of gravity for industrial activity and which have suitable road access. However, to date, without exception, actual rail shares remain well below these targets. In Melbourne’s case, although rail connections exist, there is presently no rail usage for container transfer between the port and existing metropolitan hubs at Altona and Somerton.

Given the predicted ongoing growth in world trade that is reflected in Australian import/export container throughput at major ports\(^{21}\), it seems inconceivable for economic, environmental and social reasons that truck traffic in and around ports and on roads leading to ports will be allowed to grow proportionately. In future, rail is therefore highly likely to be required to play a major part in linking capital city ports to metropolitan and regional intermodal terminals.

Under these conditions, for the most part, rail freight movements using dedicated shuttle trains will become relatively concentrated and demand levels of efficiency and precision not previously associated with freight train operation. In particular, the viability of short distance rail operations will be very dependent upon intensive asset utilisation\(^{22}\) that is only possible on dedicated corridors. As such, passenger and freight service sharing of major metropolitan rail infrastructure will no longer be feasible and dedicated freight corridors or separate freight tracks will be a necessity.

Closely linked to rail efficiency, terminal operations are critical to the overall logistics chain and can often be the link that has a significant impact on productivity of the overall system. There is an obvious disconnect in some instances between the interests of terminal operators (and particularly stevedores in capital city ports) and those of rail operators, which reflects in interacting delays and extended cycle times for rail services.

These issues can be addressed in part by more appropriate commercial arrangements between the

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\(^{20}\) Published government targets for the proportion of rail movement of containers to and from port precincts are for the Port of Botany (Sydney) 40%, Port of Melbourne 30% and Port of Fremantle (Perth) 30%.

\(^{21}\) For example, container throughput at the Port of Melbourne is expected to increase from 2.1m TEU in 2006/07 “to between five and eight million TEU by 2030” – Victorian Ports Strategic Framework, Department of Infrastructure, Victoria, November 2004, p.9.

\(^{22}\) Other studies by the author suggest that a minimum of three to four complete operating cycles every 24 hours for each train set is an essential pre-requisite for rail container shuttle viability.
parties, however some of the existing terminals are inadequately designed and incapable of achieving efficient rail-side operation. It is also evident that the culture of rail being a stand alone entity and not developing partnering relationships is also contributing to sub-optimal productivity in this area.

In terms of actions to improve terminal interfaces, the overwhelming driver in the first instance is industry co-operation and an understanding, especially by rail operators and also terminal operators, that the full harmonisation of terminal interfaces is a key productivity initiative, as well as a necessity for rail’s viability.

Whilst applicable for all rail corridors, industry comment has been made that the benefits in service quality and competitiveness to be gained from the current East Coast corridor upgrade (e.g. reduced transit times between Melbourne–Sydney-Brisbane) will be negated if access to, and operations at terminals are not fully harmonised with train operations, both in terms of capacity and efficiency.

This requires some form of total industry approach to addressing the issue, especially in relation to anticipated future requirements for the intensive operation of port to metropolitan hub rail shuttles. These “inland ports” should feature full customs and Aquis clearance capability and hence the issue of highly productive, fully harmonised rail/terminal interfaces is especially critical.

Even where major rail operators acquire terminals as a means of integrating services, this does not necessarily imply that terminals/rail operations will be harmonised. Importantly, such harmonisation will be an increasingly critical factor for the success of common user (open access) terminals or for smaller regional operations.

Modern intermodal freight terminals require extensive land holdings to accommodate long trains and provide adequate space for container handling and storage and ancillary functions, however the availability of such sites is extremely limited, especially in or near port precincts or in the developed parts of metropolitan areas. This underscores the urgent need to put in place a policy for land banking to identify, acquire and protect suitable sites that potentially remain available for this purpose, as well as for protection of future freight corridors that will be needed to access such sites.

Efficient terminal interfaces are an increasingly critical factor for rail productivity, and more so in the likely event that increasingly intensive operation of dedicated rail container shuttles will be linking capital city ports with major metropolitan intermodal terminals and hubs.
An equally important requirement is to identify and secure future rail passenger corridors, where possible as part of fully integrated transport corridors that can potentially service rail freight and passenger requirements (on separate tracks) as well as meeting anticipated road network needs. It should be noted that in Western Australia for example all new major road corridor developments are required by regulation to also include provision for a “transit” spine which has enabled that state to be better placed than most to develop extensions to its metropolitan rail network with relative ease and at significantly lower cost.

As a first approach NTC should consider championing an industry forum or undertaking further research involving freight terminal operators as well as road and rail operators to more fully analyse rail/terminal interface issues and opportunities for overall productivity improvement.

A policy framework is needed for evaluating and planning the anticipated intensive operation of dedicated rail container shuttles linking capital city ports to metropolitan hubs and associated infrastructure requirements. The policy should also address processes for land banking to cover future terminal needs and the protection of future freight and passenger corridors.

### 3.3.15. Passenger Intermodal Interfaces

The same issues apply on urban and to a lesser extent regional passenger networks regarding the interface with other modes/operators. Strong evidence exists of enormous potential in the design and configuration of passenger modal interchange infrastructure, high quality information systems and the operating arrangements for much greater take-up of multimodal trips on public transport. This is in preference to continuing reliance on cars or even park-n-ride services involving driving to stations, parking and then riding by train.

Some networks such as the integrated bus and train system of Perth’s Northern Suburbs and recently opened Mandurah corridor have fully integrated all aspects of terminal design, information systems and co-ordination of bus and train services have successfully stimulated public transport growth and more particularly a shift from car dependency.

In Melbourne for example, planning going forward indicates that up to 80% of public transport trips will of necessity be multi-modal and therefore stated public transport policy and already announced public transport projects have an emphasis on planning and implementing integrated services.

However, the immediate situation is that most passenger intermodal interfaces in major capital cities (with the possible exception of Perth) are quite inadequate in relation to current demand and require substantial re-working and expansion if there is to any chance of meeting projected demand let alone serve as an important inducement for modal shift away from complete motor vehicle dependency.

Most government transport authorities are undertaking ongoing reviews of capital city bus service networks and these are generally in expansion mode, with some key initiatives being developed for enhanced service quality and frequency, such as Melbourne’s SmartBus programme. Increasingly, bus routes are being re-configured where practicable to provide feeder services to rail-served nodes, facilitated in most cases by the availability of multi-modal ticketing. However, the facilities for bus/rail interchange are often poorly designed, of inadequate capacity and lack suitably integrated static passenger information displays at many locations, let alone dynamic information systems that provide clearly understandable connectivity between modes.

More seriously, or at least until bus networks and bus service frequencies have been developed to a much more intensive level than is presently the case, there is a significant lack of parking capacity...
(relative to assessed demand) for “park-’n-ride” users at most metropolitan rail stations. For example, customer surveys undertaken in Melbourne suggest that, with an unconstrained supply of free parking spaces at stations, approximately one-third of all existing passengers would utilise a station parking space if one was available. This implies an underlying unsatisfied demand of perhaps up to three times the present supply, excluding potential new users. This is supported by considerable anecdotal evidence of complaints and dissatisfaction from existing rail users regarding increasing difficulty in finding available parking space at stations, even during the early part of the morning peak commuting period.

Almost all existing car park areas at metropolitan stations has been provided on existing rail land, or in a few cases nearby available council property, that was formerly the site of old freight handling facilities or was otherwise unused. Most such land has now been fully developed for this purpose and the only future options at most locations involve the construction of multi-level facilities or acquisition of nearby privately held property.

Other modal interchange deficiencies include a general lack of comfortable passenger waiting spaces and a lack of adequate and sufficiently secure accommodation for bicycles at stations, which are increasingly becoming a mode of choice for access to stations by public transport users.

Overall, it seems highly probable that the inadequacy of feeder bus services to rail stations coupled with a major shortfall in car parking capacity at stations relative to current and predicted demand, are combining to suppress current rail use and hence provide an ongoing deterrent for a mode shift to public transport. This remains a key issue that needs to be tackled in conjunction with the overall objective of establishing a national approach to the urban congestion problem.

Deficiencies in the capacity and suitability of passenger modal interchanges (in particular, bus/rail interchange facilities and park and ride spaces) at many major capital city railway stations are combining to act as a deterrent to mode shift and increased public transport usage. This is a key issue that should be tackled in conjunction with the overall objective of establishing a national approach to the urban congestion problem.

Significant improvements to bus-rail interchanges can facilitate patronage increases on urban rail systems, particularly during off-peak periods when park and ride demand considerably exceeds current capacity.

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24 For example, Melbourne metropolitan rail stations currently provide approximately 32,000 car parking spaces for rail users with average utilisation of approximately 98%. A further 5,000 spaces are currently being provided over a 10-year period.
4. Responding to the Issues

4.1. Overview

The research undertaken in this study has identified a number of issues and impediments to improving productivity within the rail industry in Australia. A number of these issues are considered appropriate for further carriage by government; however there are other issues that the industry itself should be responsible for taking up. This section of the report documents suggested responsibilities for tackling the issues raised in the study, with the objective of improving productivity.

4.2. Responsibility of the Rail Industry

Recommended actions for the industry to take forward are documented in Table 3 below. The actions noted in the table are recommended as the priority actions to take forward.

Table 3 Rail Industry Recommended Actions

<table>
<thead>
<tr>
<th>Rail Industry Recommendations – Responding to the Issues – Priority Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Business and Operational Systems</strong></td>
</tr>
<tr>
<td>The industry itself needs to take a lead role in upgrading business systems as a means of improving productivity. The discussions held with stakeholders, and information gathered from literature research, strongly supports the need for investment in upgraded scheduling and rostering systems that can provide considerable productivity gains.</td>
</tr>
<tr>
<td>Opportunities also exist for providing a range of system applications for both passenger and freight businesses that facilitate improved exchange of information between track managers, train and terminal operators and customers and which can result in reduced terminal dwell times, labour cost savings and overall cycle time benefits. Other applications include trackside monitoring devices that can assist in tracking rolling stock and improve safety through monitoring of vehicle condition and loads.</td>
</tr>
<tr>
<td>Operators and infrastructure managers should be more pro-active in seeking out the latest advances in business systems through cooperation, which can result in a win-win situation. These groups need to behave more like complementors (organisations that complement each other’s activities to improve surplus and productivity), rather than discrete organisations seeking to maximise individual outcomes.</td>
</tr>
<tr>
<td><strong>2. Education and Training</strong></td>
</tr>
<tr>
<td>Workforce downsizing, age profiles and almost continuous quite rapid change within the industry since the mid-1990’s has resulted in a significant problem regarding education and training. Much of the learning in the industry is still “on the job” and is thus passed from one generation to the next. With constant changes in the industry, it is slipping behind other sectors in the economy with respect to innovative thinking and problem solving. Upheaval within the industry has also indirectly resulted in productivity declines due to the loss of skills, experience and corporate memory.</td>
</tr>
<tr>
<td>More effort is needed to better educate and train a workforce beyond the traditional internal learning processes. Symptomatic of this problem is the relatively slow pace of industry technology take-up which is a key impediment to the realisation of productivity gains.</td>
</tr>
<tr>
<td>The industry needs to develop a more comprehensive skills program to provide a wider pool of talented individuals who will bring improved skills to the industry and new ways of thinking – all of which can contribute to productivity improvements. A number of training initiatives are being progressed by the ARA’s Rail Skills and Careers Council and limited post-graduate programs have been developed and implemented through the Rail CRC.</td>
</tr>
<tr>
<td>However, it is recommended that the industry work with Engineers Australia, tertiary institutions and other professional bodies to introduce rail-related subjects as part of undergraduate degrees within the various engineering and other relevant disciplines. This will lift the industry’s profile within the enormous undergraduate population and should provide it with a greater pool of talented individuals to take the rail sector forward over the next 30 years. A similar approach would be of great benefit for other staffing issues facing the rail industry such as the recruitment and retention drivers, and signalling</td>
</tr>
</tbody>
</table>

Rail Industry Recommendations – Responding to the Issues – Priority Areas

This will provide the industry with a greater pool of talented individuals to take the rail sector forward over the next 30 years, who would otherwise end up in other sectors.\(^{26}\)

3. Develop/facilitate the development of a national policy for rail
It is apparent from the work undertaken in this study that the most critical issue facing the rail industry and that is impacting productivity is the lack of a coordinated vision and policy for the future of rail. The industry needs to work closely with the NTC and governments to achieve a strong policy position for rail. This will facilitate greater certainty and investment within the industry, stimulating productivity improvements.

4.3. Issues for Further Consideration by Government

There is considerable scope for government to take steps towards improving productivity in the rail industry. Table 4 below outlines the recommendations for government.

Table 4 Government Recommendations (in suggested approximate priority sequence)

<table>
<thead>
<tr>
<th>Government Recommendations – Responding to the Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Develop/facilitate the development of a national policy for rail</td>
</tr>
<tr>
<td>The most critical issue facing the industry, and that which is impacting on productivity, is the matter of a coordinated policy and vision for the future of rail in Australia. The current situation is a reflection of the past, however a coordinated national approach is required to maximise the potential of the industry and fully realise productivity gains.</td>
</tr>
<tr>
<td>The NTC should take a lead role in the formulation of policy, working closely with the Commonwealth to bring about a strong vision for the future of rail. This must be linked to a strong policy that seeks to achieve maximum benefit from rail’s potential strengths, not just a collection of projects. This will stimulate productivity improvement activity within the industry, as greater surety of the long-term role of rail within the national economy will encourage investment.</td>
</tr>
<tr>
<td>2. Undertake an analytical research exercise to develop key productivity indicators and undertake measurement of such.</td>
</tr>
<tr>
<td>There is much within the literature regarding productivity indicators and measurement thereof for the rail industry. These vary from country to country and through time. The NTC should lead the development of a set of endorsed productivity indicators that highlight actionable areas for performance improvement of rail within Australia, working cooperatively with the industry.</td>
</tr>
<tr>
<td>Once adopted, the NTC should proceed with systematic measurement of those indicators on an ongoing basis to determine whether various initiatives are improving productivity (gauge success) and provide trend line information for updating policies and action plans into the future.</td>
</tr>
<tr>
<td>The industry will need to be forthcoming with relevant information (with appropriate protection of commercial confidentiality) to ensure an understanding that gains are in fact occurring. Reporting should be a mandatory requirement for both private sector and publicly owned organisations.</td>
</tr>
<tr>
<td>3. Develop a policy framework for the future of regional rail networks</td>
</tr>
<tr>
<td>The NTC should develop a policy framework for assessing the overall costs and benefits of retaining and/or rationalising key regional rail freight networks on an efficient and sustainable basis, having regard to national, state and regional impacts. This should take account of all externalities and community benefit and criteria for maximising the efficiency of these networks, including necessary investment.</td>
</tr>
</tbody>
</table>

\(^{26}\) Many universities provide undergraduate students with exposure to a range of disciplines early in their degrees (e.g. structural engineering subjects, road-based traffic subjects). There are limited specialist rail subjects available at an undergraduate level.
### Government Recommendations – Responding to the Issues

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Description</th>
</tr>
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</table>
| 4. | Undertake a study of potential government financial support processes for the private sector to facilitate rail freight initiatives that will improve rail productivity and create new business opportunities for rail freight.  
There is a strong case for investigating potential government financial support for the private sector to facilitate rail freight initiatives that will improve rail productivity and where the wider economic benefits can be captured but are not able to be commercially captured by the applicant. Several overseas schemes of this nature have been very successful in transferring freight from road to rail. |
| 5. | Assist the Commonwealth in the preparation of guidelines for planning for improved urban public transport systems.  
The significant congestion now being experienced in major metropolitan areas of Australia is a national issue, impacting on the economy. It is recommended that the NTC develop a set of guidelines for planning and facilitating upgraded urban public transport systems and land use integration, with the overall objective of establishing a framework for a national approach to the urban congestion problem.  
It is apparent that State Governments do not have the capacity to tackle this problem unless a cooperative approach with the Commonwealth is implemented. These guidelines can facilitate a framework for future investment decisions in urban transport systems. |
| 6. | Provide advice to the Commonwealth in relation to the potential for improved labour productivity, especially on State-owned urban rail networks.  
Having regard to anticipated changes to federal industrial relations legislation, future Commonwealth funding of public sector rail projects, especially for urban passenger networks, should take account of further productivity gains that are potentially achievable from re-negotiation of existing labour agreements and working arrangements. |
| 7. | Lead provision of advice for elimination of multiple State-based rail safety jurisdictions and alignment of current multiple legislative requirements as the impetus for accelerated development of harmonised standards, operating rules and systems for rail, in association with the industry.  
The rail industry within Australia operates under a complex system of regulation and standards. This wastes scarce resources and is an impediment to cross-border operation, overall rail competitiveness and industry productivity.  
A simplified, national approach is required to expedite existing processes for harmonising engineering standards, operating rules and procedures and to consolidate rail safety regulation across the country. The accelerated development of such standards, operating rules and systems logically flows from a positive policy position by the Commonwealth on the future of rail and creation of a single national rail regulator.  
The Commonwealth should take a strong position on the elimination of multiple State-based rail safety jurisdictions and alignment of the existing multiple legislative requirements. NTC should have a critical role in providing relevant advice in this regard. (This model has parallels in the aviation sector). |
| 8. | In association with the CRC for Rail Innovation, undertake detailed research on increasing axle loads and easing other infrastructure constraints.  
Industry representatives have lamented the lack of quality and readily available information on the impacts of increasing axle loads on the freight network – which if undertaken, would generate immediate productivity gains for the industry, as well as enhanced customer service.  
The NTC (in association with the CRC for Rail Innovation) should initiate a research project to examine the extent to which it is possible, and if so by how much, to leverage full capability of the infrastructure by implementing higher axle loads and easing other infrastructure constraints (without involving costly upgrading) on existing freight lines, in conjunction with improved/increased monitoring of asset condition. The project should principally address technical and operational criteria, but also consider financial benefits and life cycle costs. |
| 9. | Develop processes for achieving more efficient rail/terminal interfaces, together with a policy framework for future operation of dedicated rail container shuttles between ports and metropolitan hubs and land banking to protect future terminal and transport corridor needs.  
Efficient terminal interfaces are a critical element for achieving enhanced rail freight productivity. In |
intermodal freight, there is evidence of a disconnect between the interests of rail and terminal operators, especially stevedores at capital city ports. As a first approach, NTC should consider championing an industry forum or undertaking further research involving freight terminal operators as well as road and rail operators to more fully analyse terminal interface issues and opportunities for multi-modal productivity improvement.

A policy framework is also needed for evaluating and planning the anticipated intensive operation of dedicated rail container shuttles linking capital city ports to metropolitan hubs and associated infrastructure requirements. The policy should also address processes for land banking to cover future terminal needs and the protection of future freight and passenger corridors.
5. Conclusions

The fundamental conclusions of this study are as under:

- **Australia needs an efficient 21st Century rail network that is developed and geared around the inherent strengths of the rail mode.** This requires a vision and understanding of how rail, in conjunction with other transport modes, can maximise its contribution to the national economy, the environment and Australia’s urban lifestyle.

- **In turn, the vision needs to be translated into clear policies for action that are more specific in terms of investment and other strategies that can demonstrate economic, environmental and social benefits not readily achievable by other means. “Affirmative action” policies should project a new future for rail that will progressively deliver more sustainable transport outcomes and productivity gains.** Left to market forces alone, not much will change.

- A limited number of key productivity indicators that highlight actionable areas for performance improvement should be established and reported on an ongoing basis to provide trend line data for informing policy development and action plans. Reporting should be a mandatory requirement for both private sector and publicly owned organisations;

- A policy framework is urgently needed for assessing the overall costs and benefits of retaining key regional rail freight networks on an efficient and sustainable basis, having regard to national, state and regional impacts;

- There is a strong case for government financial support for the private sector to facilitate rail freight opportunities that will improve rail productivity and where the wider economic benefits can be captured but are not able to be commercially captured by the applicant;

- The very significant congestion now being experienced in Australia’s major metropolitan areas is impacting on the national economy. **There is an urgent need to develop guidelines for planning and facilitating integrated urban public transport systems and land use, with the overall objective of establishing a national approach to the urban congestion problem;**

- Deficiencies in the capacity and suitability of passenger modal interchanges (in particular, bus/rail interchange facilities and park and ride spaces) at many major capital city railway stations are combining to act as a deterrent to mode shift and increased public transport usage. This issue should be tackled in conjunction with a national approach to urban congestion;

- The continuing policy uncertainty and unnecessary complexity created by differing State-based engineering standards, operating rules and systems and multiple safety regulation jurisdictions will continue to restrict efforts to maximise productivity gains in the industry as a whole. Commonwealth legislation for a national rail regulator would provide the impetus for achieving genuine uniformity of rail safety legislation across jurisdictions and for serious progress towards harmonisation of standards, operating rules and systems;

- The rail industry is facing serious skill deficiencies and continues to place heavy reliance on “on the job” learning. **This is a factor in the industry’s relatively slow pace of technology take-up. Notwithstanding existing initiatives, a more comprehensive skills program is badly needed which can contribute to productivity improvements.** The industry should work with relevant professional bodies and tertiary institutions to introduce rail-related subjects as part of relevant undergraduate degrees and other courses;

- A much more rapid take-up of modern business and operational systems by the industry will have significant productivity benefits in the form of increased asset and labour utilisation and improved customer service. Appropriate applications will also improve operational interfaces between above and below rail operators, terminals and customers;

- Opportunities still exist for significant improvements to labour productivity, particularly on urban passenger networks. In conjunction with potential Commonwealth Government initiatives to address urban congestion through public transport support and anticipated changes to industrial relations legislation, **State governments should ensure that rail operators are obliged to**
progressively re-negotiate existing agreements and working arrangements;

- Modest increases in permissible axle loads and easing of other infrastructure constraints will have immediate and significant productivity benefits. This should be the subject of an early research project (probably involving the CRC for Rail Innovations) which should address technical and operational criteria, as well as financial benefits (and how these might best be shared between above and below rail operators) and life cycle costs;

- Efficient terminal interfaces are a critical element for achieving satisfactory rail productivity. In the intermodal freight business, there is evidence of a disconnect between the interests of rail and terminal operators, especially stevedores at capital city ports. As a first approach NTC should consider championing an industry forum or undertaking further research involving freight terminal operators as well as road and rail operators to more fully analyse terminal interface issues and opportunities for multi-modal productivity improvement;

- A policy framework is needed for evaluating and planning the anticipated intensive operation of dedicated rail container shuttles linking capital city ports to metropolitan hubs and associated infrastructure requirements. The policy should also address processes for land banking to cover future terminal needs and the protection of future freight and passenger corridors;

In combination, the foregoing represents a major opportunity for the rail industry to take a giant stride forward in productivity improvement and thus be a more competitive and profitable part of the transport sector and indeed benefit the overall economy and the environment. There are a number of significant challenges that must be overcome, many of which are a legacy of actions from over 100 years ago, however the sector must look forward to realise its potential; and

The NTC, in its own right and through advice to government, has a major role to play in supporting the industry in reaching this potential and this study has identified a number of key actions to take forward. The recommended list of priority actions is not an exhaustive list of actions for improving productivity, but presents a manageable list of actions that can be achieved over the next 2-3 years and provide a platform for tackling more issues into the future.

As one operator described in a meeting held as part of this study –

“If we could seriously improve productivity, I could potentially triple the amount of business. My customers want to grow, but there are too many things impacting my ability to improve productivity and grow with them.”
## Appendix 1: Productivity Indicators

1. **UIC/OSZhD Indicators** (Source: United Nations, 2002)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Labour productivity: (distinguishing between high-speed and conventional rail transport)</td>
<td>employees/km of network in use&lt;br&gt;net ton-km = passenger-km/employee</td>
</tr>
<tr>
<td>(b) Productivity of freight transport:</td>
<td>per km:&lt;br&gt;- gross ton-km/km of network&lt;br&gt;- net ton-km/km of network&lt;br&gt;per employee:&lt;br&gt;- gross ton-km/employee&lt;br&gt;- net ton-km/employee</td>
</tr>
<tr>
<td>(c) Productivity of passenger transport: (distinguishing between high-speed and conventional rail transport)</td>
<td>per km: passenger-km/km of network&lt;br&gt;per employee: passenger-km/employee</td>
</tr>
<tr>
<td>(d) Productivity of traffic: (distinguishing between high-speed and conventional rail transport)</td>
<td>net ton-km = passenger-km/km of network</td>
</tr>
<tr>
<td>(e) Productivity of locomotives: (distinguishing between high-speed and conventional rail transport)</td>
<td>gross ton-km/locomotive</td>
</tr>
<tr>
<td>(f) Productivity of wagons:</td>
<td>net ton-km/wagon</td>
</tr>
<tr>
<td>(g) Productivity of lines: (where necessary only on railway lines to be determined)</td>
<td>passenger train-km + freight train-km/km of network</td>
</tr>
<tr>
<td>(h) Energy consumption (for traction power):</td>
<td>MJ/1600 gross ton-km</td>
</tr>
</tbody>
</table>


- Diesel locomotive availability (%)
- Operating ratio with normalization
- Operating ratio without normalization
- Average load, freight (km)
- Average load, passenger (km)
- Freight tonne-km per wagon (000)
- Employee productivity
- Employee per km of line
- Total wages per total revenues
- Ratio of passenger fares to freight rates
- Traffic density (000 of TU per km)
- Passenger wagons productivity (000 of pkm per wagon +MU)
- Locomotive productivity (000 of TU per locomotive +MU/MU factor)
- Freight wagon productivity (000 of ton-km per wagon)
- PPP passenger revenue per pass-km (ICP)
- PPP freight revenue per ton-km (ICP)
- Official exchange dollars passenger revenue per pass-km
- Official exchange dollars freight revenue per ton-km
- PPP passenger adjustment factor
- Adjusted PPP passenger revenue per pass-km (ICP)
- PPP freight adjustment factor
- Adjusted PPP freight revenue per ton-km (ICP)

<table>
<thead>
<tr>
<th>Productivity Ratios</th>
<th></th>
<th>Employee Productivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freight revenue per net tonne-km</td>
<td></td>
<td>Staff (total number of employees)</td>
</tr>
<tr>
<td>○ current local currency</td>
<td>- permanent</td>
<td></td>
</tr>
<tr>
<td>○ constant local currency</td>
<td>- temporary</td>
<td></td>
</tr>
<tr>
<td>○ constant dollars</td>
<td>- total</td>
<td></td>
</tr>
<tr>
<td>Freight system traffic density</td>
<td></td>
<td>Estimated non-rail employees</td>
</tr>
<tr>
<td>○ tonne-km/km (000 000)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Passenger system traffic density</td>
<td></td>
<td>Freight (tkm/employee (000))</td>
</tr>
<tr>
<td>○ passenger-km/km (000 000)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wagon utilization</td>
<td></td>
<td>Passenger (pkm/employee (000))</td>
</tr>
<tr>
<td>○ freight net tonne-km/total wagons (000)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average freight train lead (net tonnes)</td>
<td></td>
<td>Traffic units /Employee</td>
</tr>
<tr>
<td>Average gross tonnes per wagon hauled</td>
<td>(tkm = pkm/total employees (000))</td>
<td></td>
</tr>
<tr>
<td>Average gross tonnes per train operated</td>
<td>(tkm = pkm/total rail employees (000))</td>
<td></td>
</tr>
<tr>
<td>Gross tonne-km/freight train (000)</td>
<td></td>
<td>Total employees/Total km of line</td>
</tr>
<tr>
<td>Fuel consumption (litres) (000 000)</td>
<td></td>
<td>Total rail employees/Total km of line</td>
</tr>
<tr>
<td>○ total consumption on main line and in yards</td>
<td></td>
<td>Revenue and Cost (current and constant local currency and constant $)</td>
</tr>
<tr>
<td>○ others (rail diesel cars)</td>
<td>- Total wages (000 000)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Total wages/employee</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Total wages/total revenues</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Total wages/traffic units</td>
<td></td>
</tr>
</tbody>
</table>


**General Operations**

1. Average train speed (train-kilometres divided by train-hours)
2. Average number of wagons per train (wagon-kilometres divided by train-kilometres)
3. Average haul (revenue tonne-kilometres divided by revenue tonnes)
4. Gross and revenue tonnes per train (gross tonne-kilometres divided by train-kilometres, revenue tonne-kilometres divided by train-kilometres)
5. Train-switching-hours and train-switching-kilometres as percentages of total train-kilometres and train-hours
6. Revenues and expenses per train-kilometre, per revenue tonne-kilometre
7. Ratio of revenue tonne-kilometre to gross tonne-kilometre
8. Gross tonne-kilometre per tonne or litre of fuel
9. Ratio of expenses to revenues
10. Ratio of loaded to total wagon-kilometres

**Locomotives**

1. Locomotive unit-kilometres (road, train-switching, and yard-switching)
2. Locomotive switching-unit-kilometres as a percentage of total locomotive unit-kilometres
3. Locomotive unit-kilometres or locomotive-hours per serviceable locomotive-day
4. Gross and revenue tonne-kilometres per serviceable locomotive
5. Average number of wagons per locomotive (wagon-kilometres divided by locomotive road-unit-kilometres)
6. Gross tonne-kilometres per locomotive road-unit-kilometres
5. UN Suggested-Indicators (Source: United Nations, 2002)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Measure</th>
<th>Best practice*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Efficient service delivery</td>
<td>Price (US$ per freight ton km)</td>
<td>&lt; 2 €</td>
</tr>
<tr>
<td></td>
<td>Price (US$ per passenger km)</td>
<td></td>
</tr>
<tr>
<td>Service quality</td>
<td>Average train speed (km/h) (urban, local, intercity, etc.)</td>
<td>95 %</td>
</tr>
<tr>
<td></td>
<td>% of arrivals less than 15 min. late</td>
<td></td>
</tr>
<tr>
<td>Safety</td>
<td>Train accidents (per million train km)</td>
<td></td>
</tr>
<tr>
<td>Accessibility</td>
<td>Network density (route km/km²)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Freight ton km / US$ GDP (P. P. Parity)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rail share of rail = truck ton km</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rail passenger km as % of passenger km + ton km (%)</td>
<td></td>
</tr>
<tr>
<td>Environment quality</td>
<td>Kj of energy per converted ton km</td>
<td></td>
</tr>
<tr>
<td>Financial sustainability</td>
<td>% of costs covered from internal cash generation Real return on total gross assets (%)</td>
<td>&gt; 100 USA</td>
</tr>
<tr>
<td>Capital</td>
<td>Track operated under slow orders on rack and structures</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- route km</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- % total km</td>
<td></td>
</tr>
<tr>
<td></td>
<td>km travelled per available locomotive/day</td>
<td></td>
</tr>
<tr>
<td>Management</td>
<td>Ratio of average passenger tariff to average freight tariff (based on US$ per km) (%)</td>
<td>&gt; 2.0 Europe</td>
</tr>
<tr>
<td></td>
<td>Locomotive availability (%)</td>
<td>90 USA</td>
</tr>
<tr>
<td></td>
<td>Freight and passenger wagon availability (%)</td>
<td>&gt; 90% USA Europe</td>
</tr>
</tbody>
</table>
# Appendix 2: Key Issues Log

## Inputs

<table>
<thead>
<tr>
<th>System Element</th>
<th>Issues</th>
</tr>
</thead>
</table>
| Freight        | • Lack of long-term vision for Australian freight transport and logistics network  
                 • Need for Commonwealth leadership on maximising economic and environmental efficiency of freight transport and logistics chains  
                 • Improving incentives for private sector investment in transport infrastructure  
                 • Uniformity of rail safety regulation  
                 • Harmonisation of rail operating rules and systems  
                 • Creating a ‘level playing field’ across modes  
                 • Lack of appropriate investment in strategic rail infrastructure. (Present AusLink program insufficient to address future needs)  
                 • Insufficient consideration of environmental factors in setting freight infrastructure investment priorities  
                 • Desirability of stimulating above rail competition / entry hurdles inhibiting competition  
                 • Transferring some risk associated with grain production volatility to grain industry (e.g. wagon fleet ownership)  
                 • Increased government support for industry innovation |
| Passenger      | • Integration of public transport and land use  
                 • Commonwealth support for urban public transport investment  
                 • Taxation and other incentives for increased modal shift to public transport  
                 • Need for long term planning of public transport networks  
                 • Creating and protecting reservations for future rail corridors |
| Freight        | • Degradation of regional freight infrastructure networks, especially grain lines  
                 • Rationalisation of regional networks to optimise commodity logistics  
                 • Scope for increased permissible axle loads  
                 • Matching corridor capacity to optimum train size and frequency  
                 • Maximising train mass net/gross ratios  
                 • Improving existing rolling stock durability, permitted speeds and/or load capacity |
| Passenger      | • Adopting operational (non-investment) measures to maximise practical network capacity  
                 • Investment to maximise capacity of existing infrastructure (e.g. signalling/train control/ATO)  
                 • Changing operations or infrastructure to eliminate conflicting train movements  
                 • Creation of additional infrastructure capacity (new track) where other options have been exhausted  
                 • Investment in new corridors to support urban growth and/or renewal  
                 • Improved vehicle design to optimise passenger capacity (relative to journey duration) and minimise station dwell time |
| Freight        | • Optimising the wheel-rail interface  
                 • Challenging existing design standards through risk assessment to minimise life-cycle costs  
                 • Optimising vehicle designs for maximum maintainability and reliability  
                 • Providing infrastructure to minimise freight/passenger service conflicts |
## System Element

<table>
<thead>
<tr>
<th>Labour</th>
<th>Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freight</td>
<td>• Minimising operational cycle times</td>
</tr>
<tr>
<td></td>
<td>• Effective use of train crews (especially for non-continuous operations)</td>
</tr>
<tr>
<td></td>
<td>• Upgrading terminal operations (efficiency and throughput) to facilitate improved train crew productivity.</td>
</tr>
<tr>
<td></td>
<td>• Expansion of driver-only operation and remote-control shunting</td>
</tr>
<tr>
<td>Passenger</td>
<td>• Insufficiently productive train crew rostering</td>
</tr>
<tr>
<td></td>
<td>• Improving integration of train crew rostering and timetables</td>
</tr>
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<td></td>
<td>• Disproportionate demand for crew hours during peak periods</td>
</tr>
<tr>
<td></td>
<td>• Increasing systems automation</td>
</tr>
<tr>
<td>Freight Passenger</td>
<td>• Eliminating remaining inefficient work practices and limitations</td>
</tr>
<tr>
<td></td>
<td>• Increasing multi-skilling and job sharing</td>
</tr>
<tr>
<td></td>
<td>• Skills – addressing loss of skills/knowledge transfer/training and skills development</td>
</tr>
<tr>
<td>Access</td>
<td>• Minimising operational cycle times</td>
</tr>
<tr>
<td></td>
<td>• Facilitating practical freight train access on passenger networks</td>
</tr>
<tr>
<td></td>
<td>• Effectiveness of mutual recognition</td>
</tr>
<tr>
<td></td>
<td>• Challenge presented by multiple safety regulatory jurisdictions – varying interpretations</td>
</tr>
<tr>
<td></td>
<td>• Harmonisation of operating rules across jurisdictions</td>
</tr>
<tr>
<td></td>
<td>• Inappropriateness of ‘one size fits all’ rail safety accreditation</td>
</tr>
<tr>
<td></td>
<td>• Pricing structures that discourage short-haul freight operations</td>
</tr>
</tbody>
</table>

## Environment

<table>
<thead>
<tr>
<th>System Element</th>
<th>Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broader economic and physical environment</td>
<td>Freight Passenger</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Markets</td>
<td>Freight</td>
</tr>
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<tr>
<td></td>
<td>Passenger</td>
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<tr>
<td></td>
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<tr>
<td>Customers</td>
<td>Freight Passenger</td>
</tr>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>System Element</td>
<td>Issues</td>
</tr>
<tr>
<td>-----------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Project Planning and Delivery           | • Inadequately defined project objectives and project scoping  
• Poor cost estimating and control - risk aversion – projects to improve productivity are abandoned, deferred, down-scoped  
• Poor constructability planning  
• New equipment does not perform as expected (e.g. poor quality control, scope error, contractual inadequacies)                                                                                                                                               |
| Business Systems                        | Freight  
• Inadequate systems / investment in systems to optimise train scheduling and crewing  
• Legacy of outmoded business processes  
• High upfront costs for major overhaul of systems  
• Excessive customisation and reluctance to embrace alternative systems                                                                                                                                                                                                        |
|                                          | Passenger                                                                                                                                                                                                                                                   |
| Train Operations                        | Freight  
• Unsatisfactory matching of service plans to customer requirements  
• Unreliability of train performance against schedule  
• Inadequate availability of appropriate motive power/rolling stock resources  
• Optimising transit times against energy consumption  
• Excessive train cycle times                                                                                                                                                                                                                                             |
|                                          | Passengers                                                                                                                                                                                                                                                 |
| Maintenance                             | Freight  
• Funding availability, resulting in insufficient maintenance activity, or compromised activities  
• Short-term expediency leading to long-term increases in life cycle cost  
• Need for more rigorous systematic approaches to maximising equipment reliability  
• Lack of continuous improvement in minimising maintenance downtime  
• Matching maintenance facilities and practice to current and future technology                                                                                                                                                                                |
|                                          | Passenger                                                                                                                                                                                                                                                   |
| Terminal and Intermod                   | Freight  
• Unreliability of train arrivals against schedule  
• Inability/unwillingness of terminal operators to unload and load trains in a timely fashion  
• Constrained flexibility of terminals, due to layout and operations (configuration, equipment, loading and discharge rates)  
• Lack of discipline in terminal operation, including inadequate priority to rail  
• Documentation/information flow between entities                                                                                                                                                                                                                 |
|                                          | Passenger                                                                                                                                                                                                                                                   |
| Institutional interfaces                | Freight  
• Processes to optimise trade-offs between above and below rail organisations  
• Systems to optimise the wheel/rail interface and create ‘win-win’ situations  
• Need for a genuine ‘one stop shop’ for operator access across jurisdictions  
• Discontinuity and loss of focus due to ongoing industry acquisitions and re-structuring.                                                                                                                                 |
|                                          | Passenger                                                                                                                                                                                                                                                   |
### Innovation

<table>
<thead>
<tr>
<th>System Element</th>
<th>Issues</th>
</tr>
</thead>
</table>
| Innovation     | • Excessive short-term focus and unwillingness to invest in research and development.  
|                 | • Poor understanding of the potential for productivity improvement through R & D  
|                 | • Excessive internal focus leading to unawareness of successful innovation elsewhere  
|                 | • Loss of corporate knowledge and experience resulting in reduced ability to identify opportunities for technical innovation  
|                 | • Industry too slow to embrace change  
|                 | • No perceived incentive to take up innovative technologies |
| Freight Passenger |       |
| Passenger       |       |
Appendix 3: Industry Workshop Notes

INPUTS

<table>
<thead>
<tr>
<th>System Element</th>
<th>Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government Policy</td>
<td>Freight</td>
</tr>
</tbody>
</table>

- Most governments do not want to run railways, especially “above rail” operations, preferring the private sector to do this. For other than large scale bulk operations, there seems to be a considerable disjoint between the return on investment expected by the private sector and what governments consider ‘value for money’. This results in a need for some form of subsidy by governments if services are to be sustained. There has been a tendency to set this subsidy below that which private interests could make if funds were invested in other rail or transport ventures. An obvious example is the threat to continued operation of regional grain networks in Victoria and NSW. This is the difference between the commercial and economic benefits.

- Building on the above, there is an issue of the role of government in financing or subsidising railway networks (e.g. regional) that may not have an adequate commercial return, but are seen as being in the community interest or in support of government policy objectives.

- The above points raise key policy questions that should lead other decisions – what is the position of governments (at a federal and state level) regarding rail? – Do they want rail? If so, where and to what extent? (E.g. are regional grain networks and/or metropolitan port container shuttles wanted and what should be rail’s target market share?). The market cannot resolve these issues and clear direction is required from government.

- There are two related policy questions – Where does government want competition between rail operators? (e.g. long-haul interstate links; regional intrastate grain networks, etc.) – Where does government want public or private investment? Without these key policies and mechanisms to give them effect, there can be no certainty for the private sector or other stakeholders.

- Research may be required to develop better mechanisms to provide appropriate levels of subsidy, provide reasonable commercial returns, provide incentives for ongoing efficiency improvement and keep some competitive tension.

- Greater incentive is required for private sector investment in rolling stock (additional to the fixed-infrastructure comment from the issues paper).

- The taxation system could be better utilised for providing investment incentives.

- There is insufficient leadership by government to generate support for long-term investment in rail. Governments have levers that can be pulled to allow rail to maximise its potential effectiveness. Perhaps the industry needs something akin to the Button Plan for the automotive industry to guide policy over the next 10-20 years?
<table>
<thead>
<tr>
<th>System Element</th>
<th>Issues</th>
</tr>
</thead>
</table>
| Freight        | • Is the Auslink policy a sufficient/appropriate framework for evaluating projects? The decision making process for AusLink is not transparent and should be. It was also noted that AusLink funding is not directly accessible by the private sector.  
• Short election cycles (e.g. 3 years for Commonwealth and Queensland) hinder long-term thinking and investment by government.  
• There needs to be a reduction in barriers between States to consider the network from a total national (including regional) system perspective, especially where cross-border operations are involved and to provide the lowest cost paths to ports for export commodities. Realistically, this is a role for the Commonwealth. This could help inform plans for overall network connectivity and the future of regional rail networks.  
• ‘One size fits all’ is not necessarily the best approach to standards and regulations. Some of these factors provide too high a barrier to entry to the industry in areas where some relaxation does not impair safety. There is a need to recognise that the future of regional rail freight and specialised operations (e.g. port links) require different regulatory and access/pricing/accreditation models. |
| Passenger      | • Urban congestion in Australian capital cities is now acknowledged as imposing serious costs on the overall economy. This supports the thinking that the Federal Government should play a major role in public transport investment, as it does for urban roads. A counter-argument was put that benefits in urban rail are too localised for the Federal Government to play an effective role.  
• The existing taxation system provides disincentives for public transport use, e.g. the FBT regime and tariff concessions for imported 4WD vehicles. These measures are long overdue for review.  
• State Governments are unlikely to have sufficient financial capacity to adequately invest in urban systems in order to support future growth and/or make any impact on urban congestion, thus Federal and/or private sector support will be required.  
• Public transport users may not pay enough during peak periods (given fleet and infrastructure capacity requirements are based on peak needs) but this should be related to the perceived costs of available alternatives, e.g. road congestion pricing or car parking levies.  
• Where applicable, franchise periods are generally too short and work against long-term objectives. |

Opportunities raised:  
1. NTC could research appropriate mechanisms for the sustainability of freight services and/or network infrastructure required by governments (e.g. regional grain networks) that provide best “value for money” for governments whilst providing adequate financial returns for private sector operators.  
2. NTC could look at differential regulations for rail operations in varying environments;  
3. NTC could develop frameworks to advise governments on incentive mechanisms for investment in the future for rail.
<table>
<thead>
<tr>
<th>System Element</th>
<th>Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assets – configuration / capability / capacity</td>
<td>Freight</td>
</tr>
<tr>
<td></td>
<td>• There is a need to carefully examine increases in rail axle loads to leverage full capability of the infrastructure. The road industry has had the benefit of successive increases in permissible gross mass, but not enough has occurred on rail. This is historically a cultural issue where the industry is very conservative and risk adverse. There needs to be a push to extract more out of the infrastructure backed up with improved/increased monitoring of asset condition. A relatively small increase in axle load can result in marked improvement in productivity (e.g. a 4t increase in permissible axle load from 19t to 23t with a typical 2t increase in wagon tare weight can yield a 14t increase in product carry per wagon.).</td>
</tr>
<tr>
<td></td>
<td>• There is a lack of appropriate asset registers and a need for improvement in asset management practices. This is primarily a responsibility of the industry and it has the capability to do so.</td>
</tr>
<tr>
<td></td>
<td>• The opportunity for certain key assets to be shared between competing operators should be maximised in parallel to those being used for competition. There needs to be a commercial incentive for both parties – North American railroads show considerable maturity in this regard where it is seen that collaboration in asset utilisation is mutually beneficial.</td>
</tr>
<tr>
<td></td>
<td>• There is considerable potential to get more out of both above and below rail assets through better utilisation and reduced cycle times.</td>
</tr>
<tr>
<td></td>
<td>• People do not always appreciate the long life of rail assets which can impact investment expectations and decisions. This may be a need for improved education of those outside the industry.</td>
</tr>
<tr>
<td>Passenger</td>
<td>• Inadequate maintenance practices and defective components result in unsatisfactory rolling stock reliability and availability on some networks. Continuous improvement through well established asset management practice is a critical issue for delivering increased fleet utilisation on these systems.</td>
</tr>
<tr>
<td>Freight Passenger</td>
<td>• The wheel-rail interface is a critical issue and industry should work towards national standards and a much better understanding of the critical trade-offs. The cost, operational and safety impacts of this issue is often poorly understood and is an obvious area for improved collaboration and education, to the mutual benefit of above and below rail operators.</td>
</tr>
<tr>
<td>Labour</td>
<td>Freight</td>
</tr>
<tr>
<td></td>
<td>• There was mixed debate on industrial issues – one side indicated management needed to work more collaboratively with unions that can be receptive to reform if fully involved; the other side suggested unions were still holding back the industry.</td>
</tr>
<tr>
<td></td>
<td>• The industry still has numerous examples of unsatisfactory work practices that can be readily changed through the application of appropriate technology and comprehensive risk assessment. Examples include extended application of Driver Only Operation (DOO) and remote controlled shunting or train placement at terminals.</td>
</tr>
<tr>
<td>Passenger</td>
<td>• There is evidence of continued poor rostering practices on some networks with resultant unsatisfactory productivity of train crew and other on-train staff in particular.</td>
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<td>• Justification for the continued use of Guards on some urban systems was questioned, especially in the light of Melbourne’s successful Driver Only operation of metropolitan trains for over a decade.</td>
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### System Element

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<thead>
<tr>
<th>System Element</th>
<th>Issues</th>
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<tbody>
<tr>
<td>Freight Passenger</td>
<td>Opportunities raised:</td>
</tr>
<tr>
<td></td>
<td>1. NTC could publicise productivity issues to help stimulate change (labour issues/union issues).</td>
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<td></td>
<td>2. OH&amp;S problems were indicated as not being union problems – NTC could examine conditions imposed by other authorities.</td>
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<tr>
<td>Access</td>
<td></td>
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<tr>
<td>Freight</td>
<td>• No specific issues raised.</td>
</tr>
<tr>
<td>Passenger</td>
<td>• No specific issues raised.</td>
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### ENVIRONMENT

<table>
<thead>
<tr>
<th>System Element</th>
<th>Issues</th>
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<tbody>
<tr>
<td>Broader economic and physical environment</td>
<td>• A supportive environment is required to support rail investment. The industry needs to fully leverage increasing community and business concerns regarding ‘peak oil’, carbon emissions, climate change and urban congestion in ways that encourage widespread attitudinal change towards rail – both internal and external to the industry.</td>
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<td>• A better understanding is required of the long-term inputs that rail can effectively respond to (e.g. the big picture planning environment – forecasts; demographic changes, industry development, overall economic climate, etc).</td>
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<tr>
<td>Markets</td>
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<tr>
<td>Freight</td>
<td>• Rail management often fails to properly understand market and customer requirements. Conversely, many freight users and logistics providers lack an understanding of rail strengths and potential.</td>
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<td></td>
<td>• On regional rail networks, there is too much concern about intra-rail competition over a relatively small pie. Some competition is important, e.g. on major, high volume routes/services. On low volume networks, it is a ‘horses for courses’ approach that is required. Options may include a return to vertical integration, facilitation for entry of regionally based ‘short line’ operators, CSO type service contracts, etc.</td>
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<td>• Operators do not show enough initiative in attracting customers and identifying new markets, etc.</td>
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<td>• Customers pushing risk onto logistics providers through KPI's in contracts. The logistics providers must generally have a road-based capability due to rail reliability/pricing issues. Inadequate service guarantees from rail (and often blame shifting occurs) makes road more attractive.</td>
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<tr>
<td>Passenger</td>
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<tr>
<td></td>
<td>• Railways have not done enough to attract passengers. Patronage growth has generally been due to negative external forces such as fuel prices and congestion and has little to do with customer inducement through improved service.</td>
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<tr>
<td></td>
<td>• Operators do not show enough initiative in attracting customers and identifying new markets, etc.</td>
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<td></td>
<td>• TransPerth is an exception to these comments.</td>
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<tr>
<td>Customers</td>
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<tr>
<td>Freight</td>
<td>• There is a disconnect between the needs of the provider and the needs of the passenger in urban rail systems.</td>
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<td>• Effectiveness of rail service delivery leaves a lot to be desired in many cases, due to limited customer focus.</td>
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<tr>
<td>Passenger</td>
<td>• Customer service provided by the industry needs significant improvement.</td>
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</table>
What do customers really want? Frequency, reliability, reduced transit times? Much more market research is needed.

Inadequate passenger information systems, particularly for urban systems (potential learning from Perth?)

Rail service providers need stronger financial incentives to lift overall network performance.

### PROCESSES

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<tr>
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</table>
| Project Planning and Delivery       | Projects that seek to achieve optimum outcomes from rail over the long term need to be properly “sold” to offset shareholder expectations for short term gain.  
• Insufficient planning undertaken to provide greater certainty to stimulate investment (e.g. protecting land for future corridors and terminals). This links to policy at a federal level and is a significant role for states.  
• There at times is a competence issue in effective rail project planning and delivery.  
• Planning for future rail corridors should consider co-locating road and rail corridors.  

**Opportunities raised:**  
It was considered that getting more knowledge into the public domain on the importance of long term strategic planning and appropriate project planning for the industry was important. NTC could get involved in publishing frameworks/templates for transport plans etc. |
| Business Systems                    | Information transfer between above and below rail operators and between modes at terminals still requires considerable streamlining in many cases.  
• What role does carbon trading have in the future? |
| Train Operations                    | There needs to be more fuel saving initiatives (e.g. use of driver simulators, technical improvements, etc) that can directly improve the ‘bottom line’ and thus free up resources for other efficiency improvements.  
• Communications problems and some adversarial relationships exist between some above rail and below rail providers to the detriment of overall industry efficiency. A more mature approach would indicate strong collaboration to achieve ‘win-win’ outcomes, e.g. improved energy efficiency. |
| Maintenance                         | Sound infrastructure maintenance practice is discarded in some cases in the quest for short term financial gain.  
• Inadequate maintenance practices and defective components result in unsatisfactory rolling stock reliability and availability on some networks. Continuous improvement through well established asset management practice is a critical issue for delivering increased fleet utilisation on these systems. |
| Terminal and Intermodal interfaces  | Must better manage interfaces along the logistics chain to benefit the end customer.  
• No ‘penalty’ on terminal operators (or lack of understanding of implications) if the logistics chain is ‘held up’. Operators or track managers can also hold up services en-route, with major flow-on impacts at terminals.  
• The capacity and/or layout of some terminals to efficiently interface with rail operations can be a major issue |
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<tr>
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<td>• A mismatch between terminal and line haul performance is a problem – this can be due to lack of suitable equipment, inappropriate equipment utilisation; cultural, industrial or institutional problems.</td>
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<td>• Pricing established by terminals or stevedores can adversely impact short-haul operations.</td>
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<tr>
<td>Passenger</td>
<td>• Interchange facilities between modes are often not customer friendly and lack integrated passenger information.</td>
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<tr>
<td>Institutional interfaces</td>
<td>Freight Passenger</td>
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**INNOVATION**

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<th>System Element</th>
<th>Issues</th>
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<tr>
<td>Innovation</td>
<td>Freight Passenger</td>
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<td>Freight Passenger</td>
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Appendix 4: Rail Operators Workshop Notes

Government Policy

- Policy a national problem - Government doesn’t appear to have a clear policy or strategy on freight that departments can get behind.
- The Commonwealth will get interested because it is an interstate issue.
- Conflicting issues around privatisation of ports – who’s motivated by the movement of goods? Standard gauge e.g. not really a net state benefit, more so a federal benefit.
- What is pushing things is to get volume through their asset.
- Passenger is beyond capability/capacity for state governments to fund it – either private sector or federal government will be required. FBT playing around the edges – pricing needs capacity accordingly.
- Do you want a railway? Yes/No? What do you want it to do? Bulk? Passenger? Intermodal freight? If you know what you want to do, then everything else can happen from it. These are questions for Government (Commonwealth).
- If Commonwealth make that statement, everyone will expect them to fund it – that is what the Commonwealth is concerned about. E.g. regional grain lines. If you want them for social reasons, invest in them, if you don’t, rip them up as they can’t make money.
- Structure of the NTC is a problem – surely if interested in productivity; should be a statutory authority reporting to a board – it has no independence, and only takes forward things that have got an agreement before hand.
- NTC has no powers, it can only report. Funded by the States.
- Rail Safety Reform is an example of the process being flawed. Single regulator should be in place.
- Regulation is too strong.
- Why are there different standards between road and rail? E.g. truck accident kills two people in a car. OHS doesn’t come. If train hits car, they do. Why not consistent – should be consistent and based on risk.
- Different expectations from different modes of transport – e.g. drivers on trucks compared to rail. Why is there this difference? Similar with loads for trucks compared to rail.
- Thus policies are different road versus rail – not well thought through and they do not compete equally at the moment.
- National uniform rail safety regulations – attempt made but it doesn’t appear to be working – latest evidence is NSW free from risk rather than what is practical. Silly situation. Benefits are very small.
- No set of Australian Standards for railway technical issues – why does the industry have to write these?
- Pricing mechanism – 40% costs is track access. This needs to be passed onto the customer. Negligible contribution on road – fuel is only 6-8% of costs as had experience in road industry. It is not a level playing field.
- Misalignment of commercial needs versus public benefit – misalignment of objectives. Above rail like trucks – private, below rail state owned.
• Road funds are easy to access.
• Cost of roads is high for heavy trucks.
• Government might need to subsidise below rail.
• Federal Government should run freight networks.

**Assets**
• Rostering/control/scheduling of the assets, most of the decision support software is nonexistent – so many movements and assets- scheduling is very manual – needs modest investment to get good gains. 90% of time spent devising a solution, could spend 90% of time optimising a solution.
• Collaboration important between agencies.
• Maintenance, scheduling, timetabling a decade behind manufacturing.
• Shifting maintenance from time based to reliability based.
• Total cost structure to high.
• Age of assets if looked after properly could get more out of them – e.g. Japan has old assets.
• Applicability of North American interchange agreements – NTC should look at. Allow a set rate. Pre-privatisation had this. Now subject to competition rules – but if in public interest, we could get waiver. Productivity more important than argument for competition.
• Lack of science in axle loads there must be more research into this and NTC should champion this.
• Road industry gets more efficient managing cycle time more intensely than rail.
• Fit for purpose railways, not over-engineered railways.
• Loading/unloading infrastructure needs improvement.
• Don’t fragment rules and regulations too much.

**Labour**
• Not enough attention to detail – cultural problem is big – underlying lack of education – learnt from forefathers.
• Education provides opportunity for step changes.
• Not enough people thinking about the issues and empowered to get after them.
• IR – no supervision – so I’ll go to union, as no manager to go and see with a problem.
• Opportunities – decision support issue – software – rostering solution – people can spend more time optimising solutions, not just devising solutions.
• Labour union – benchmarking might need to be done – NTC couldn’t find out how productivity things are due to government ownership and union influence. Very restrictive work practices.
• Influence of unions impacts on XPT. Current industry hamstrung by factional lobby groups with special interest. Need an independent authority to make these calls.
• Measure and report on productivity – factual reporting is important.
• Industry has to reform its own work practices.
• 8 hour day versus 17-hour days on truck drivers
• Unions are very difficult to deal with – draconian almost.
• No strong leadership in rail, but challenges are harder than road.
• Mistakes are blamed here, not celebrated for trying something different.
• Improved productivity could lead to triple the business. Customers want to grow, but productivity limitations prevent this.
• Maintenance costs can be higher – stop over-engineering and get fit for purpose.

Institutional Factors
• Privatisation doesn’t really work – Government still want control but someone else to blame.
• Integrated model only way to work – vertically operated doesn’t work as how do you know how to trade off issues.
• When business integrated, far better opportunities to tailor spend to optimise outcomes. Freight side a bit harder with so many operators. Contractual arrangements creating different thinking etc.
• Freight – real money and their money – passenger is subsidised – behaviour of PN – where is the profitability? Road system seems to work but rail doesn’t. Financials just don’t work in rail.
• Impossible, other than bulk coal etc, to write a business case for rail. Not enough return. Thus Government may need to get involved.
• Can separate freight and passenger networks
• Could the industry own the assets instead of Government?
• Inefficiencies caused by mixing freight and passenger traffic on lines.
• States have owned systems for 100 years, but it needs a leadership role
• Industry needs to think more than five years ahead and stop being in survival mode.

Intermodal Interfaces
• Trucks have figured out interfaced. Save money and time by doing the unloading themselves, instead of customer doing it – moving towards a logistics/supply chain.
• Rail needs to think more customer to customer – not just on rail.

Business Systems
• Integrated software for scheduling and crewing could improve productivity by estimate of 10-15%.

Innovation
• Digital railway big opportunity – e.g. real time information for passenger; inside businesses – real time monitoring of assets, real time communications back to crews.