Freight and Logistics Council of NSW
Path to Innovation

Innovation in the NSW Freight Logistics Industry

January 2008
# Table of Contents

## Executive Summary
- Overview of supply chain analysis 58
- Supply chain analysis 63
- Drivers of innovation 74

## Background and Objectives
- Background and Objectives 18

## Recommendations
- Recommendations 125

## PART A Industry Overview
- Defining freight logistics 23
- Freight logistics industry in context 25
- Key NSW Freight Tasks 35
- NSW Infrastructure Issues 48

## PART B Barriers to Efficiency
- Background 51
- ABS Innovation Survey 53

## PART C Uptake of Technology
- Challenges and context 81
- Overview of new technology 85
- Port Botany freight dynamics 99
- Web based freight matching Systems 106
- Web based freight matching for Port Botany 117
- Summary of findings 123
<table>
<thead>
<tr>
<th>Appendices</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A – Explanation of business types</td>
<td>131</td>
</tr>
<tr>
<td>B – Supply chain mapping</td>
<td>137</td>
</tr>
<tr>
<td>C – Productivity issues and innovation barriers and drivers</td>
<td>156</td>
</tr>
<tr>
<td>D – Innovation examples</td>
<td>167</td>
</tr>
<tr>
<td>E – Interview notes</td>
<td>169</td>
</tr>
<tr>
<td>F – Examples of technological innovation</td>
<td>176</td>
</tr>
<tr>
<td>G – Sample of US freight matching sites and load boards</td>
<td>188</td>
</tr>
<tr>
<td>H – Container movement logistics and virtual container yards</td>
<td>190</td>
</tr>
</tbody>
</table>
EXECUTIVE SUMMARY
The NSW Government has identified the freight logistics industry as a priority for economic growth through innovation

• In late 2006 the NSW Premier launched the NSW Government Statement on Innovation to:
  – Develop an innovation strategy to support economic growth in NSW
  – Focus on industries that are important to the State economy and that have the greatest potential for innovation

• The freight logistics industry (including the associated transaction services) has been identified as a significant and important sector representing between 9.6% to 14.5% of Australia’s GDP

• The Department of State and Regional Development (DSRD) has been charged with identification of the steps to deliver improvements to this sector through innovation policy
The Freight Logistics Council of NSW has commissioned this project to provide the foundation for a series of innovation strategies and actions for the freight logistics sector.

- SAHA International has been appointed to commence Phase 1 of an “Innovation Strategy Project” looking at innovation and efficiency within the NSW freight logistics industry.
- Phase 1 comprises three distinct elements:
  - Part A: Overview of the industry
  - Part B: Identification of barriers to innovation and efficiency
  - Part C: Uptake of technology within the industry and potential for web-based freight matching to address port congestion.
- This first phase of work outlines a series of actions that could be taken by Government to stimulate innovation and efficiency within the NSW Freight Logistics Industry in both the short and long term.
- It is envisaged two further phases of work would be undertaken which could include detailed benchmarking, strategy and policy development.
The freight and logistics sector operates in an increasingly challenging environment

Changing world economic geography
- Many manufacturing activities have relocated to low cost markets for labour and other inputs

Supply chains are becoming longer
- Distance and number of links are increasing creating issues with regard to collecting and translating information and sharing it with other members both up and down the chain.

Increasing pressure from customers to:
- Shorten lead times yet “deliver in full on time” (DIFOT)
- Ensure transparency and visibility
- Continually look for ways to reduce cost

New distribution models are emerging
- New distribution models emerging, particularly in response to e-trading via the internet, reverse flow planning and lengthening supply chains.

Increasing energy costs
- While the cost of fuel in Australia is lower than that of many other developed economies, prices are increasing for all across the world.

Labour and skills shortages
- Particularly drivers in road and rail and handling

Increasing compliance requirements
- Security measures require increased information about cargo, its movement and history
- Safety and environmental regulation require improved monitoring and management

Growing city populations
- Large markets not only demand more freight but generate more traffic
- Congestion and conflict with passengers increasing in metro areas
- Increased pressure on infrastructure capacity

Increasing environmental awareness
- Increasing demands are being placed on business to become more environmentally sustainable
- The freight and logistics industry is a major contributor to CO₂ emissions and has a significant impact on local air quality and amenity
Within this environment, the NSW freight logistics industry is defined by a number of key characteristics

Freight logistics covers all domestic, import and export movements in NSW. Estimates of its contribution to NSW GSP are as high as 11.2% - some major characteristics of the NSW freight logistics industry include:

- **The industry is made up of a large number of small companies** - there are at least 29,000 businesses in NSW supporting the industry, and 90% of these companies employ fewer than 20 people

- **The industry has an ageing workforce** – a significantly higher percentage of workers in the freight logistics industry are in the 45 year old age bracket compared with the general labour market averages

- **The state relies on a number of key infrastructure gateways** (e.g. Port Botany, Sydney Airport), which means capacity constraints can have a significant impact on the NSW economy as a whole

- **The majority of state infrastructure gateways that support the industry are capacity constrained:**
  - Port of Newcastle (coal and grain exports)
  - Port Botany (container imports)
  - Port Kembla (coal and other traffics)
  - Rail paths (the passenger network is given priority access to paths over a growing requirement for freight paths)
  - Road congestion (particularly around the Port/Airport precinct)
Infrastructure requirements for the NSW freight logistics industry are heavily influenced by the volume of freight movements; the value of these movements is also important to the wider economy.

- The largest NSW logistics task by volume is the movement of goods domestically within the state representing 62% of the total task. This is dominated by domestic coal and aggregates.
- Export bulk is the second largest logistics task by volume (15%), comprising predominantly coal and grain.
- The third largest logistics task by volume (20%) is the movement of manufactured goods into (9%) and out of (11%) NSW to other Australian States.
- The smallest task by volume is the international import of goods into NSW (3%), though by value these import movements account for 71% of the total value of NSW imports and exports combined.
- Air exports make up 32% of total export value (when excluding export coal).

**Definitions**

- **Within NSW** – the movement of goods around and within the State of NSW only*
- **Export to Overseas** – the export of goods from NSW to overseas countries
- **NSW to Interstate** – the movement of goods from NSW to other Australia States
- **NSW from Interstate** – the movement of goods from other States within Australia into NSW
- **Import from Overseas** – the import of goods into NSW from overseas countries

**Notes:** * “Within NSW” includes movements of previously imported finished product and other imported materials – for example, an import may be delivered to a warehouse in Botany before being distributed domestically. Due to data limitations the percentage of previously imported goods classified under “Within NSW” is not available.

**NSW Total Freight Task (Tonnes) by Source/Destination**

- **NSW total freight task is approx 576m tonnes p.a.**
- **Within NSW** 63%
- **NSW to Interstate** 10%
- **NSW from Interstate** 9%
- **Import from Overseas** 3%
- **Export to Overseas** 15%

*Includes movement of previously imported finished product and other imported materials.*
Innovation can be defined as significantly improved goods or services, operational processes or organisational/managerial processes, and is driven by a number of factors

- The ABS has identified three types of innovative activities which can be defined as new or significantly improved:
  - Goods or services;
  - Operational processes; or
  - Organisational/managerial processes.
- From analysis of a group of representative supply chains in NSW, it was found that drivers of innovation in the freight logistics industry are generally similar to other sectors. The following factors appear to be particularly important:
  - **The market is particularly price driven** – this provides a major incentive to reduce cost in the supply chain so that market share can be expanded
  - **Infrastructure capacity is a critical element** – where shared infrastructure is at capacity, supply chain members have much to gain by cooperating with others
  - **Cost of transport is a significant proportion of product price** – significant gains can be achieved by eliminating non value adding activities from supply chains and reducing costs to increase margins
  - **Labour supply is critical** – where there is high labour involvement within the freight logistics task, there is an incentive to reduce labour costs through innovative processes and technology
  - **Service delivery is fundamental to customer retention** – this is a focus on satisfying the customer and delivering on time, in full, with accurate invoicing
Stakeholders reported a number of barriers to innovation that are particularly influential in the freight logistics sector

- Beyond the conventional barriers to innovation that affect all organisations such as cost, market related issues and skill shortages, there are also a range of factors that act as particular barriers to innovation within the NSW freight logistics industry.
- These were grouped into a three major categories:
  - **Limited ‘co-opetition’** – fragmented and complex supply chains, and unsophisticated end users can often act as a barrier to improving efficiency (e.g. small transport operators and retailers which have basic business processes)
  - **Limited interfacing** – transport operations are often seen as providing a competitive advantage which can prevent firms in different markets working together (e.g., combining transport operations/resources to reduce costs). Significant number of transactions along chain, limited utilisation of technology and availability of relevant data can also be an issue
  - **Domination of incumbent organisations** – high barriers to entry for new players and long term contractual arrangements (e.g. in the provision of infrastructure) can also prevent innovation

- Three particular supply chains within the NSW, export coal, domestic grocery and export grain supply chains, demonstrated innovative approaches to overcoming these barriers
- Other chains appear to be lagging in their efforts to take advantage of the drive for innovation within their chain primarily due to a larger number of barriers present. Consequently these chains are unable to leverage cooperation or clustering into effective solutions
From the results of supply chain analysis major productivity issues affecting the industry were identified. Stakeholders highlighted the need for Government leadership to assist industry in responding to these issues.

**Infrastructure**
1. Intermodal infrastructure planning
2. Air freight capacity planning
   - Capacity at Port Botany
   - Landside interface at Port Botany
   - Interstate rail double stacking
   - Shared rail network with passenger services in metro areas
   - Condition of regional rail
   - Non-uniform rail gauge
   - High land costs around airport
   - Future capacity at Sydney Airport for freight carriers

**Operations**
3. Labour cost and shortages
4. Fuel cost
5. 24 hour operations
6. Technology uptake
   - Labour and skills shortage particularly prevalent in freight logistics
   - Fuel cost is rising faster than inflation
   - 24 hour operations are not in place across whole supply chains
   - Limited use of technology along supply chains
   - Manual processes and duplicated data entry still prevalent
   - Government interface can be low tech and cumbersome

**Regulation & Standards**
7. Streamlining regulations
8. Impact of carbon emissions on freight logistics
   - Lack of leadership from Government on carbon footprint
   - Concerned that Australia is behind the rest of the world on addressing carbon footprint
   - Difficult dealing across jurisdictions – especially for road haulage
   - Differing State regulations for rail accreditation
   - Bar Coding and other technological applications not standardised
Technology uptake is a major tool of innovation within the services sector - Government should therefore support increased penetration and development of new technologies

- Technology is integral to innovation. The uptake of technology supporting freight logistics companies is vitally important as the industry faces a number of challenges.
- A number of new technologies have emerged as a result of market pressures and are being implemented to improve productivity at various points along supply chains. Change has been exponential in the development of information and communications technology. Key systems in the industry include:
  - warehouse management
  - fleet management,
  - intelligent transport and tracking systems for both cargo and vehicles
- Costs of systems have reduced, and they are becoming more accessible to even the smallest firms. However, the rate of evolution is rapid and technology can be quickly superseded. Making the right investment choice can be challenging.
- The breadth and depth of new technology being applied across supply chains and modes is vast and government’s role within that development must be to support the development and application of new technologies whilst being careful not to preempt the market by trying to pick the winners.
One technology initiative explored was a web based freight matching system to reduce congestion in and around Port Botany. While this could offer some promise, there are a number of market issues which may limit its success in the short term.

- In addition to looking at the general development of IT in the industry, this project also examined systems which could help reduce congestion in and around Port Botany.
- The Port has experienced considerable growth over the past 5 years and this is set to continue into the future. Minimising the movement of empty containers in and out of the Port will be a key priority in coming years.
- Web based freight matching systems used in conjunction with virtual container parks appear to offer potential to address this issue.
- While there are now a number of freight matching systems on the Australian market, they are relatively new and none cater specifically to port traffic.
- While in principle, these systems appear very useful, there are a number of barriers to port web based freight matching, including:
  - Wider logistical issues related to empties management and the role of ocean carriers
  - Contractual arrangements between shippers and road freight operators
  - Chain of responsibility legislation which necessitates closer relationships between transport users and operators
  - Ability to match terminal slots within the Port Botany terminals Vehicle Booking System (VBS)
- While there does not appear to be a strong market incentive for the development of a system at present, a change in market dynamic (e.g. multi modal terminal storage away from port) could assist success.
- Government can focus its efforts on helping to remove some of the barriers for a successful web based freight matching system (e.g. issues relating to empty container parks, ability to match slots at freight terminals).
A range of actions can be taken to resolve productivity issues and remove barriers to innovation. There is a role for both Government and industry.

<table>
<thead>
<tr>
<th>Objective</th>
<th>Short Term Actions</th>
<th>Medium Term Actions</th>
</tr>
</thead>
</table>
| 1) Improving policy making through better information | 1-A Develop strategic vision for NSW freight logistics industry, including an agenda for further actions  
1-B Develop a freight database for Sydney  
1-C Investigate systems which could gather information on container movements within Sydney (e.g. RFID) | 1-D Improve freight modelling capability and work with other states to develop a comprehensive integrated freight model for future planning |
| 2) Increasing efficiency of transport system though better infrastructure planning and provision | 2-A Implement proposed and approved AusLink projects  
2-B Investigate short term solutions to key infrastructure capacity issues (e.g. IPART solutions for Port Botany, solutions to improving rail freight access into and out of Sydney)  
2-C Establish partnership group to identify and address freight issues surrounding Sydney Airport  
2-D Research on the potential usefulness of urban consolidation centre(s) in Sydney | 2-E Examine feasibility of developing air freight hubs outside Sydney  
2-F Work with state and federal government to:  
  – Increase standardisation of rail gauges  
  – Develop long term plans for container double stacking on interstate rail  
  – Prioritise development of intermodal rail freight terminals |
| 3) Improving competitiveness and productivity through better regulations | 3-A Continue to work closely with National Transport Commission to harmonise freight transport regulations and accreditation and approval schemes between states  
3-B Investigate any local authority or government issues which may impede the operation of 24 hour supply chains | 3-C Work with state and federal bodies to  
  – Standardise rail accreditation  
  – Harmonise OH&S legislation between states |
Further actions specifically dealing with industry best practice and technology should also be considered

<table>
<thead>
<tr>
<th>Objective</th>
<th>Short Term Actions</th>
<th>Medium Term Actions</th>
</tr>
</thead>
</table>
| 4) Help industry and Government make informed decisions | 4-A Review new technology and advise on capabilities  
4-B Identify best practice programs and assist industry with assessment of costs and benefits  
4-C Develop operational toolkits for improved efficiency  
4-D Develop systems and tools to help industry monitor and improve environmental performance (e.g. assistance with external benchmarking, carbon footprinting) | 4-E Develop a set of relevant quantitative and qualitative indicators to assist both industry and Government to analyse the impact of policies upon innovation and improve performance in the long term  
4-F Establish a framework for regular measurement of innovation and productivity improvement across the sector |
| 5) Encouraging development of new solutions to address short term problems and long term efficiency | 5-A Remove barriers for a successful web based freight matching system to make it an attractive option for industry, i.e.: undertake work to  
– Address issues in relation to location of empty container parks  
– Improve ability to match slots at fright terminals  
– Investigate potential role of pricing instruments  
5-B Consider the potential role of freight matching systems and improvements in interfacing between supply chain members in relation to all new freight hubs and intermodal terminals | 5-C Participate in global technology initiatives in freight logistics  
5-D Research and establish standards for frequencies, platforms and system networks used in freight transport  
5-E Examine tax incentives that could be used to support investment in best practice technology solutions and R&D of solutions to improve productivity  
5-F Promote industry partnerships and knowledge clusters to encourage ongoing innovative technological solutions |
This report represents the first steps towards a path to innovation - further work to benchmark, measure and support key supply chains is required

- An agenda must be developed for actions that can be taken by Government to help increase innovation in this vital sector
- We recommend that the following actions be considered as early priorities within stages 2 and 3 of the Innovation Strategy Project:
  - **Gather improved and additional data on the NSW freight logistics industry**
    In particular developing a strategic vision and agenda for next steps and taking steps to establish a freight database for Sydney (Recommendations 1A and 1B)
  - **Focus on integrated infrastructure planning**
    Progressing AusLink projects (2A) IPART recommendations for Port Botany (2B) and addressing issues surrounding Sydney Airport (2C)
  - **Help industry make more informed decisions**
    Development of toolkits, case studies and reviews of new products and technologies to encourage greater take up of industry best practice (4A to 4D)
  - **Establish benchmarking programs for the sector**
    Develop indicators and programs to benchmark the sector against other jurisdictions and industries to gauge the relative success of any actions (4E and 4F)
- Finally we would suggest the need for more comprehensive strategy and policy development to direct the most appropriate support to NSW’s target supply chains
PROJECT BACKGROUND AND OBJECTIVES
The NSW Government has identified the freight logistics industry as a priority for economic growth through innovation

- In late 2006 the NSW Premier launched the NSW Government Statement on Innovation to:
  - Develop an innovation strategy to support economic growth in NSW
  - Focus on industries that are important to the State economy and that have the greatest potential for innovation
- The freight logistics (including the associated transaction services) industry has been identified as a significant and important sector representing between 9.6% to 14.5% of Australia’s GDP
- Following a report by Dr Jonathan West several key observations provide a framework for investigation of innovation within this industry sector:
  - Productivity is measured by both cost reduction and raising sales i.e. the willingness of the customer to pay
  - Productivity through innovation needs to be targeted to the most important and largest sectors and within leading innovative firms
  - Innovation begins with the identification of a customer need but requires the support of infrastructure, capability and resources
  - The benefits of innovation need to be scaled and the risks shared. Collaboration and clustering will help overcome potential barriers to innovation
The Freight Logistics Council of NSW has commissioned this project to provide the foundation for a series of innovation strategies and actions for the freight logistics sector.

- SAHA International has been appointed to commence Phase 1 of an “Innovation Strategy Project” looking at innovation and efficiency within the NSW freight logistics industry.
- Phase 1 comprises three distinct elements:
  - Part A: Overview of the industry
  - Part B: Identification of barriers to innovation and efficiency
  - Part C: Uptake of technology within the industry and potential for web based freight matching to address port congestion.
- This first phase of work outlines a series of actions that could be taken by Government to stimulate innovation and efficiency within the NSW Freight Logistics Industry in both the short and long term.
- It is envisaged two further phases of work would be undertaken which could include detailed benchmarking, strategy and policy development.

Phase 1 – Foundation Studies

Part A
Overview of Freight Logistics in NSW

Part B
Innovation – Barriers and Drivers

Part C
Uptake of Technology and potential for web based freight matching

Actions to enhance innovation and efficiency

SAHA
The project involved extensive desktop research on the nature of the NSW freight logistics industry, examination of efficiency issues and use of technology, interviews with key industry stakeholders and analysis of a sample of supply chains.

Methodology overview......

Part A – Industry Overview
- Definitions of “freight logistics”
- Research to identify major freight tasks within NSW and their contribution to GSP
- Analysis of key infrastructure nodes and comparison of issues with other Eastern States
- Desktop research to identify key industry stakeholders

Part B – Barriers to Innovation
- Desktop research to identify priority chains for further investigation
- Interviews with key stakeholders and detailed supply chain analysis focusing on physical assets, outsourced management tasks, transactions and costs
- Identification of key areas for productivity improvement, key efficiency drivers and barriers to innovation

Part C – Use of Technology
- Interviews with industry stakeholders to identify the role and take up of new transport technologies
- Desktop research on web based freight matching systems and interviews with providers relevant to port related movements in Sydney
- Cost benefit modelling of a freight matching service for container traffic at Port Botany
PART A:
OVERVIEW OF THE NSW FREIGHT LOGISTICS INDUSTRY
There is no universally accepted definition or term for freight logistics, despite a number of attempts at defining the industry

- The US Department of Transport has defined logistics as:
  "the process of planning, implementing, and controlling the efficient, effective flow and storage of goods, services, and related information from point of origin to point of consumption for the purpose of conforming to customer requirements"

- In 2001 The Bureau of Transport Economics defined logistics as:
  "the activities required for the movement and handling of goods and materials, from inputs through production to consumers and waste disposal"

- This BTRE definition was adopted by the Australian Logistics Industry Strategy in 2002 and later the National Industry data Steering Committee

- Perhaps the most succinct definition of freight logistics is that suggested by the Industry Steering Committee of the Freight Transport Logistics Industry Action Group, simply – “everything to do with freight”

- Even the term for the freight logistics industry itself sees many variations, such as:
  - Transport & Logistics (T&L)
  - Value Chain Management
  - Supply Chain Management

The definition given to freight logistics is critical as it significantly influences the measurement of its contribution to GDP and hence national importance

- While there is no doubt that freight logistics is a significant contributor to the GDP, its exact measure is unknown
- There is no coherent and accurate set of data defining the contribution of freight logistics to the national economy
- Unlike other industry sectors, the ABS does not classify freight logistics as an individual line item in the national accounts – instead freight logistics is partially recognised within the Transport and Storage (T&S) segment with the remainder hidden within other categories such as Retail and Mining
- If the definition of freight logistics is accepted to be concerned with “the movement and storage of all freight and the associated activities”, then its contribution to GDP will indeed be greater than that of T&S
- A number of recent attempts by BTRE and the Australian Logistics Council (ALC) to estimate the contribution of freight logistics to GDP, through extrapolating and analysing the ABS data, has led to NSW related figures of 9.2%, 14.5%, and 14.8%

Sources: Bureau of Transport Economics, 2001; Contribution of Transport and Logistics to the Economy, Australian Logistics Council, 2007
Recent estimates by BTRE and the ALC of the contribution of freight logistics to GDP are based on the premise that the complete definition of freight logistics is wider than that covered by T&S in the National Accounts

- The full definition of Logistics includes two key elements:
  - Hire and Reward (H&R) – traditional outsourced freight logistics tasks
  - “In-house” or Ancillary – freight logistics functions carried out by businesses whose primary task is not logistics related – e.g. retailers and miners carrying out logistics style functions
- T&S, as defined by ANZSIC and the National Accounts, only covers the H&R proportion of logistics in addition to passenger transport which is unrelated to freight logistics
- To satisfy the wider definition of freight logistics then, it is necessary to try and separate the ancillary component of freight logistics from the other National Accounts categories – the diagram below outlines this method

Notes: For a fuller discussion of the definition of LTS see Bureau of Transport Economics 2001 and ALC “Contribution of Transport and Logistics to the Economy” 2007
Regardless of the method of measure, there is no doubt that freight logistics is one of the top contributors to the Australian and NSW economies – in fact the most recent analysis estimates a three fold increase in the value of Logistics to GDP

- The tables below compare existing National Accounts data to a revised set of numbers based on the analysis described in the previous slide

- The most recent analysis by the ALC places freight logistics as the number one contributor to GDP – a three fold increase in its value from 5.42% to 14.5%

<table>
<thead>
<tr>
<th>Rank</th>
<th>Industry</th>
<th>% of GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Property and business services</td>
<td>13.84%</td>
</tr>
<tr>
<td>2</td>
<td>Manufacturing</td>
<td>13.47%</td>
</tr>
<tr>
<td>3</td>
<td>Finance and Insurance</td>
<td>8.23%</td>
</tr>
<tr>
<td>4</td>
<td>Construction</td>
<td>7.51%</td>
</tr>
<tr>
<td>5</td>
<td>Retail trade</td>
<td>7.34%</td>
</tr>
<tr>
<td>6</td>
<td>Health and community services</td>
<td>7.29%</td>
</tr>
<tr>
<td>7</td>
<td>Wholesale trade</td>
<td>5.96%</td>
</tr>
<tr>
<td>8</td>
<td>Transport and Storage</td>
<td>5.42%</td>
</tr>
<tr>
<td>9</td>
<td>Education</td>
<td>5.18%</td>
</tr>
<tr>
<td>10</td>
<td>Mining</td>
<td>5.04%</td>
</tr>
</tbody>
</table>

Table 1: Unadjusted National Accounts – 2004/05

<table>
<thead>
<tr>
<th>Rank</th>
<th>Industry</th>
<th>% of GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Transport and Logistics</td>
<td>14.5%</td>
</tr>
<tr>
<td>2</td>
<td>Manufacturing</td>
<td>10.3%</td>
</tr>
<tr>
<td>3</td>
<td>Property and Business Services</td>
<td>9.9%</td>
</tr>
<tr>
<td>4</td>
<td>Finance and Insurance</td>
<td>6.0%</td>
</tr>
<tr>
<td>5</td>
<td>Construction</td>
<td>5.6%</td>
</tr>
<tr>
<td>6</td>
<td>Health and community services</td>
<td>5.2%</td>
</tr>
<tr>
<td>7</td>
<td>Retail Trade</td>
<td>5.1%</td>
</tr>
<tr>
<td>8</td>
<td>Mining</td>
<td>4.7%</td>
</tr>
<tr>
<td>9</td>
<td>Wholesale Trade</td>
<td>4.1%</td>
</tr>
<tr>
<td>10</td>
<td>Education</td>
<td>3.8%</td>
</tr>
</tbody>
</table>

Table 2: Adjusted National Accounts – 2004/05

Sources: Australian Logistics Council, Contribution of Transport and Logistics to the Economy, 2007
The importance of freight logistics at a national level also translates to NSW where it is estimated to account for up to 11.2% or $34.3b of the Gross State Product (GSP). Given the importance of LTS to Australia and NSW in particular, innovation in this sector is critical to the continued prosperity of the State economy.

In comparison to its State counterparts, NSW has the lowest % equivalent of LTS to GDP.

Given the diversified nature of the NSW economy, it is less reliant on LTS than other states – however the total $ impact is such that it cannot be ignored.

Sources: ALC, Contribution of Transport and Logistics to the Economy, 2007; ABS Cat. 5368; Saha International internal analysis.
At a National level over 87,000 businesses support Australia’s hire and reward (outsourced) freight logistics industry

Snapshot of Australia’s Hire and Reward Transport & Logistics Industry

<table>
<thead>
<tr>
<th>Business Type</th>
<th>Fewer than 20 Employees</th>
<th>20 Employees or More</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road Freight Transport</td>
<td>49,275</td>
<td>1,737</td>
<td>51,012</td>
</tr>
<tr>
<td>Rail Transport</td>
<td>108</td>
<td>27</td>
<td>135</td>
</tr>
<tr>
<td>International Sea Transport</td>
<td>360</td>
<td>18</td>
<td>378</td>
</tr>
<tr>
<td>Coastal Water Transport</td>
<td>1,485</td>
<td>72</td>
<td>1,557</td>
</tr>
<tr>
<td>Inland &amp; Water Transport</td>
<td>2,769</td>
<td>57</td>
<td>2,826</td>
</tr>
<tr>
<td>Scheduled International Air Transport</td>
<td>180</td>
<td>21</td>
<td>201</td>
</tr>
<tr>
<td>Scheduled Domestic Air Transport</td>
<td>234</td>
<td>39</td>
<td>273</td>
</tr>
<tr>
<td>Non-Scheduled Air &amp; Space Transport</td>
<td>951</td>
<td>60</td>
<td>1,011</td>
</tr>
<tr>
<td>Transport</td>
<td>1,938</td>
<td>27</td>
<td>1,965</td>
</tr>
<tr>
<td>Services to Road Transport</td>
<td>4,560</td>
<td>36</td>
<td>4,596</td>
</tr>
<tr>
<td>Stevedoring</td>
<td>63</td>
<td>18</td>
<td>81</td>
</tr>
<tr>
<td>Water Transport Terminals</td>
<td>81</td>
<td>18</td>
<td>99</td>
</tr>
<tr>
<td>Port Operators</td>
<td>18</td>
<td>15</td>
<td>33</td>
</tr>
<tr>
<td>Services to Water Transport</td>
<td>729</td>
<td>72</td>
<td>801</td>
</tr>
<tr>
<td>Services to Air Transport</td>
<td>483</td>
<td>33</td>
<td>516</td>
</tr>
<tr>
<td>Road Freight Forwarding</td>
<td>522</td>
<td>39</td>
<td>561</td>
</tr>
<tr>
<td>Freight Forwarding (Except Road)</td>
<td>453</td>
<td>90</td>
<td>543</td>
</tr>
<tr>
<td>Customs Agency Services</td>
<td>537</td>
<td>39</td>
<td>576</td>
</tr>
<tr>
<td>Services to Transport</td>
<td>828</td>
<td>51</td>
<td>879</td>
</tr>
<tr>
<td>Grain Storage</td>
<td>114</td>
<td>12</td>
<td>126</td>
</tr>
<tr>
<td>Storage</td>
<td>1,617</td>
<td>162</td>
<td>1,779</td>
</tr>
<tr>
<td>Postal Services</td>
<td>5,283</td>
<td>69</td>
<td>5,352</td>
</tr>
<tr>
<td>Courier Services</td>
<td>11,754</td>
<td>144</td>
<td>11,898</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>84,342</strong></td>
<td><strong>2,856</strong></td>
<td><strong>87,198</strong></td>
</tr>
</tbody>
</table>

Sources: ABS, Business by Industry Class: June 2006; business numbers are overstated as they include passenger services

- 87,198 businesses support and service the Australia’s hire and reward logistics industry
- 97% of which employ fewer than 20 people
- There is a significant number of Road Freight Transport business – accounting for 59% of industry
- Of the 3% of firms employing greater than 20 people, storage, courier and freight forwarding (except road) are the more fragmented business types
- Refer to Appendix A for description of each business type
Although many businesses support freight logistics, the reality is that the sector is dominated by a few key players who operate across a number of modes and tasks.

- The top 28 logistics providers by revenue employ over 98,000 people, and have an annual turnover of $23 billion.
- The largest 5 players (Toll, QR, Asciano, Linfox and DP World) represent 77% of total employees and 65% of total revenues of the top 28 players.
- The majority of the freight logistics task is captured by:
  - Freight forwarding (49%);
  - Rail (16%);
  - Air freight forwarding (10%);
  - Stevedoring (10%);
- The remaining 15% is captured by grain storage, track access, airports, ports and shipping.

Sources: Saha analysis from FY05/06 company annual reports with a qualitative extrapolation of total revenues by key business segments.
Ageing workforce appears to be a problem in the freight logistics Industry, with a higher proportion of workers over 45 years than the general labour market.

- It can be seen that the freight logistics industry is faced with an ageing labor force with 44% of its workforce in the over 45yrs old age bracket.
- The freight logistics Industry is facing similar problems as businesses in:
  - Agriculture, Forestry and Fishing;
  - Education and Training;
  - Health Care and Social Assistance.
- Along with these industries, freight logistics businesses face a major problem in attracting and retaining high calibre ‘Gen X’ and ‘Gen Y’ workers.
- The problem is likely to worsen as baby boomers exit the labor market over the next decade.

Sources: ABS Catalogue 6291 (Aug 2006); Saha International Analysis
Although the average age of the freight logistics workforce is higher than the national average, this relationship is not uniform across the industry – while Road and Rail transport is significantly higher than the average, Air and Water transport is actually lower.

- Rail and Road Operators face the greatest risk in skill shortage over the coming years with baby boomers making up 50% of the workforce.
- This percentage is markedly higher than the rest of the Transport and Logistics Industry.
- Rail Transport Issues:
  - Locomotive driver shortage has long been recognised by the union and rail operators – however this analysis suggests that the skill shortage crisis in this sector extends far beyond just train drivers but all aspects of the business.
- Road Transport Issues:
  - Average Age of truck drivers working in Road Transport is 43, compared to 39 for all other occupations.
  - Only 4.6% of current truck drivers are aged between 20-25.
  - The Road Transport Industry has grown at an average rate of 6.5% over the last five years while the aggregate growth in truck driver employment rose by only 1.6%.

Sources: ABS Catalogue 6291 (Aug 2006); Saha International Analysis
From a NSW perspective, as home to over 29,000 (34%) of Australia’s hire and reward freight logistics businesses, the State is a key employment hub for the industry

### Snapshot of NSW’s Hire and Reward Freight Logistics Industry

<table>
<thead>
<tr>
<th>Business Type</th>
<th>Fewer than 20 Employees</th>
<th>20 Employees or More</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road Freight Transport</td>
<td>16,431</td>
<td>498</td>
<td>16,929</td>
</tr>
<tr>
<td>Rail Transport</td>
<td>39</td>
<td>12</td>
<td>51</td>
</tr>
<tr>
<td>International Sea Transport</td>
<td>123</td>
<td>9</td>
<td>132</td>
</tr>
<tr>
<td>Coastal Water Transport</td>
<td>390</td>
<td>15</td>
<td>405</td>
</tr>
<tr>
<td>Inland &amp; Water Transport</td>
<td>873</td>
<td>18</td>
<td>891</td>
</tr>
<tr>
<td>Scheduled International Air Transport</td>
<td>75</td>
<td>15</td>
<td>90</td>
</tr>
<tr>
<td>Scheduled Domestic Air Transport</td>
<td>69</td>
<td>9</td>
<td>78</td>
</tr>
<tr>
<td>Non-Scheduled Air &amp; Space Transport</td>
<td>288</td>
<td>12</td>
<td>300</td>
</tr>
<tr>
<td>Transport</td>
<td>602</td>
<td>9</td>
<td>612</td>
</tr>
<tr>
<td>Services to Road Transport</td>
<td>1,455</td>
<td>12</td>
<td>1,467</td>
</tr>
<tr>
<td>Stevedoring</td>
<td>21</td>
<td>9</td>
<td>30</td>
</tr>
<tr>
<td>Water Transport Terminals</td>
<td>24</td>
<td>3</td>
<td>27</td>
</tr>
<tr>
<td>Port Operators</td>
<td>6</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>Services to Water Transport</td>
<td>213</td>
<td>30</td>
<td>243</td>
</tr>
<tr>
<td>Services to Air Transport</td>
<td>147</td>
<td>9</td>
<td>156</td>
</tr>
<tr>
<td>Road Freight Forwarding</td>
<td>207</td>
<td>12</td>
<td>219</td>
</tr>
<tr>
<td>Freight Forwarding (Except Road)</td>
<td>189</td>
<td>51</td>
<td>240</td>
</tr>
<tr>
<td>Customs Agency Services</td>
<td>201</td>
<td>18</td>
<td>222</td>
</tr>
<tr>
<td>Services to Transport</td>
<td>231</td>
<td>12</td>
<td>243</td>
</tr>
<tr>
<td>Grain Storage</td>
<td>51</td>
<td>6</td>
<td>57</td>
</tr>
<tr>
<td>Storage</td>
<td>588</td>
<td>66</td>
<td>654</td>
</tr>
<tr>
<td>Postal Services</td>
<td>1,635</td>
<td>33</td>
<td>1,668</td>
</tr>
<tr>
<td>Courier Services</td>
<td>4,611</td>
<td>54</td>
<td>4,665</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>28,473</strong></td>
<td><strong>915</strong></td>
<td><strong>29,388</strong></td>
</tr>
</tbody>
</table>

Sources: ABS, Business by Industry Class: June 2006; business numbers are overstated as they include passenger services

- 29,388 businesses support and service the NSW Transport and Logistics industry
- The composition of the industry in NSW is very similar to the national picture, that is:
  - 97% of which employ fewer than 20 people
  - Road freight transport businesses also account for 58% of total business number
- Interestingly, this profile does not change significantly between NSW and Victoria
With so many businesses supporting the freight logistics task in NSW, fragmentation is an issue in some sectors – understandably, infrastructure intensive areas with a high degree of cost to enter the market exhibit the least fragmentation.

- The graph depicts the degree of fragmentation within the freight logistics industry.
- The graph presents the 14 top business types within freight logistics which have the largest impact on overall sector operations.
- It indicates that asset and infrastructure intensive business areas are the least fragmented – this is logical as it is hard for new players to enter these markets without significant investment.
- The most fragmented business area is freight forwarding (road), where only 3% of businesses have more than 20 employees.

Sources: ABS, Business by Industry Class: June 2006; Saha International analysis.
As an example, Road Transport and Courier Services are highly fragmented with no one player holding more than 11% of the market, whereas Rail Freight is dominated by two parties – as such the fragmented business areas have a large proportion of the freight task performed by a multitude of firms.

Sources: Based on BIS Shrapnel Supply Chain Distribution in Australia, 5th edition, 2004-2008
Before presenting the key freight tasks for NSW it is necessary to acknowledge the limitations placed on this analysis by the data available at the time.

- The NSW freight task can be examined from two perspectives: **Volume** and **Value**.
- Two primary sources of data were relied on in assessing these areas:
  - Volume data for all domestic, import and export flows for NSW was based around comprehensive data collected by FDF and obtained from the NSW Ministry of Transport’s Transport Data Centre.
  - Value data for imports and exports by both sea and air was obtained commercially through statistics company MariTrade.
- There was no readily available data to assess the value of domestic freight flows in NSW.
- It should be noted that the volume data, whilst being the best available, has a number of recognised flaws.
- However, given the strategic nature of this document, the high level of aggregation, and the lack of any alternative data, this information was considered to be suitable for its task after consultation with the Transport Data Centre.

Notes: The Transport Data Centre (TDC) is the premier source of transport data for NSW. TDC’s role is to assist those involved in transport and land use planning to make informed decisions by providing reliable and up-to-date information on current and future travel patterns and employment and population trends. More information is available at [www.transport.nsw.gov.au/tdc/](http://www.transport.nsw.gov.au/tdc/).
There are two dimensions to consider when assessing the key freight tasks throughout NSW, Volume and Value, with each dimension offering a different perspective on the strategic importance of the freight flows.

Volume

- Volume flows can be split into three main categories:
  - **Domestic** – flows that start and end within NSW
  - **Imports** – flows ending in NSW and starting from Interstate or Overseas
  - **Exports** – flows originating in NSW and ending Interstate or Overseas
- These volume flows can then be assessed based on commodity, mode, origin and destination
- Volume flows relate directly to infrastructure demand and therefore can inform us of potential infrastructure issues such as bottlenecks, key gateways and modal shares
- Volume is therefore relevant to the operation of the freight logistics industry itself

Value

- Value of freight flows can add an extra dimension to volume flows
- Once volume flows are established a value overlay can be added
- While volume is important to understand the freight logistics industry, value of the actual freight transported can inform of the importance of the flows to the wider NSW economy
- Flows associated with high value totals should also therefore be a focus for any targeted innovation programs

Volume and Value play a key role in analysing the key supply chains and freight flows in NSW
NSW freight volumes can be segmented into import, export, domestic markets with domestic movements representing over half of total freight volume.

- **NSW largest freight task (by volume) is the domestic or intra State movement of goods within NSW at 62.4%**
- Exports are the second largest freight task for NSW, at 15.2%, dominated by the export of coal
- NSW to and from interstate are the third and fourth largest tasks at 10.5% and 9.4% respectively
- Imports from overseas into NSW make up only 2.6% (by volume) of the total freight task
  - This figure changes significantly when the value is consider
  - Largely because imports are not commodity driven

**Definitions**

- **Domestic** – the movement of goods around and within the State of NSW only*
- **Export to Overseas** – the export of goods from NSW to overseas countries
- **Export to Interstate** – the movement of goods from NSW to other Australia States
- **Import from Interstate** – the movement of goods from other States within Australia into NSW
- **Import from Overseas** – the import of goods into NSW from overseas countries

Sources: NSW Ministry of Transport, Transport Data Centre; Saha International analysis

Notes: *

* “Within NSW” includes movements of previously imported finished product and other imported materials – for example, an import may be delivered to a warehouse in Botany before being distributed domestically. Due to data limitations the percentage of previously imported goods classified under “Within NSW” is not available.
The Domestic freight task, as the largest single task for NSW, is dominated by Fuel (mainly Coal) with Non-metallic Minerals such as aggregates and construction materials also being a significant contributor to volume flows.

- Coal (under “Fuel” in the graph) is the largest category of product moved within NSW making 33.4% of the total task.
- Non metallic minerals e.g. limestone, gypsum, salt, sand, construction materials are the second largest category of products moved domestically within NSW at 15.2%.
- Foodstuffs e.g. meat, fish, dairy, grains, vegetables and beverages - 15.1%.
- Metals, metal manufactures e.g. steel, iron, appliances and machinery – 13.2%.
- Non metallic products e.g. cement, concrete, glass and bricks – 5.1%.
- Remaining categories are not significant domestic NSW freight tasks e.g. chemicals, livestock, other manufactured goods and metallic minerals.

Sources: NSW Ministry of Transport, Transport Data Centre; Saha International analysis.
The second largest freight task by volume for NSW is exports to overseas destinations with Fuel providing the overwhelming majority of volume flows at 87.8% and Foodstuffs a distant second at 6.2%.

- NSW exports are completely dominated by coal at 87.8% of the volume flows.
- The second largest at a much smaller 6.2% by volume is Foodstuffs which is predominantly made up by grains.

Sources: NSW Ministry of Transport, Transport Data Centre; Saha International analysis
While the modal split for the Overseas Export task is heavily weighted towards Sea freight at 98.6% of volume flows, when a value overlay is applied Air freight is shown to be notably more important than would appear based purely on volume flows.

- Sea freight exports make up 98.6% of the freight volume flows from NSW to Overseas destinations.
- Given the commodity based transport task in NSW this relationship is understandable with Sea freight suitable for large volume, non time critical cargo.
- When Coal volume flows are removed from the analysis Sea freight still dominates the modal split with a 90% share of the Overseas Export market.
- Further adding value data to the analysis shows that although Air freight may account for on 10% of non-coal export volumes they account for 32% of value.

Sources: ABS/MariTrade Air and Sea Freight Data; NSW Ministry of Transport, Transport Data Centre; Saha International internal analysis.
The Air export task is characterised by high value/low volume manufactured products and low value/high volume perishables such as meat, fruit and nuts.

### Export Products by Air by Volume and Value

<table>
<thead>
<tr>
<th>Products</th>
<th>Grwt (kg)</th>
<th>%</th>
<th>FOB AUD</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical Products</td>
<td>2,353,990</td>
<td>7%</td>
<td>554,835,960</td>
<td>20%</td>
</tr>
<tr>
<td>Mach Office</td>
<td>2,451,200</td>
<td>7%</td>
<td>325,080,364</td>
<td>12%</td>
</tr>
<tr>
<td>X-ray + Meas Inst</td>
<td>318,538</td>
<td>1%</td>
<td>204,105,997</td>
<td>7%</td>
</tr>
<tr>
<td>Photo+Cin+Med Ins</td>
<td>1,033,694</td>
<td>3%</td>
<td>194,008,534</td>
<td>7%</td>
</tr>
<tr>
<td>Dom Appliances + Entert</td>
<td>1,113,467</td>
<td>3%</td>
<td>130,052,585</td>
<td>5%</td>
</tr>
<tr>
<td>Aircraft</td>
<td>710,040</td>
<td>2%</td>
<td>115,232,603</td>
<td>4%</td>
</tr>
<tr>
<td>Precious Stones + Metals</td>
<td>22,519</td>
<td>&lt;1%</td>
<td>105,165,707</td>
<td>4%</td>
</tr>
<tr>
<td>Electrical Dom Appliance</td>
<td>387,572</td>
<td>1%</td>
<td>74,537,454</td>
<td>3%</td>
</tr>
<tr>
<td>Electrical Parts</td>
<td>519,628</td>
<td>1%</td>
<td>73,643,825</td>
<td>3%</td>
</tr>
<tr>
<td>Animals Live</td>
<td>890,600</td>
<td>3%</td>
<td>44,266,760</td>
<td>2%</td>
</tr>
<tr>
<td>Printed Matter</td>
<td>1,863,633</td>
<td>5%</td>
<td>40,089,687</td>
<td>1%</td>
</tr>
<tr>
<td>Fish + Crustaceans</td>
<td>994,141</td>
<td>3%</td>
<td>32,303,333</td>
<td>1%</td>
</tr>
<tr>
<td>Cosmetics + Oil + Resin</td>
<td>1,077,315</td>
<td>3%</td>
<td>29,652,983</td>
<td>1%</td>
</tr>
<tr>
<td>Meat Fresh</td>
<td>3,517,564</td>
<td>10%</td>
<td>28,176,085</td>
<td>1%</td>
</tr>
<tr>
<td>Motor Vehicles</td>
<td>1,122,768</td>
<td>3%</td>
<td>21,028,013</td>
<td>1%</td>
</tr>
<tr>
<td>Fruits + Nuts Fresh</td>
<td>5,626,404</td>
<td>16%</td>
<td>10,832,946</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Printed Matter Other</td>
<td>1,053,392</td>
<td>3%</td>
<td>6,661,879</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Vegetables</td>
<td>1,638,372</td>
<td>5%</td>
<td>4,733,755</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Other</td>
<td>8,868,175</td>
<td>25%</td>
<td>759,324,940</td>
<td>28%</td>
</tr>
</tbody>
</table>

### Air Export Volume/Value Contrast

- Perishable items represent a high volume to relatively low value product category – 49% of volume and only 5% of value.
- By contrast Manufactured items are a relatively high value to volume ratio with 51% of volume accounting for 95% of value.
- By value, products related to the medical industry make up the largest export categories at a total of 34%.
- By both volume and value, Meat Fresh is the most significant perishable export category.

Sources: ABS/MariTrade Air Freight Data; Saha International internal analysis
Sea freight export volumes and values are dominated by minerals, with a mix of manufactured goods and perishable products representing less than 20% of volumes but a greater proportion of value.

### Sea Freight Export Products by Volume and Value

<table>
<thead>
<tr>
<th>Products</th>
<th>Grwt (kg)</th>
<th>%</th>
<th>FOB AUD</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal, coke &amp; briquettes</td>
<td>232,921,795</td>
<td>37.3%</td>
<td>24,353,384,000</td>
<td>19.0%</td>
</tr>
<tr>
<td>Iron ore &amp; concentrates</td>
<td>255,910,284</td>
<td>41.0%</td>
<td>12,831,373,000</td>
<td>10.0%</td>
</tr>
<tr>
<td>Confidential</td>
<td>20,010,020</td>
<td>3.2%</td>
<td>7,559,838,000</td>
<td>5.9%</td>
</tr>
<tr>
<td>Meat &amp; meat preps</td>
<td>1,513,052</td>
<td>0.2%</td>
<td>6,365,262,000</td>
<td>5.0%</td>
</tr>
<tr>
<td>Petroleum oil</td>
<td>9,179,114</td>
<td>1.5%</td>
<td>6,098,607,000</td>
<td>4.7%</td>
</tr>
<tr>
<td>Aluminium ore/alumina</td>
<td>20,548,545</td>
<td>3.3%</td>
<td>5,307,592,000</td>
<td>4.1%</td>
</tr>
<tr>
<td>Aluminium &amp; alloys</td>
<td>1,734,854</td>
<td>0.3%</td>
<td>5,233,964,000</td>
<td>4.1%</td>
</tr>
<tr>
<td>Cereals &amp; cereal preps</td>
<td>20,897,723</td>
<td>3.3%</td>
<td>4,846,140,000</td>
<td>3.8%</td>
</tr>
<tr>
<td>Transport equipment</td>
<td>432,113</td>
<td>0.1%</td>
<td>4,542,229,000</td>
<td>3.5%</td>
</tr>
<tr>
<td>Liquefied natural gas</td>
<td>Unknown</td>
<td>N/A</td>
<td>4,415,783,000</td>
<td>3.4%</td>
</tr>
<tr>
<td>Machinery</td>
<td>381,779</td>
<td>0.1%</td>
<td>4,308,777,000</td>
<td>3.4%</td>
</tr>
<tr>
<td>Copper ores &amp; conc</td>
<td>1,717,375</td>
<td>0.3%</td>
<td>3,403,942,000</td>
<td>2.6%</td>
</tr>
<tr>
<td>Other metallic ores/scrap</td>
<td>6,986,334</td>
<td>1.1%</td>
<td>3,310,099,000</td>
<td>2.6%</td>
</tr>
<tr>
<td>Wine &amp; vermouth</td>
<td>1,704,835</td>
<td>0.3%</td>
<td>2,756,150,000</td>
<td>2.1%</td>
</tr>
<tr>
<td>Chemicals</td>
<td>1,218,184</td>
<td>0.2%</td>
<td>2,755,485,000</td>
<td>2.1%</td>
</tr>
<tr>
<td>Copper &amp; copper alloys</td>
<td>385,259</td>
<td>0.1%</td>
<td>2,601,056,000</td>
<td>2.0%</td>
</tr>
<tr>
<td>Dairy products &amp; eggs</td>
<td>863,513</td>
<td>0.1%</td>
<td>2,406,646,000</td>
<td>1.9%</td>
</tr>
<tr>
<td>Wool, sheep &amp; lambs</td>
<td>440,897</td>
<td>0.1%</td>
<td>2,246,415,000</td>
<td>1.7%</td>
</tr>
<tr>
<td>Other</td>
<td>47,635,250</td>
<td>7.6%</td>
<td>23,150,337,000</td>
<td>18.0%</td>
</tr>
</tbody>
</table>

### Sea Freight Export Volume/Value Contrast

**Excluding minerals**

- Perishable items represent a high volume to relatively low value product category – 72% of volume and only 28% of value.
- By contrast Manufactured items are a relatively high value to volume ratio with 27% of volume accounting for 73% of value.
- By value, transport equipment is largest category of Manufactured Sea exports.
- By value Meat and meat preparations are the largest category of Perishable Sea exports.
- As expected the export of minerals by sea is the dominant commodity by both value and volume.

Sources: ABS/MariTrade Air Freight Data; Saha International internal analysis
The third largest freight task volume flow for NSW is the movement of goods to and from Interstate – these flows are comprised primarily of manufactured goods and raw material inputs for industry.

- Manufactured goods dominate the interstate freight task of which road vehicles, machinery and associated parts are the major components.
- NSW is a net interstate importer of metallic mineral used to supply local manufacturers and heavy industry such as the steel works at Wollongong.
- NSW is a net interstate exporter of chemicals with the majority coming out of nominated national terminal locations in the Port Botany precinct and moved interstate.

Sources: NSW Ministry of Transport, Transport Data Centre; Saha International internal analysis.
The smallest freight task volume flow for NSW is the import of goods from overseas at only 3% of the total task and 25% of total imports.

**Overseas Import Volume Flows**

- Import volumes into NSW are predominantly made up of Fuels at 50.1%.
- In particular, petroleum products for refining drive Fuel volumes.
- Other key import volumes include:
  - Various manufactured goods at 19.8%.
  - Chemicals for local industry at 11.6%.
  - Metallic Minerals for industry at 7.1%.
- This product mix reflects the nature of the NSW and wider Australian economy as a net importer of value added manufactured goods and net exporter of raw materials.

Sources: NSW Ministry of Transport, Transport Data Centre; Saha International analysis.
Although a small freight task by volume, when considering the value of Overseas Imports to NSW they represent a significant flow to both NSW and Australia.

- When compared to the volume of goods being moved domestically within NSW and exported from NSW, the volume task associated with imports is relatively small.
- When looking at the value of goods, however, the picture changes. NSW, and in particular Port Botany, is the key import hub for Australia responsible for over 39% of all imports by value.
- Note that while Port Botany is a key import hub, the Port of Melbourne is the largest container hub for Australia when considering the total movement of goods through the port i.e. imports and exports.
- Similar to exports, there is a high value/low volume and low value/high volume relationship between Air and Sea freight imports respectively:
  - value of goods imported into NSW is fairly even between Sea freight at 60% and Air freight at 40%.
  - volume flows are however lopsided with Sea freight accounting for 99%.

Sources: ABS/MariTrade Air Freight and Sea Freight Data; NSW Ministry of Transport, Transport Data Centre; Saha International internal analysis.
The profile of Sea freight imports is one of high value and low volume – note that this is in contrast to Sea freight exports.

The import supply chains are varied in terms of their volume contribution and value.
- Manufactured items tend to make up the higher value items.
- Bulk petroleum and fuel products tend to make up the largest categories by volume.
  - E.g. Machinery is the highest import product by value at (22%) but makes up only (3%) by volume.
  - E.g. Petroleum Oil is the highest import product by volume (30%) but makes up only (11%) by value.

**Import Sea Freight by Value and Volume**

<table>
<thead>
<tr>
<th>Product</th>
<th>Grwt (kg)</th>
<th>%</th>
<th>FOB AUD</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machinery</td>
<td>2,285,472</td>
<td>22%</td>
<td>26,938,380,000</td>
<td>3%</td>
</tr>
<tr>
<td>Road Vehicles and Trans Equipment</td>
<td>1,736,398</td>
<td>18%</td>
<td>21,731,644,000</td>
<td>2%</td>
</tr>
<tr>
<td>Petroleum Oil</td>
<td>21,654,158</td>
<td>11%</td>
<td>13,292,483,000</td>
<td>30%</td>
</tr>
<tr>
<td>Misc Manufactures</td>
<td>1,882,838</td>
<td>8%</td>
<td>9,502,475,000</td>
<td>3%</td>
</tr>
<tr>
<td>Petroleum oils and refined products</td>
<td>10,192,082</td>
<td>7%</td>
<td>7,921,509,000</td>
<td>14%</td>
</tr>
<tr>
<td>Chemicals</td>
<td>5,782,385</td>
<td>4%</td>
<td>4,876,848,000</td>
<td>8%</td>
</tr>
<tr>
<td>Manufactured Metals</td>
<td>909,716</td>
<td>3%</td>
<td>3,503,587,000</td>
<td>1%</td>
</tr>
<tr>
<td>Apparel and Clothing</td>
<td>237,467</td>
<td>3%</td>
<td>3,193,059,000</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Iron and Steel</td>
<td>2,528,060</td>
<td>3%</td>
<td>3,162,944,000</td>
<td>4%</td>
</tr>
<tr>
<td>Paper, Paperboard and articles</td>
<td>1,889,241</td>
<td>2%</td>
<td>2,557,570,000</td>
<td>3%</td>
</tr>
<tr>
<td>Plastics</td>
<td>897,147</td>
<td>2%</td>
<td>2,226,420,000</td>
<td>1%</td>
</tr>
<tr>
<td>Textile yarn, fabrics and articles</td>
<td>365,828</td>
<td>2%</td>
<td>2,020,276,000</td>
<td>1%</td>
</tr>
<tr>
<td>Rubber manufactures</td>
<td>433,463</td>
<td>2%</td>
<td>1,920,688,000</td>
<td>1%</td>
</tr>
<tr>
<td>Iron ore and concentrates</td>
<td>4,895,668</td>
<td>&lt;1%</td>
<td>218,515,000</td>
<td>7%</td>
</tr>
</tbody>
</table>

Sources: ABS/MariTrade Sea Freight Data; NSW Ministry of Transport, Transport Data Centre; Saha International internal analysis.
Air freight imports to NSW, exclusively transport through Sydney Airport, outweigh exports both value and volume and are characterised by high value/low volume product

- The import of goods by air is significantly larger than the export of goods by both value and volume
- By value 82% of imported goods by air is linked to the top five trade product groups
- These five product groups make up only 58% of the volume, leaving a further 42% of goods by volume that are as individual categories of substantially low value

### Breakdown of Sydney Airport Imports

<table>
<thead>
<tr>
<th>Product</th>
<th>Grwt (kg)</th>
<th>%</th>
<th>FOB AUD</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motors, Appliances, Radio, TV</td>
<td>14,545,977</td>
<td>16%</td>
<td>2,816,030,158</td>
<td>21%</td>
</tr>
<tr>
<td>Engines, Machines</td>
<td>19,314,435</td>
<td>21%</td>
<td>2,778,561,065</td>
<td>21%</td>
</tr>
<tr>
<td>Imports unspecified</td>
<td>12,586,029</td>
<td>13%</td>
<td>2,100,896,985</td>
<td>16%</td>
</tr>
<tr>
<td>Pharmaceutical Goods</td>
<td>3,248,199</td>
<td>3%</td>
<td>1,729,176,161</td>
<td>13%</td>
</tr>
<tr>
<td>Spectacles, Cameras, Instruments</td>
<td>4,634,752</td>
<td>5%</td>
<td>1,415,046,827</td>
<td>11%</td>
</tr>
<tr>
<td>Chemicals Organic</td>
<td>449,866</td>
<td>&lt;1%</td>
<td>714,482,377</td>
<td>5%</td>
</tr>
<tr>
<td>Precious Stones, Jewels</td>
<td>360,280</td>
<td>&lt;1%</td>
<td>314,451,222</td>
<td>2%</td>
</tr>
<tr>
<td>Clothes Other</td>
<td>3,133,446</td>
<td>3%</td>
<td>111,202,052</td>
<td>1%</td>
</tr>
<tr>
<td>Books, Paper Arts</td>
<td>3,781,375</td>
<td>4%</td>
<td>85,332,267</td>
<td>1%</td>
</tr>
<tr>
<td>Essential Oils Perfumes</td>
<td>2,128,282</td>
<td>2%</td>
<td>75,913,543</td>
<td>1%</td>
</tr>
<tr>
<td>Clothes, Knitted</td>
<td>2,981,580</td>
<td>3%</td>
<td>72,850,211</td>
<td>1%</td>
</tr>
<tr>
<td>Polymers Plastics</td>
<td>2,933,558</td>
<td>3%</td>
<td>58,452,345</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Fish &amp; Crustaceans</td>
<td>2,079,540</td>
<td>2%</td>
<td>15,005,009</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Vegetables</td>
<td>1,943,780</td>
<td>2%</td>
<td>5,621,147</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Fruits &amp; Nuts</td>
<td>1,574,031</td>
<td>2%</td>
<td>7,227,044</td>
<td>&lt;1%</td>
</tr>
</tbody>
</table>

Sources: Sydney Airports Corporation Limited Annual Report 2006/04; ABS/MariTrade Data; Saha International internal analysis
Growing import and export volumes are placing increasing pressure on ports and associated landside transport infrastructure within NSW

Port Botany
Task
- Handles 95% of containerised trade in NSW
- 26.7m mass tonnes/yr – 76% import, 24% export (2005/06)
- 1.61m TEUs FY 06/07 forecast growth to 3.63m in 2024/25 – roughly 50/50 import/export split
- Push to increase rail mode share to 40%

Issues
- High annual growth in container volumes over the last 2 years (>10%p.a.)
- Forecast significant growth over the next 20 years (>5% p.a.)
- Landside interface demand regularly outstrips supply – congestion in and around Port
- Constrained rail siding infrastructure at DP World terminal
- Location and proximity to airport and major arterial routes contributes to congestion
- Further investment required to improve rail infrastructure connection
- IPART investigating landside efficiency and have made a number of recommendations

Port Waratah (Newcastle)
Task
- Handle majority of NSW coal export (93%) with approximately 102mtpa capacity
- Future capacity expansion of coal terminal and rail network to meet increased production
- Has been identified as next major NSW container port in NSW Ports Growth Plan

Issues
- Future demand for increased bulk services and concrete batching to service inner Sydney
- Pressure for redevelopment as a result of increasing commercial and residential land values

Port Kembla
Task
- 25.9mtpa throughput – 63% export, 27% import
- Diversified exports with coal, steel and grain
- Import break bulk and cars

Issues
- Further investment could expand uses of this port
- Limited rail path capacity and crossing loops on Illawarra line to Sydney
- Increasing traffic volumes and steep grades on main road north (Mount Ousley Road)

Glebe Island/White Bay
Task
- Bulk cargo primarily cement, sugar and gypsum
- 1.4-1.5mtpa throughput with stable forecasts

Issues
- High annual growth in container volumes over the last 2 years (>10%p.a.)
- Forecast significant growth over the next 20 years (>5% p.a.)
- Landside interface demand regularly outstrips supply – congestion in and around Port
- Constrained rail siding infrastructure at DP World terminal
- Location and proximity to airport and major arterial routes contributes to congestion
- Further investment required to improve rail infrastructure connection
- IPART investigating landside efficiency and have made a number of recommendations

Port Eden and Yamba
Task
- Tertiary port status handling small volumes of specialised cargo including fish and forestry products

Further investment is required in the long term to find innovative solutions to these issues

**Sydney Airport**

**Task**
- 630mtpa air freight – 50/50 domestic/international split
- 50% of Australia’s air freight task
- 4.7% p.a. growth
- $34.68 billion FOB annual international trade

**Issues**
- Freight routes governed by passenger routes – 80% freight in belly of passenger aircraft
- Freight is a secondary consideration for investment – freight contributes only 3% of total earnings
- Resistance by local authorities to allow development of a planned “air-freight hub” in the area
- Night time curfew imposed
- Significant road congestion around port/airport precinct

**Rail Infrastructure**

**Task**
- Two main physical corridors (MEL-SYD and SYD-BNE), dominated by containerised trade
- Regional networks service grains and coal
- CityRail passenger network shared between passenger and freight operations

**Issues**
- Aging regional network hampering export grain rail haulage productivity. Choices need to be made around economics of investment in grain lines
- Access to key paths facilitating movements between Port and key intermodal terminals is hampering rails’ service offering
- NSW dedicated access to south planned – need for Southern Sydney freight Line to be delivered on schedule
- Capacity constraints on interstate freight moving north to Brisbane need to be addressed

**Intermodal Terminals**

**Task**
- Metropolitan and regional terminals operated by private sector
- Handle containerised cargo with limited bulk volume

**Issues**
- Metropolitan terminals reaching capacity and not all on dedicated freight network
- Restricted ability to develop additional capacity
- Priority given to passenger services in metro area
- Container congestion building at Port Botany
- Rail share to/from Botany restricted
- Enfield and Moorebank intermodal terminals are key to easing congestion and increasing rail share

PART B: BARRIERS TO EFFICIENCY IN THE NSW FREIGHT LOGISTICS INDUSTRY
There are a number of specific challenges emerging that require change and adaptation from the freight logistics industry. Many of these challenges have been the result of innovation by particular players – others require broader industry innovation to address.

The changing world economic geography
- Many manufacturing activities have relocated to low cost markets for labour and other inputs

Supply chains are becoming longer
- Distance and number of links are increasing creating issues with regard to collecting and translating information and sharing it with other members both up and down the chain.

Increasing pressure from customers to:
- shorten lead times yet “deliver in full on time” (DIFOT)
- ensure transparency and visibility
- Continually look for ways to reduce cost

New distribution models are emerging
- New distribution models emerging, particularly in response to e-trading via the internet, reverse flow planning and lengthening supply chains.

Increasing energy costs
- While the cost of fuel in Australia is lower than that of many other developed economies, prices are increasing for all across the world.

Labour and skills shortages
- Particularly drivers in road and rail and handling

Increasing compliance requirements
- Security measures require increase information about cargo, its movement and history
- Safety and environmental regulation require improved monitoring and management

Growing city populations
- Large markets not only demand more freight but generate more traffic
- Congestion and conflict with passengers increasing in metro areas
- Increased pressure on infrastructure capacity

Increasing environmental awareness
- Increasing demands are being placed on business to become more environmentally sustainable
- The freight and logistics industry is a major contributor to CO₂ emissions and has a significant impact on local air quality and amenity
Innovation has been viewed as critical to productivity enhancements as current industry and market reforms are expected to offer declining marginal returns

- Innovation can be broadly defined as technological and non technological innovation. Technological innovation ranges from incremental to transformational change of a product, service and/or process whilst non technological innovation refers more broadly to changes in an organisation, a business model, governance arrangements or human capital.

- It is widely acknowledged that innovation is not just concentrated in high technology or manufacturing sectors but that all sectors of the economy including traditional and serviced based sectors innovate.

- Firms now compete on the basis of services and not on the basis of physical products\(^1\).

- In the NSW’s Direction for Innovation Professor West says that innovation increases productivity by improving efficiency (reducing costs) and raising sales (increasing customer willingness to pay).

- In order drive effective innovation strategy it is therefore necessary to identify what barriers to efficiency may exist (in order to reduce or remove them) or what drivers are present (in order to introduce, facilitate and encourage) within the sector.

In 2003 and again in 2005 the ABS undertook a survey (based on the Oslo Manual – an EU framework for collecting and measuring innovation data) to measure both the type and level of innovative activity across a range of sectors.

- The 2005 Innovation Survey assessed the level of innovation across the main ANZSIC industry groupings as well as by state, size of firm and level of income.
- The survey collected information about three types of activity:
  - New or significantly improved goods or services
  - New or significantly improved operational processes
  - New or significantly improved organisational or managerial processes
- The Survey looked at where innovation had been implemented or introduced, where it had been started but not yet completed and where it had been abandoned.
- It also asked firms to report on the major drivers to innovation as well as key barriers which may be impeding the level of innovative activity within the firm.
- The survey also reported on the type and levels of collaboration between firms.
- Key findings of the survey with reference specifically to the Transport and Storage sector in NSW are covered in the following slides.
The level of innovative activity in NSW varied significantly by industry sector with a number of organisations, including those in the transport and storage sector, starting but having to abandon innovative endeavours.

- The transport and storage sector is rated as having the 6th highest percentage of innovative businesses in NSW. 35% of companies in this sector reported engaging in some kind of innovative activity.
- Only the utilities, manufacturing, wholesale trade sectors have levels of innovation that are significantly higher than transport and storage in NSW.
- A low percentage of transport and storage businesses have not completed or abandoned innovative activity – only hospitality and construction sectors were found to have lower levels in NSW.

Sources: ABS Innovation Survey 2005
Comparison across states for the Transport and Storage sector illustrate Queensland and Tasmanian firms reporting the most proactive approach to innovative activities.

- Nationally, NSW has the third highest levels of innovation in its transport and storage sector. 51% of transport and storage businesses in Queensland reported engaging in innovation compared to 35% in NSW.

- NSW has the third lowest level of transport and storage businesses which reported starting but not completing or abandoning innovative activity.

Sources: ABS Innovation Survey 2005, No figures available for ACT and only partial figures available for Tasmania
There are three key drivers of innovation: profit (and cost reduction), market pressures and legal or compliance requirements. Transport and Storage firms report profit and market related issues as the main incentive for innovation.

- **Profit related drivers** include improving productivity, reducing costs and increasing revenue. These are the most influential in the transport and storage sector of NSW. This is consistent with the broader national picture in this sector.

- **Market related drivers** while market related drivers refer to factors such as increasing market share, establishing new markets and exploiting new ways to manage supply chains.

- **Legal drivers** (e.g., work safety and environmental responsibility) on the other hand appear to be less of an issue for transport and storage companies in NSW compared to those in other states.

Sources: ABS Innovation Survey 2005
Conversely, a number of barriers were identified with the issue of cost being a major prohibitor of innovative activity across the sector. This appears to be a more influential issue in NSW in comparison the same sector in other states.

- Cost issues are the most influential barrier to innovation in the transport and storage sector in NSW. These barriers include excessive economic risks perceived by financiers and the businesses itself, high direct costs and the cost of finance. These issues are more influential in NSW compared to the national average.

- Market related issues (inability to secure strategic partnerships, lack of demand for new services, domination of market by established players) and lack of skilled staff are less influential than cost issues, however in both cases levels of influence are higher in NSW compared to the national average.

- Fewer NSW transport and storage companies reported having no barriers to innovation compared with the national average.

Sources: ABS Innovation Survey 2005
In order to gain a greater insight into barriers hampering innovation in NSW, Saha selected eleven different supply chains as representative of the NSW freight logistics sector and were subjected to further analysis.

- Further analysis of productivity issues in the logistics sector in NSW was undertaken by selecting key representative supply chains based on:
  - Major commodity flows by volume identified in Part 1;
  - A value overlay with particular emphasis on the value of air import and export products; and
  - A final overlay ensured a representative number of supply chains included all modes of freight transport including road, rail, sea and air.
- 11 different supply chains were eventually chosen as representative of the NSW freight logistics industry (see Appendix B for full details)
- Interviews were conducted with key stakeholders within each of these chains. No attempt was made to interview all stakeholders or to engage specifically with the smaller freight logistics providers. As a consequence, the findings detail issues experienced by a broad section of the freight logistics industry, but may not be applicable to all organisations and supply chains
- The primary objective of the analysis of these supply chain was to identify the following:
  - Key NSW supply chain productivity issues;
  - Instances where innovation was being utilised to address these issues;
  - Drivers of innovation and leaders of innovation within the sector; and
  - Potential barriers to innovation
Supply chain analysis focused on key players, management functions, physical assets and the role of functions and cost of transactions across chains

- The supply chain analysis was therefore structured to specifically observe the following:
  - **The key players along the supply chain** i.e. to gain insight into the depth of fragmentation, consolidation and integration of particular supplier sectors within the chain
  - **The management overlay within chains** i.e. to gain insight into the types of “outsourced” products and services emerging within the industry, and the degree of co-opetition amongst chain members
  - **The physical assets involved in the freight task** i.e. to gain an understanding of the process flow of the freight task by mode and activity
  - **The role of transactions along the chain** i.e. to observe the extent of utilisation of technology versus manual processes in the information flow
  - **Where available, the cost of each task along the chain** i.e. to observe the different cost elements associated with the entire task to provide a platform from which later benchmarking could identify and potentially quantify potential cost areas for productivity improvement

- The observations from this supply chain analysis combined with the stakeholder interviews provided information on the key drivers for innovation within chains, potential barriers to innovation within chains, the role of Government versus business in developing and utilising innovation and the high level productivity issues facing the industry (Refer to Appendix C for more detailed discussion)
A sample of the supply chain mapping is illustrated below

### Hunter Valley Export Coal Supply Chain

<table>
<thead>
<tr>
<th>Physical Movement</th>
<th>Management</th>
<th>Players</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal is mined and stored at railway siding located at the mine or at a coal loading facility</td>
<td>HVCCLV (through assigned CDS)</td>
<td>30 Coal Mines</td>
</tr>
<tr>
<td>Coal is then transported to the port via rail, Pacific National performs 87% of the task</td>
<td>Exporter</td>
<td>17 Producers</td>
</tr>
<tr>
<td>Coal is offloaded onto stockpiles in the Port Waratah Coal Services facilities</td>
<td></td>
<td>23 Load Points</td>
</tr>
<tr>
<td>Coal is loaded onto vessel via conveyor belts</td>
<td></td>
<td>2 Above Rail Operators</td>
</tr>
<tr>
<td>Vessel arrives at final destination and the coal is delivered to the buyer</td>
<td></td>
<td>2 Track Operators</td>
</tr>
<tr>
<td>Haulage Distance up to 350km</td>
<td></td>
<td>2 Coal loading Terminals (KCT &amp; CCT)</td>
</tr>
<tr>
<td>5 Dump Stations</td>
<td></td>
<td>9 Vessel Agents</td>
</tr>
<tr>
<td>5 Ship Berths</td>
<td></td>
<td>1000 vessels per yr</td>
</tr>
<tr>
<td>Tidal constrained river port</td>
<td></td>
<td>34 End Buyers</td>
</tr>
<tr>
<td>85% to Japan, Korea &amp; Taiwan</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Through the CDS, the Hunter Valley Coal Chain Logistics Team (HVCCLT) allocates current capacity of coal supply to existing coal exporters</td>
</tr>
<tr>
<td>Exporter plans coal supply and delivery to the port based on allocation advice provided by the HVCCLT</td>
</tr>
<tr>
<td>Exporter has commercial contracts with: end buyer, above rail operator and port operator – transactions and freight schedules are organised between these parties</td>
</tr>
<tr>
<td>Vessel or Web Query</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Available</td>
</tr>
</tbody>
</table>
Supply chains included domestic movements of aggregates, food and beverages as well as export coal and grain

<table>
<thead>
<tr>
<th>Supply Chain</th>
<th>Stakeholder Interviewed</th>
</tr>
</thead>
</table>
| 1. Domestic movement of aggregates    | Hanson
Anthony Clarkson – Regional Logistics Manager Eastern Region |
| 2. Domestic movement of groceries     | Metcash
Ken Bean – Chief Executive Group Logistics and Corporate Development
Toll Holdings
Phil Crook – General Manager Toll Line haul |
| 3. Domestic movement of beer          | Lion Nathan
John Monck – Customer Supply Manager                          |
| 4. Export coal                        | RailCorp
Tony Gausden                                               |
| 5. Export grain                       | AWB
Lachlan Benson                                               |
| 6. Export (Containerised) grain       | MIST
Grey Heraghty – Director                                     |
Interviews and mapping were also conducted for the air freight sector and manufactured goods – Refer Appendix B & C for a fuller discussion

<table>
<thead>
<tr>
<th>Supply Chain</th>
<th>Interviewed</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. Export Fresh Meat – Air</td>
<td><strong>Bush Logistics</strong></td>
</tr>
<tr>
<td></td>
<td>Malcolm Bush – Director</td>
</tr>
<tr>
<td>8. Import Parcel Freight Air</td>
<td><strong>Bush Logistics</strong></td>
</tr>
<tr>
<td></td>
<td>Malcolm Bush – Director</td>
</tr>
<tr>
<td></td>
<td><strong>Sydney Airport Corporation</strong></td>
</tr>
<tr>
<td></td>
<td>Michelle Turcotte – Manager for Freight and Aviation Agreements</td>
</tr>
<tr>
<td>9. Import General Freight Air</td>
<td><strong>Bush Logistics</strong></td>
</tr>
<tr>
<td></td>
<td>Malcolm Bush – Director</td>
</tr>
<tr>
<td>10. Import Componentry for Manufacture</td>
<td><strong>Electrolux</strong></td>
</tr>
<tr>
<td></td>
<td>Peter Savas – General Manager National Operations</td>
</tr>
<tr>
<td></td>
<td><strong>Transport and Logistics Consultant</strong></td>
</tr>
<tr>
<td></td>
<td>Tony Davidson</td>
</tr>
<tr>
<td>11. Export Manufactured Appliances</td>
<td><strong>Electrolux</strong></td>
</tr>
<tr>
<td></td>
<td>Peter Savas – General Manager National Operations</td>
</tr>
<tr>
<td></td>
<td><strong>Transport and Logistics Consultant</strong></td>
</tr>
<tr>
<td></td>
<td>Tony Davidson</td>
</tr>
</tbody>
</table>
The following types of innovation have been observed:

- New technologies
  - E.g. – voice pick, air freight track and trace (Pangea), Hanson SAP, Freight portals (freight matching, TALC), RFID
- New organisational structures / joint venture arrangements
  - E.g. – Bevchain (Linfox and Lion Nathan)
- New market structures
  - E.g. – 4PL service offerings, Toll fee for service as ‘bolt on’
- Process improvement / procedural change
  - E.g. – HVCCLT, MIST container grain, Sydney Ports Corp 24 hr operations Enfield
- Substitute products
  - E.g. – MIST ethanol and LPG fuel
- Policy changes
  - E.g. – Government permits higher mass limits for road haulage
- New assets
  - E.g. – Toll glass carriers, Toll automotive carriers

These innovations were designed to deliver some of the following productivity benefits:

- Cost reductions / better asset utilisation;
- Customer retention / satisfaction;
- Increased market share; and
- Improved yields

Notes: See Appendix D for further examples of innovation and their benefits.
New supply chain market structures have evolved over time from simple in-house operations to more sophisticated 4PL offerings with the potential for further development in the form of alliances involving stakeholders beyond the horizontal supply chain.

- Since the early 1980’s companies have sought to outsource non-core activities in the search for efficiencies and competitive advantage.
- The diagram to the right represents the evolution of the freight logistics task.
- As the freight logistics industry has become more sophisticated it has evolved into a multi-disciplinary activity relying on the coordination of players across the supply chain.

This evolution towards a more coordinated supply chain approach can be seen in the actions of industry participants, users and in specific supply chains.

<table>
<thead>
<tr>
<th>Freight Logistics Area</th>
<th>Actions</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key Players</td>
<td>Throughout the 1990’s and into the new millennium the big players in the Australian freight logistics industry sought efficiencies through the acquisition of key assets along the supply chain</td>
<td>Toll Holdings acquisition of Patrick and Pacific National</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Recent moves by Qantas to spin off its air freight operations and purchase Linfox to develop greater exposure along the supply chain</td>
</tr>
<tr>
<td>Users</td>
<td>Traditional heavy users of freight logistics services have sought greater control across their supply chains by investing heavily in infrastructure and operations such that they are part of the production line ensuring maximum efficiency in planning and coordination of operations</td>
<td>BHP and Rio Tinto’s Iron Ore operations in the Pilbara</td>
</tr>
<tr>
<td>Specific Supply Chains</td>
<td>Where complete control of the supply chain is not practical, special industry cooperatives have formed to ensure maximum efficiencies can be achieved from stressed infrastructure</td>
<td>Hunter Valley Coal Chain Logistics Team (HVCCLT)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Woolworth’s Project Refresh supply chain initiatives</td>
</tr>
<tr>
<td></td>
<td></td>
<td>National Foods and Dairy Farmers joint logistics tender in South Australia</td>
</tr>
</tbody>
</table>

Key Elements:

- Coordination
- Integration
- Cooperation
- Information flows
- Transaction focus
- Interface between players
Asset innovation is one of the more obvious forms of innovation as has been present across all modes of transport with ships, trucks, rail wagons and containers all increasing in efficiency and capacity over the last 50 years – some are now double or treble the capacity.

<table>
<thead>
<tr>
<th>Shipping</th>
<th>Trucking</th>
<th>Rail</th>
<th>Containers</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Average TEU capacity per vessel increased by 66% over 12 years</td>
<td>• Truck capacity has quadrupled (rigid to semi, B-double and Super B-Double)</td>
<td>• TEU capacity per wagon doubled between 1970 and 1990</td>
<td>• First specialist Container ships built in 1950s</td>
</tr>
<tr>
<td>• Newest class of ships in 2007 50% greater capacity than 2006 models – 10,000 to 15,000 TEUs</td>
<td>• Higher Mass Limits (HML) introduced in late 1990s</td>
<td>• 1970’s saw introduction of 3 and 4 TEU wagons</td>
<td>• Containerisation standards (TEU) emerged in early 1970s</td>
</tr>
<tr>
<td>• By 2010 world TEU capacity will have 40% based on forward orderbooks</td>
<td>• Performance Based Standards (PBS) spreading amongst the States providing for custom designed large volume trucks</td>
<td>• Double stacking of TEUs was introduced in 1997 from Parkes to Perth although double stacking operating between Adelaide and Perth since the late 1980s</td>
<td>• Expansion from twenty foot (TEU) to forty foot (FEU) and longer containers as well as high cube (9’6” high) containers enter the market</td>
</tr>
</tbody>
</table>

Minto Intermodal Terminal have developed a special 20ft container with a number of unique features:

- Automatic lid across the top, allowing grain to be loaded direct from silo into container at a speed of 5km/hr as the train continues to move along the track
- Shared assets with other tasks e.g. straddles, as the container is inverted into export containers back at the intermodal terminal where straddles also operate the broader general freight task
- Reduced loading time in bush e.g. direct 30T load v’s 2x17T inverter processes
- Container able to be integrated into the broader general freight task enabling full train loads out to bush as opposed to current empty container traffic

Some individual business leaders are taking asset innovation further through the redesigning of traditional assets servicing one particular freight task to a more flexible asset base capable of being cascaded across multiple freight tasks.
In some supply chains, such as the Hunter Valley Coal Chain, stakeholders have adopted an innovative new planning process to minimise the impact of infrastructure constraints.

- The Hunter Valley Coal Chain Logistics Team (HVCCLT) includes members from all the transport providers along the coal chain.
- With constrained capacity, this innovative approach provides a holistic planning process which ensures maximum throughput and fair rationing to coal exporters.
- Below is an excerpt from a weekly Throughput Report which is made publicly available – it helps to demonstrate the level of information sharing along the supply necessary to achieve the innovation benefits.

Sources: Hunter Valley Coal Chain Logistics Team, Throughput Report
Whilst other business leaders continue to look at various product substitutes to reduce the cost of fuel and move toward a position of carbon neutrality

- MIST – Reducing carbon emissions
  - Biofuel project with Value Plus
  - Manufacturers will not guarantee engines
    - E.g. rubber seals an issue
  - Uptake is slow - floated companies going broke

- MIST – Fuel Cost
  - Ethanol production
  - Acquired farm with water supply in wheat district, Junee
    - E.I.S. completed

- MIST – Fuel Cost
  - Diesel engine hybrid technology - Tim Elderton
  - 10% gas injection – 6 month trial rail locomotives
  - 12-20% saving in fuel / gas emissions
  - Trialing older trucks – 2 months until results available
In addition to observing these current business innovations within the sector, the interviews also identified the business sector’s view in relation to the role of Government in supporting innovation

- There was little comment as to the role of Government in supporting business with developing and implementing an innovation program
- The sector saw innovation as primarily the responsibility of the business sector
- For Commonwealth funded innovation programs, the sector would be more supportive of a national approach, potentially coordinated through the ALC as a number of supply chains are National rather than State based, and some issues are common to all States
- The sector utilises only minimally Government supported University research programs and questioned the timeliness and applicability of the outcomes
- The sector did not proactively budget for “research and development” and was unaware of applicable tax concessions / deductions
- The majority of the sector have no dedicated research and development personnel within their firms with most innovation either incremental or as a result of day to day business activities
- However the sector was eager for the State and Commonwealth Governments to play a role in addressing some of the major productivity issues identified in particular;
  - planning, investing and implementing infrastructure plans
  - streamlining regulations and establishing standards
  - establishing a clear future view of carbon emissions, costing and trading for this sector
In summary, the supply chain interviews and desktop research identified 8 categories of significant productivity issues which can be grouped under 3 main headings: Infrastructure; Operations; and Regulations and Standards.

**Infrastructure**
1. Intermodal infrastructure planning
2. Air freight capacity planning
   - Capacity at Port Botany
   - Landside interface at Port Botany
   - Interstate rail double stacking
   - Shared rail network with passenger services in metro areas
   - Condition of regional rail
   - Non-uniform rail gauge
   - High land costs around airport
   - Future capacity at Sydney Airport for freight carriers

**Operations**
3. Labour cost and shortages
4. Fuel cost
5. 24 hour operations
6. Technology uptake

**Regulation & Standards**
7. Streamlining regulations
8. Impact of carbon emissions on freight logistics
   - Labour and skills shortage particularly prevalent in freight logistics
   - Fuel cost is rising faster than inflation
   - 24 hour operations are not in place across whole supply chains
   - Limited use of technology along supply chains
   - Manual processes and duplicated data entry still prevalent
   - Government interface can be low tech and cumbersome
   - Lack of leadership from Government on carbon footprint
   - Concerned that Australia is behind the rest of the world on addressing carbon footprint
   - Difficult dealing across jurisdictions – especially for road haulage
   - Differing State regulations for rail accreditation
   - Bar Coding and other technological applications not standardised

Notes: Further and more detailed information on the interview can be found in Appendix C.
Overall it was felt that little progress had been made on facilitating innovation to address the key productivity issues

| Infrastructure Planning | • Lack of a State “freight vision” for NSW. While there are various elements of what could be a broader freight plan interviews suggested that a more holistic approach needs to be taken in regards to infrastructure planning  
• Desire for the implementation of current plans (e.g. Port Botany rail links) to be accelerated |
| Fuel | • Some business leaders are looking at alternative fuel products and the option of importing directly to lower costs  
• Currently no coordinated approach |
| Air Freight Capacity | • SACL continues to be frustrated by difficulties with local council approvals for development of its freight plans  
• The options of a dedicated freight airport at Newcastle and/or Goulburn have not progressed  
• Potential for more investigation into the options of decoupling air freight from reliance on the passenger air network |
| Human Capital | • Some progress through initiatives such as Government funding, scholarships, industry promotion and careers seminars  
• Still a shortage of qualified workers at many levels and aging population in key sectors |
| Streamlining Regulation | • Some recent progress with Higher Mass Limits and Performance Based Standards emerging but changes to regulation of trucking industry have been slow and cumbersome  
• The nature of local and interstate networks has made progress difficult with the reliance on cooperation between multiple jurisdictions |
| 24 Hour Operations | • Implementation of 24 hour operations at key infrastructure nodes requires an integrated response by both industry and government  
• Little progress has been made e.g. initiative to operate 24hrs at Enfield Intermodal has not been well supported by local council |
| Technology | • Take up in some industries is significant but there is significant potential for further penetration  
• Crucial government interfaces such as customs and Ports have a big role to play in encouraging technological innovation |
| Environmental Costs | • No current policies for freight logistics on the future measurement, cost, treatment etc of carbon emissions  
• Industry seeking leadership and concerned about Australia lagging other countries in addressing the issues |

NB: Refer Appendix C for a fuller discussion of the issues and interview responses
It was also felt that encouraging innovation is not the sole domain of Government. Those interviewed made it clear that there are roles for both Government and Business in facilitating innovation to address the productivity issues facing the NSW freight logistics industry.

- The Government should take a leading role in:
  - Infrastructure Planning and Investment
  - Streamlining Regulations
  - Developing Policies around Carbon Footprint as it relates specifically to this sector

- Both Government and the Business sector need to work together in addressing the a number of issues:
  - Fuel – its absolute costs and relative % cost to final product
  - Air Freight – available airport infrastructure, belly space capacity, competitive pricing
  - Human Capital – including available resources, training and education, flexibility of conditions and wage rates
  - Developing 24hr operations across multiple infrastructure nodes to facilitate increased functionality in supply chains
  - Technology uptake – to virtually integrate the chains, enhance visibility of information and reduce transactions

NB: Refer Appendix C for a fuller discussion of the issues and interview responses
Based on the supply chain interviews, five industry characteristics were identified as being potential “drivers” to innovation – where each of the characteristics is present in a supply chain there will be greater incentive to innovate. These are consistent with the ABS Survey findings.

1. **The market is particularly price driven** – a price driven market provides an enormous incentive to reduce cost in the supply chain and provide the product at a low cost to end users thereby securing market share and generating scale economies.

2. **Infrastructure capacity is a critical element** – where shared infrastructure is at capacity the supply chain members have an enormous desire to cooperate / innovate, thereby helping to ensure all their supply needs are met. Clustering to improve utilisation of scarce resources can lead to innovation within a sector.

3. **Cost of transport is a significant proportion of product price** – if seen as a non value adding element, the opportunity to eliminate costs from freight logistics and increase margin or price competitiveness provides a significant incentive for innovation.

4. **High labour elements remain within chain** – where there is high labour involvement within the freight logistics task, or more generally within the end to end chain process, reducing labour costs through innovative processes and technology is incentivised.

5. **Service Delivery** – this is a focus on satisfying the customer and delivering the “ultimate invoice” e.g. in full, on time, invoicing and billing 100% accurate”. This acts to secure customer loyalty and market share which is an enormous incentive to innovate in an otherwise homogenous market.

*NB: Refer to Appendix C for a fuller discussion*
Some supply chains have responded more successfully than others to innovation drivers within the industry

**Innovation Leaders**
- Export Coal
- Domestic Grocery
- Export Bulk Grain

**Innovation Laggers**
- Domestic Aggregate
- Export Containerised Grain
- Domestic Beverages
- Import Manufactured Goods
- Export Perishables by Air

- With massive demand and infrastructure at capacity, the export coal supply chain in the Hunter Region has centralised the planning process of all stakeholders through the HVCCLT, and is now managing capacity bottlenecks through this cooperative approach.
- Operating in globally price sensitive markets, the export grain supply chain and the domestic grocery supply chains continue to undergo significant consolidation to take advantage of scale economics.
- However the other chains are lagging and although drivers toward innovation do exist in these chains they are typically more fragmented and unable to leverage cooperation into effective solution.
Counteracting the five drivers of innovation, interviews revealed nine factors which industry believe act as potential “barriers” to innovation – where these barriers exist, innovation may be stifled or slowed

1. **Cost and risk** – small end business users, high in number, and usually family owned and run, are unable or unwilling to look for longer term productivity improvements because of the cost and risk involved and often have a short term mind set

2. **Fragmented Supply Chain** – multiple suppliers and multiple end users create difficulties in: working collaboratively on innovative projects; price driven working arrangements; short term focus; can go elsewhere; potential for different processes; information along multiple competitive chains

3. **Significant interfacing between multi modal parties along the chain** – limits the opportunities for integration and the streamlining of procedures/processes and increases the extent of information sharing required

4. **Competitive positioning** – where a supply chain member sees their freight logistics operation as a competitive advantage they are unlikely to share information and would be highly protective of any innovative processes they have developed

5. **Significant number of transactions along the chain** – increases the chances of duplication and errors and can be time consuming (particularly where still manual) making innovations more complex and costly

6. **Limited utilisation of technology** – where information cannot be readily shared it is difficult to supply chain partners to cooperate to improve flows

7. **Limited availability of relevant data** – limited analysis of opportunities for improvement along chain

8. **High barriers to entry for new chain members** – no new ideas entering chain; limited opportunity for new industry players; lack of competition driving price and product based innovation

9. **Long term contracts in place with end users** – a subset of high barriers to entry – with long term contracts in place it is hard for new players to enter the supply chain market and drive change
Some business leaders are actively breaking down these barriers to innovation

- Lion Nathan – Transport seen as a competitive advantage – “Bevchain”
  - An incorporated JV with Linfox
  - Share in risks / share in profits
  - Services other third party manufacturers
  - Consolidator by product category E.g. liquor
  - Looking to cooperate with Fosters / co-opetition

- Metcash – Overcoming fragmented supply chains
  - With Diageo liquor have integrated warehousing
  - Eliminating distribution leg

- Metcash – Technology Uptake
  - Voice Pick
  - No labels, no paper work, all linked electronically
  - No lost orders, no errors

- Bush Logistics – Technology Uptake
  - “Track & Trace”
  - Web based track and trace system that allows all supply chain participants to locate movement of freight
  - Eliminated need for scale to receive benefits
However, whilst some business leaders are making progress in removing barriers to innovation, substantially more could be done

<table>
<thead>
<tr>
<th>Barrier</th>
<th>Progress</th>
</tr>
</thead>
</table>
| Fragmented supply chain                      | • There continues to be consolidation through acquisitions and joint venture arrangements, however there is still considerable fragmentation across particular providers including: Storage; Customs agencies; Road freight forwarding; Road transport operators; Couriers and Parcel services  
  • Further cooperation to overcome fragmentation can be exemplified by the establishment of buying consortiums e.g. National Associated Retail Traders of Australia (NARTA) |
| Significant interfacing                      | • Leading chains such as the HVCCLT have taken major steps to overcome the interfacing issues between multiple stakeholders by centralising the planning process of the entire chain  
  • Significant interfacing remains a major issue for the air export perishable chain where little has been done to address the problem |
| Competitive positioning                      | • Transport and distribution networks can often be a competitive advantage in industries  
  • While forcing cooperation is not desirable there were thoughts that some industries do not understand the potential benefits  
  • Collaboration among players, especially in fragmented markets, through the introduction of joint ventures or cooperatives can achieve real efficiencies and benefits |
| Limited availability of relevant data        | • State borders, a metropolitan focus, difficulties collecting commercially sensitive information from industry, coupled with limited electronic data capture software within the industry itself has prevented the sharing of up to date and relevant supply chain data  
  • E.g. BTRE continues to provide volume information by mode versus supply chain and recent attempts to formalise the FDF data have been abandoned  
  • To some extent private companies have filled this gap e.g. Maritrade provision of international air and sea freight data however application and coverage is limited |
| Long term contracts                          | • The introduction of PN and QR becoming national operators as evidence by PN’s entry to the North East Corridor in Queensland and QR’s entry into the East West Corridor, is providing more competition and choice  
  • Freight forwarders and other end users are now maintaining their flexibility by entering into shorter term contracts – the same is being reflected in coal contracts |
| Cost and risk/Barriers to entry/Significant Number of Transactions | • Interviews suggested that these barriers to innovation have seen little progress  
  • It may be the case that some of these barriers are natural industry conditions and therefore unavoidable  
  • Regardless there are still some improvements that could be made in these areas |
Government should focus on the issues that provide the potential for the greatest gain with least effort

**HIGH PRIORITY**
- Streamlining regulation and cooperation with other States as well as working with councils and other departments within NSW
- Promoting examples of industry best practice in the freight logistics industry to encourage innovation
- Long term infrastructure planning

**MEDIUM PRIORITY**
- Rail Infrastructure issues, both within the State of NSW and co-ordination with rail interstate infrastructure
- Long term infrastructure provision
- Issues around air freight carriage and infrastructure
- Alternatives to increasing fuel costs

**LOW PRIORITY**
- Human capital is a key issue and is important to the industry’s success, however it is important to note that there are already significant efforts in place to tackle these issues.

Hence Government’s attention may be best prioritised elsewhere
PART C:  
THE UPTAKE OF STATE OF THE ART TECHNOLOGY IN THE NSW FREIGHT LOGISTICS INDUSTRY
The rapid growth in information and communication technologies has been a major driver in the growth of service industries. These technologies continue to be one of the main sources of innovation with the freight logistics sector as the global landscape changes. Factors such as the internet, mobile phone technology, data recognition as well as increasingly sophisticated engineering technologies and new business models permeate all business transactions and none more so than in freight logistics.

The expectations of faster service, increased information and shorter delivery times have led to a continuous need for innovation driven by the customer but also a need to reduce cost to compete.

Understanding the uptake of technology within the freight logistics sector as well as the drivers and barriers to increasing the development and application of new technologies will assist in forming a holistic strategy for the industry.
A number of observations were made about the current challenges of operating in the NSW market during interviews with supply chain participants and selected technology based service providers in the industry.

Pressure from customers for efficiency and cost reduction
- Transport operators and supply chain managers are constantly trying to drive down unit cost and increase efficiency in order to compete.

Cooperation and integration in supply chain
- The levels of cooperation and integration vary markedly within supply chains and across different industries.

Technology sophistication varies
- There are varying levels of technology sophistication not wholly dependent on size or complexity of task.

Multinationals influence supply chain processes
- Multinational corporations and their impact on the systems, standards and investment where they set protocols which may be inefficient beyond their own link the supply chain.

Concerns with infrastructure capacity
- Infrastructure capacity and congestion management remains a major theme particularly around key gateways such as the port and airport.
- Restrictions for rail freight within the Sydney metropolitan area were also noted.

Challenges managing freight in metro areas
- The challenges of distribution in a metropolitan context are emerging as key issues with increasing pressure on inner city movement of freight, zoning and residential pressures as well as rising land prices.
- A number of freight logistics companies stated that Sydney was more challenging than both Melbourne or Brisbane.
In response, parties within supply chains are looking for ways to reduce cost, manage safety and remain competitive. Global experience suggests collaboration and information sharing through technology are two means of addressing these challenges.

**Potential Strategies**

- Improvement of asset utilisation
- Monitoring safety performance
- Improvement in quality and velocity of information flows
- Reduction of rework and errors
- Improvement in cash to cash cycle times
- Differentiation from competition
- Building stronger relationships with customers and supply chain partners

**Further Research**

For the last four years the Computer Sciences Corporation and the Supply Chain Management Review magazine collaborated on a global survey among supply chain professionals across 22 industries and representing all parts of the world.

The survey recently found future work needs to progress in two areas to progress along the supply chain maturity model:

- collaboration for those who have not yet begun to work with their partners and
- technology to enhance collaboration and enable sharing of knowledge electronically in order to manage information better
Vehicles involved in transport have become larger, longer and capable of carrying greater revenue earning cargos and while maintaining lower tare weights.

Significant changes to transport vehicle technology over recent years include:

**Container vessels increasing**
- from 2-3,000 TEU vessels to upwards of 15,000 TEU vessels

**Container sizes evolving**
- From 20’ to 40’, high cube, 48’ and longer to cater to lighter bulkier goods within the same or similar tare weight

**Rail wagons axle loads have increased**
- track and bridge strength has been improved to enable increased capacity, particularly for main line and high volume corridors

**Loco power and drawgear strength increased**
- Enables longer, heavier trains and remote control technology with the terminal has the potential to reduce labour costs and time.

**Truck and trailer sizes increasing**
- Trucks once carried a single twenty foot container – new super B doubles can carry the equivalent of four twenty foot containers.

**Handling equipment has evolved**
- Particularly at port, terminals and distribution centres.
- In response to new larger vessels, trucks and trains using the facilities
- Introduction of remote control equipment, intelligent yard and stack designs and automated warehousing has also changed business processes
From a physical perspective internationally ships, trucks, rail wagons and containers have all increased in size and capacity over the last 50 years – some assets have doubled or even treble in capacity

**Shipping**
- Average TEU capacity per vessel increased by 66% over 12 years
- Newest class of ships in 2007 50% greater capacity than 2006 models – 10,000 to 15,000 TEUs
- By 2010 world TEU capacity will have 40% based on forward orderbooks

**Trucking**
- Truck capacity has quadrupled (rigid to semi, B-double and Super B-Double)
- Higher Mass Limits (HML) introduced in late 1990s
- Performance Based Standards (PBS) spreading amongst the States providing for custom designed large volume trucks

**Rail**
- TEU capacity per wagon doubled between 1970 and 1990
- 1970’s saw introduction of 3 and 4 TEU wagons
- Double stacking of TEUs was introduced in 1997 from Parkes to Perth although double stacking operating between Adelaide and Perth since the late 1980s

**Containers**
- First specialist Container ships built in 1950s
- Containerisation standards (TEU) emerged in early 1970s
- Expansion from twenty foot (TEU) to forty foot (FEU) and longer containers as well as high cube (9’6” high) containers enter the market

---

In the second dimension of technological development, communication and information management, change has been exponential.

**Phone capability** – voice communication has evolved from operator assisted calls of the 1950’s to major leaps in digital voice and mobile technology in the last 5-10 years with the addition of widespread mobile internet and data capabilities over the last 3 years.

**Equipment and cargo tracking** – both timeliness and the level of granularity has evolved from using the original paper based documentation on a historical basis to that of real time, accurate location down to a pallet and cargo unit basis with the increased application of GPS over the past decade, and RFID in last 5 years.

**Interfacing and interoperability** – 50 years ago, large firms had a workforce focusing on communication and coordination within the organisation. This evolved to coordination within an industry before emerging within supply chains in the last 10 years. The next stage of development is improved interfaces across supply chains.
As such, new technology can be applied within supply chains to improve processes, for example information transmission but also across supply chains to manage the drivers of cost, for example fuel optimisation through GPS monitoring.
At one end of the spectrum there are a few large, often multinational organisations (e.g. infrastructure and multimodal transport operators) who have a high level of investment and equipment as well as technology.

At the other end there are small, low tech operators who are not early adopters of technology but find they must invest to remain linked to the supply chain they service.

The depth and breadth of this sector lends itself to a vast array of technologies and applications.

- This report is limited in both time and scope. It does not investigate each of these sub-sectors and the particular technologies that they are adopting.

- Its focuses on identifying new emerging technologies that are likely to have a significant impact on the industry in order to identify potential areas for NSW and the government to focus support. The work also considers steps that could be taken to improve uptake of systems that are already on the market and for which benefits are well proven.

<table>
<thead>
<tr>
<th>Freight Logistics Activity Checklist</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport/Line Haul</td>
</tr>
<tr>
<td>Inventory Management</td>
</tr>
<tr>
<td>Packaging</td>
</tr>
<tr>
<td>Planning</td>
</tr>
<tr>
<td>Regional Consolidiation</td>
</tr>
<tr>
<td>Courier route trade</td>
</tr>
<tr>
<td>Reverse flows</td>
</tr>
</tbody>
</table>
A number of interviews were conducted as part of the broader project. Those interviewed were asked what role technology played in their business and what new technologies were emerging.

Representative industries were interviewed

- Whilst it was not possible to engage specifically with small logistics providers within the scope of this project, it is worth noting that the way these companies perceive IT systems may differ from those interviewed.
- In particular, smaller companies are less likely to utilise technology to the extent that larger companies do.
- Anecdotal evidence also suggests they often encounter greater difficulties in justifying the time and resources needed to fully evaluate their costs and benefits.

Companies interviewed

- In addition to those organisations interviewed regarding their supply chains, further interviews were conducted with:
  - Sydney Ports Corporation
  - ViSA
  - TALC
  - 1-Stop
  - Tradegate
  - FreightNow

Note: Further information from the consultation exercise can be found in Appendix E
Investment in new technology, like most innovation, often emerges as a response to one or more external drivers. As with innovation the most common drivers for technology investment are cost reduction, customer requirements, competitive pressures and compliance.

**Customer Requirements**
- more visibility in the supply chain
- driven by need to manage their inventory and to inform their customers.

**Competitive advantage**
- market leaders designing and implementing solutions to gain competitive advantage.
- technology seen as a means of delivering more effective service and better shipment integrity.
- adopting new technology as a means of keeping up with their competitors.

**Cost reduction**
- rising cost of fuel, labour, pressure to reduce inventory levels and working capital, high levels of rework and poor data accuracy can provide the impetus and the tangible benefits to warrant the investment.

**Compliance**
- regulatory compliance can be a very effective driver in short term uptake as the choice for firms becomes how to comply, not whether to comply.
Those interviewed agreed that the logistics industry’s dependence on information for efficient operations has emerged as one of the greatest challenges it faces.

Industries and communication systems have adapted
- New ranges of systems, standards and technological solutions have emerged.
- However, most of the information gathered and collected within these industries (by the manufacturer, customer and intermediary parties) has tended to be developed and held within the organisation in order to improve internal performance.

New attempts to integrate and share information
- Only recently has there been genuine drive to attempt to integrate the various systems and a recognition of the value of sharing the information across the various platforms.

Supply chains are attempting to become digitally linked

Information and communication technology can refer to hardware, software and network design that enables information collection, processing and exchange between the various links in the supply chain.

It can include such tools and technologies as
- Global Position System (GPS)
- Web based ordering
- Electronic data interchange
- Barcoding
- Radio frequency identification (RFID)
- Systems for order entry and processing
- Vehicle routing and scheduling
- Fuel and fleet management
- Inventory replenishment
- Automated storage
- Warehouse management and order picking
- Asset management and performance (e.g. vehicle tracking and driver monitoring)
- Safety monitoring
As supply chains attempt to link digitally, all components from raw materials through transport to final point of sale must be connected.

Sources: Intel solutions white paper – Building the Digital Supply Chain 2005
The advances in technology that were identified can be broadly grouped into key areas: the process, the technology and the project or initiative.

**Process Innovation**
- ERP
- Warehouse and inventory management
- Procurement and payment
- Cargo management
- Asset Utilisation
- Electronic import and export delivery orders (IDO and EDO)

**Technology Solutions**
- RFID Transponders
- GPS
- GS1 Middleware
- Transponders
- E-tags
- Voicepick
- Web portals

**Specific project and industry initiatives**
- eFreight (IATA initiative)
- Metcash – voicepick
- Intelligent Access Program
- CRA by Department of Customs
- RFID showcase warehouse (Logica CMD)
- Electronic Import delivery order ((EIDO) project – Tradegate Development Fund
- TILIS Industry portal - TALC
- APEC Single Window initiative Virtual container yards (US)
The most significant advances emerging at present are in information exchange including real time data collection and transmission for management and tracking of cargo and equipment.

- Smaller parties still communicate via fax, phone and paper documents and are only now considering migrating to low threshold technology solutions partly driven by the need to comply with the terminal operators systems and regulatory requirements i.e. customs and maritime security.
- There are now several wireless technologies that are well established that have enabled communications with transport operators in the field – the most common being mobile phones.
- More advance technologies such as GPRS and on board computers are still relatively expensive but are becoming more commonplace particularly in large vehicle fleets.
- As mobile communication costs have come down, these systems have become more affordable. Systems (such as route planning and vehicle tracking) are increasingly web based, which has lowered up front investment costs in many cases and made them more accessible to small and medium sized companies.

Source: Masternaut UK
But, while communications technology use is widespread across port and landside interfaces, it is far from homogeneous with uptake differing among elements of the supply chain as found by Victoria during their Transport Benchmarking Study.

<table>
<thead>
<tr>
<th></th>
<th>AQIS</th>
<th>Customs</th>
<th>ABS</th>
<th>Customs Broker</th>
<th>Exporter</th>
<th>Finance Houses</th>
<th>Ports</th>
<th>Freight Forwarder</th>
<th>Shipping Lines</th>
<th>Stevedore</th>
<th>Transport Provider</th>
<th>Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-tag</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Customs Interactive</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EDI</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td></td>
<td>●</td>
</tr>
<tr>
<td>EFT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>●</td>
<td>●</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GPS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td></td>
<td>●</td>
</tr>
<tr>
<td>Shipping Line Portal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td></td>
<td>●</td>
</tr>
<tr>
<td>PDF</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td></td>
<td>●</td>
</tr>
<tr>
<td>Tradegate</td>
<td>●</td>
<td>●</td>
<td></td>
<td></td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voice</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td></td>
<td>●</td>
</tr>
<tr>
<td>XML</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>●</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Only the most basic technologies, such as voice communication, internet and fax are ubiquitous across the supply chain.

Sources: Adapted from Transport Benchmarking Study, Transport Distribution and Logistics Industry Round Table, 2006
Some industries, and in particular some organisations are more advanced than others. The airfreight industry has traditionally been slow to adopt technology to manage information exchange but a new program has been launched to address it at an international level.

- Contrary to our initial perception the adoption of technology differs markedly between the sea freight and air freight industries.
- The air cargo industry relies almost exclusively relies on paper-based processes to support freight movement.
- The average shipment generates more than 30 documents
- A number of documents are used or handled by more than one involved party (shippers, freight forwarders, handling agents, export and import brokers, airlines, customs and other government agencies
- A key challenge is to improve the stakeholders confidence in the completeness and accuracy of the data.

IATA e-freight
- In 2004, IATA launched a project, IATA e-freight, designed to eliminate the need to produce and transport paper documents for air cargo shipments by moving to a more simple, industry-wide, electronic, paper-free environment.
- Their focus is on message improvement programmes targeting both quality issues and process penetration.
- The program pilot was launched on November 5, 2007 across a number of airlines and customers across various jurisdictions.
- As IATA e-freight impacts the entire cargo supply chain, an Industry Action Group has been formed, including airlines, top freight forwarders represented by their association Freight Forward International and the World Customs Organization.

Note: Further information can be found in Appendix F
A number of new technologies (or applications of existing technology) are starting to have impact on the productivity of logistics services but wider implementation opportunities exist both here and overseas.

<table>
<thead>
<tr>
<th>Technology</th>
<th>Description</th>
<th>Comments</th>
<th>Examples</th>
</tr>
</thead>
</table>
| **RFID** Radio Frequency Identification Devices including transponders, active and passive transmitters | Electronic tags attached to consignments which allow real time tracking of movements and reduce the time needed to move, load and unload products | • Is being driven largely by major supply chain owners  
• Global standards are emerging  
• Cost of introducing on a per unit basis is dropping | • Airbus - tracking tools in real time  
• Aust Dept of Defence - tracking equipment  
• Marks and Spencer (UK) – moving products more efficiently |
| **EIDO, EEDO and ESCM** Electronic Import and Export Delivery Orders and Supply Chain Manifests | Replacement of paper documents with electronic versions transmitted in real time | • A number of initiatives are currently underway in Australia and globally  
• Transactions costs and time reduction are key drivers behind the initiatives | • EIDO – Australian Department of Customs documentation |
| **Optimisation tools** Fuel optimisation Route optimisation | Software that calculates the optimal route given fuel price, traffic, loads and destinations. Systems can also monitor the subsequent performance of vehicles and drivers | • Leveraging off other technology such as GPS tracking and the spread of cheap and fast computing | • www.smarttrack.com.au  
• www.mapds.com.au |
| **Electronic Credentialing** | In-vehicle transponders communicate with weigh stations and check points to pre-screen trucks for proper credentials | • Similar technology to RFID  
• Requires Government cooperation and coordination | Both stevedores at Port Botany |
| **Middleware** | A piece of software that functions as a conversion or translation allowing two separate software packages to integrate | • Allows multiple technology platforms to interact  
• Can be rolled out to smaller players who can’t afford custom software | Viewlocity at www.supply-chain.com.au |
| **Internet connectivity and portals** | Access to a common interface and marketplace to facilitate more efficient movement of freight | • Internet is ubiquitous allowing universal access  
• Facilitates freight matching and other electronic transactions such as EIDO and payment mechanisms | TILIS at www.talc.com.au |

*Note: Further information on these systems can be found in Appendix F*
There are a number of challenges organisations face with considering the investment in state of the art technology

Barriers include:

**Technical maturity**
- New technologies may not be well tested within the environment and can pose a risk to early adopters

**Standards and acceptance**
- Organisations may wish to ensure a new application or product meets compliance requirements (such as the Intelligent Access Program for higher mass vehicles) or is adopted as an industry standard

**Systems integration**
- Challenges of integrating with existing internal systems or external providers can be costly and challenging

**Business Case**
- Long and risky payback periods and historical tendencies for coming in over budget can hinder investment in the first place

**Competitive advantage**
- Protection of intellectual property can hinder diffusion of new technologies or solutions particularly if a firm has invested heavily in the research and development

**Willingness to change**
- “If it’s not broken why fix it?”. . . . A firm’s internal culture or perception of effort required to change can slow uptake.

**Lack of information**
- Companies may lack independent information on IT systems, or may not have the skills or resources to properly assess their costs and benefits

An example of an RFID adoption path

Source: IBM Consulting Services, *Focus on the Supply Chain: Applying Auto-ID within the Distribution Center*, June 2002
In response to increasing volumes and anticipated congestion around Port Botany, one particular solution may involve the use of technology to streamline vehicle and cargo movements.

Port Botany has experienced average 9.9% growth in container throughput over the last 5 years – this has been an increase of 2% in the rolling average over the last 2 years.

**Sydney Ports Containerised trade in TEU’s**

*Five year progression 2001/02 to 2006/07*
Road movements currently represent 80% of all container movements into and out of the Port and given the close proximity to the airport, residential areas and arterial roads such as the M5, future road congestion is a major issue.

Minimising the number of empty truck movements by matching loads into and out of the port is crucial as volumes increase. Web based freight matching in conjunction with virtual container parks should be considered as an option to address this issue.

### 2005/06 Task

- **1.44m TEU**
  - 2005/06
- **20% Rail Mode Share**
- **290,000 TEU Rail**
- **1.05m TEU Road**
- **725,000 TEU Containers**
  - **2,950 Containers per Day**
  - **1,750 Trucks per day**
  - **1.48 Containers per Truck**
  - **3,500 Truck Trips per day**
- **TEU to Container Ratio = 1.45**
- **280 Working Days**
- **1,050 Trucks per day**
- **3,500 Truck Trips per day**

### Forecast 2025 Task

- **3.2m TEU**
  - Forecast 2025
- **40% Rail Mode Share**
- **1.28m TEU Rail**
- **1.92m TEU Road**
- **1.2m TEU Containers**
  - **3,846 Containers per Day**
  - **2,350 Trucks per day**
  - **1.6 Containers per Truck**
  - **2,700 Truck Trips per day**
- **1.2m TEU Containers**
  - **3,846 Containers per Day**
  - **2,350 Trucks per day**
  - **1.6 Containers per Truck**
  - **2,700 Truck Trips per day**
- **312 Working Days**
  - 6 day work week
- **34% increase in daily truck movements will need to be accommodated through new infrastructure and technology investment**

If the 40% Rail Share target cannot be met then Road share will be greater placing further pressure on already stretched infrastructure.

**TECHNOLOGY**

Meeting the Task

- TEU task 120% increase over 20 years
- Associated Road and Rail task will have to grow to meet this new TEU demand
- Capacity can be met through
  - Increased truck capacity
  - Increased working days
  - Greater Rail Share
  - **TECHNOLOGY**

Sources: Sydney Ports Corporation; Saha International internal analysis
The challenge faced by the industry and government is how to minimise the number of unnecessary truck trips by reducing where possible the number of empty movements to collect or deliver containers to the port precinct.

Perceived  
Actual  
Optimal

The major advantage of the Optimal container transfer arrangements is the reduction in overall empty container movements – by having the Parks or even a “virtual container yard” relative to the export source the long movement back to the Port can be avoided.

Sources: Sydney Ports Corporation, Metropolitan road and rail links
Currently Import Containers are returned to empty container parks at the Port precinct where they wait to be collected and taken to an Exporter to be filled and returned for export – this movement pattern results in significant empty container movements.


Notes: TEU and Truck Movement figures are only indicative, however they are based on assumptions used by Sydney Ports to forecast truck movements and freight activity.
If Import and Export container movements are matched there is the potential to reduce total truck movements by up to 40% through eliminating empty container movements traditionally taken back to the Port.

**Old Truck Movements**

<table>
<thead>
<tr>
<th>Movement</th>
<th>Status</th>
<th>TEUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port-Importer</td>
<td>Full</td>
<td>800K</td>
</tr>
<tr>
<td>Importer-Park</td>
<td>Empty</td>
<td>800K</td>
</tr>
<tr>
<td>Park-Port</td>
<td>Empty</td>
<td>430K</td>
</tr>
<tr>
<td>Park-Exporter</td>
<td>Empty</td>
<td>370K</td>
</tr>
<tr>
<td>Exporter-Port</td>
<td>Full</td>
<td>370K</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>2770K</strong></td>
</tr>
</tbody>
</table>

**New Truck Movements**

<table>
<thead>
<tr>
<th>Movement</th>
<th>Status</th>
<th>TEUs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port-Importer</td>
<td>Full</td>
<td>800K</td>
</tr>
<tr>
<td>Importer-Port</td>
<td>Empty</td>
<td>430K</td>
</tr>
<tr>
<td>Exporter-Port</td>
<td>Full</td>
<td>370K</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>1600K</strong></td>
</tr>
</tbody>
</table>

Notes: TEU and Truck Movement figures are only indicative, however they are based on assumptions used by Sydney Ports to forecast truck movements and freight activity.

Key to the success of reducing unnecessary empty container movements then is facilitating the “matching” of inbound and outbound loads from the Port – web based freight matching is one possible solution

- A web based freight matching system (also referred to as online freight exchanges) is generally an open system where cargo owners can advertise for an appropriate way to move their goods and carriers can respond that they can carry out the request.

- In its simplest form a web based freight matching system is a notice board for those who have freight to move and those who have the space and interest in moving it.

- While freight matching provides the opportunity to reduce truck movements it does not guarantee this as it relies on a suitable export task existing at a time proximate to imports.

Sources: Gateway Cities Council of Governments, Empty Ocean Container Logistics Study, May 2002
Web based freight matching services have developed over the last 15 years, mainly overseas but a small number of companies have established themselves in Australia

Most appear to be in the US and UK
- Web based freight matching services have emerged as commercial businesses and appear to be in the greatest number in the US and the UK.

They are the freight brokers of the 21st Century
- Given the relatively short life of the internet – most companies have been around for less than 20 years and have evolved from the more traditional role of the freight broker, a development of the move to outsourcing transport and logistics services through the 1970’s and 1980’s.

Proliferation is translating into specialisation
- There are numerous freight matching services operating in the US and many are now specialising in particular transport and logistics sectors or geographical areas.
- No evidence of port specific sites was found however one site www.loadmatch.com does cater to intermodal terminals. It should be noted that intermodal terminals in the US have high volumes of domestic freight throughput.

Transactions over the web in the US are increasing
- It is claimed that up to 20% of all freight transactions now occur in the US via a freight management system.

Freight matching services are relatively well established in the UK and other parts of Europe
- The most high profile European site is probably Teleroute (http://corporate.teleroute.com) which covers the UK and Continental Europe and reports to have more than 60,000 users each day. Other significant sites include www.cargotrans.net, www.freightnet.com, www.truckspace.co.uk, www.loadup.co.uk, and www.haulageexchange.co.uk.

Note: A list of additional US freight matching websites and links can be found in Appendix G
Research indicates that there are currently 4 web based freight matching systems operating commercially in Australia at present. All are less than 8 years old and focus on the domestic road freight market.

<table>
<thead>
<tr>
<th>Company</th>
<th>Age</th>
<th>Market</th>
<th>Penetration</th>
<th>Cost</th>
<th>Services offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moveitnet</td>
<td>8 yrs</td>
<td>Domestic market focus Road, rail, sea and air services  Focus on supply chain owner solutions</td>
<td>150,000 consignments per month</td>
<td>Tailored to customer – dependent on volume</td>
<td>Freight matching</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Data collection</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Data reporting</td>
</tr>
<tr>
<td>FreightNow</td>
<td>2 yrs</td>
<td>Domestic market focus Road, rail, sea and air services  Focus on supply chain owner solutions</td>
<td>1,000 transactions per week 800 Carriers registered</td>
<td>$10 per transaction charged to 25c SMS alert</td>
<td>Freight matching</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Data collection and reporting</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Subcontractor allocation</td>
</tr>
<tr>
<td>Fillmytruck</td>
<td>&lt;2 yrs</td>
<td>Domestic road market only</td>
<td>730 members of which 94% carriers and 6% cargo owners.</td>
<td>Transaction fee of $2 per pallet Min - $6.00 Max - $50.00</td>
<td>Freight matching</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Subcontractor allocation</td>
</tr>
<tr>
<td>Frayt</td>
<td>&lt;1 yr</td>
<td>Domestic and international cargo movements. Road, rail, sea, air. Also US and NZ</td>
<td>5000 carriers and cargo owners listed but few jobs.</td>
<td>Free</td>
<td>Portal and carrier directory where jobs and/or flat rates posted</td>
</tr>
</tbody>
</table>
In addition there are other internet products specifically catering to the transport and logistics industry – these include directories, portals and gateways

<table>
<thead>
<tr>
<th>Company</th>
<th>Description</th>
<th>Function</th>
</tr>
</thead>
</table>
| Tradegate                | A not-for-profit organisation operating nationwide with the aim of advancing the efficiency of import and export movements across Australian borders through providing software technology to integrate existing technologies into one package. | • Tradegate’s foundation software platform is called “Smartrade”  
• Specific modules for exports, imports, payments etc can be “bolted on” as necessary  
• Modules focus on allowing documentation such as PRAs, EDNs and CRNs to be sent/received electronically and in real time |
| TILIS                    | The Totally Intelligent Logistics Inquiry Service (TILIS) is a web based, shared infrastructure project under construction for the national transport and logistics (T&L) industry. TILIS will enable real-time collaboration, knowledge exchange and access to extensive training and education resources, irrespective of users location or activity within the transport and logistics industry. | • Be the single gateway to current and useful career, learning and related information on the T&L industry for all interested parties  
• Help employers and educators do more refined and relevant online searches to discover, share and reuse information, resources and content  
• Customisable User Interface (UI)  
• Industry directory for both commercial and non-commercial web content providers whether hosted on TILIS or independently |
| Freight Directory        | Freight Directory is a free directory to both look up freight company’s websites and to add a listing for companies operating within the freight industry. Freight Directory is heavily marketed to the freight industry and to key targeted users of freight. The directory is split into countries to enable users to select companies that are located in the area that they require. | • Linked to international directory for listings  
• Contains NSW Freight directory across modes and includes a freight exchange but no current entries |
| Australian Government Directory | The Australian Government Directory is a commercially based online directory for businesses across Australia | • Online directory allowing for advertising and listing of businesses |
FreightNow is a recent starter in the marketplace which provides not just freight matching but also associated cost calculations and other value adding information.

FreightNow, based in Sydney, was formed in 2005
- Caters for internal fleet or contract carriers
- Transport costing and billing for deliveries and pick-ups allows for contract or live market rates to be negotiated
- Freight costing/tendering option
- Calculates contract driver payments or carrier costs
- Uploads carrier rates and information

It can provide:
- Immediate notification of jobs available via SMS, fax or email as well as via the web site
- Printed consignment documentation and proof of delivery capabilities (paper based)
- Chain-of-Responsibility protection
- History of transport activity by carrier, vehicle type

In addition either party can:
- Auto scan of documents into online repository using OCR scanning technology
- Source document images online via web enquiries
- Customise reporting functions

Sources:  www.freightnow.com.au
Similarly, www.fillmytruck.com.au is a recent starter based out of Melbourne and serving the domestic market

Established 14 months ago, based in Melbourne
- fillmytruck caters primarily to the domestic market.
- The company currently has 800 truck members and caters to less than and full truck loads as well as logging and finding prime movers as tow operators for trailers
- Free membership is provided to carriers and no transaction or ongoing use charges for carriers
- When freight senders log freight or find trucks they are charged a transaction fee of $2 per pallet moved

Plan to extend service
- SMS/email broadcasts of trucks and/or freight available
- Freight tracking
- Electronic POD’s (proof of delivery)

Sources: www.fillmytruck.com.au
Moveitnet offers an integrated service with carrier management, information transfer and order reconciliation and primarily acts for the cargo owner – it focuses on domestic transactions and handles on average 150,000 consignments per month.

Technology
- Web based technology requires no additional software installation on clients’ IT systems
- Can integrate 3rd party WMS/ERP style software on clients computers with Moveitnet servers

Benefits
- Cost reduction through consolidation and coordination across carriers
- Reduced customer service costs
- Single source of online tracking across multiple carriers
- Automated analytics and performance reporting
- Compare carrier costs and performance
Unlike the other freight matching web systems Frayt.com is cross border with service in NZ, UK and the US. It also hosts load boards for rail, sea and air as well as road freight.

Technology
- Web based search engine technology
- Accessible from any computer with internet access
- Lacks functionality to integrate with 3rd party ERP software

Issues
- No suburbs or capital cities were available for selection, only rural and regional centres
- Testimonial user contacted was unaware of the service and had no knowledge of authorising the testimonial.

Benefits
- Both a directory of freight providers and a limited freight matching service
- Customers can post their job details online and freight operators can “bid” to take their consignment
- Standard rates and a rating/feedback system displayed against operators names and services

Sources: www.frayt.com
It should be noted that the issues faced by Sydney and other ports around Australia are not unique. Road congestion and port related truck movements are also driving investigations into new technology solutions at other ports such as Long Beach and New York.

There is an increasing “issue of excessive unproductive trips made to and from the port. In the Port of New York and New Jersey, the problem needs to be addressed with a sense of urgency, as the NY-NJ region is also one of the most densely populated residential areas in the neighbourhood of a port. Port related truck traffic causes not only additional vehicle miles travelled and related emissions, but also…marine terminal, depot gate delays and roadway congestion.”

- A report released in mid October 2007 examines the feasibility of establishing a virtual container yard to optimise empty container movement in a bid to reduce road congestion around the port of New York-New Jersey
- Similar issues exist at other major ports and the report examines new initiatives at the Port of Long Beach, Port of Seattle, Vancouver and Rotterdam
- It specifically notes that next generation internet and new information technology platform solutions may be used and, in particular, the concept of the Virtual Container Yard (VCY) to enable direct interchanges of empty containers – reducing the need to either return empties to the port or do a repositioning truck movement
- In the US they have called these direct interchanges of containers “street-turns”, a concept similar to that of triangulation but based on a more sophisticated open model for information exchange and adhoc movements

They also recognise that the shipping industry has played a major role to date in the inefficiencies and has not focused on the impact of landside repositioning of empty containers

- Empty Container Repositioning
  To date ocean carriers have been motivated and focused on minimizing container repositioning costs in the ocean transit segment by utilising empty ship slots to reposition containers to other markets without focusing on minimizing the necessity and cost of repositioning of empty containers on the inland transport segment.

- The market imbalance is complex
  The regulatory and market circumstances that give rise to the current imbalance in trade and number of empty container movements are rather complex and, accordingly, are not likely to be resolved through a single or simple solution.

- The major barriers are institutional
  Several previous studies, including the recent Gateway Cities Study on Empty Ocean Containers Logistics, have pointed out that “the major barriers to rationalizing empty container movements in the region are not technical or economic, but institutional,” and suggest that the greater burden for institutional change rests properly with the ocean carriers.

Extracts from the UTRC report on empty container movements

“why are obvious local inefficiencies in the movement of empty containers are permitted to persist in a competitive international setting”

“international logistics are optimized at a global scale, and that realizing optimization at a sub-system level could very well compromise the performance of the system as a whole.”

As noted in the Gateway Cities study, “empty containers move back and forth because, at present, there is no alternative.”

“... some promise in several internet-based container information sharing ventures. The hope is that, given sufficient real-time information on the location and type of empty containers available, it would be more likely that the number of empty container trips in the region could be reduced”

“... to make these systems a viable solution for rationalizing empty container movements, it is not the mere posting and sharing of information, but the timeliness and reliability of the information that matters”

“... there may be public policy options available that, through encouraging or discouraging certain behaviors, could modify the set of market choices and institutional arrangements that direct the present physical movements of empty containers.”

Sources: Theofanis and Boile, Investigating the Feasibility of Establishing a Virtual Container Yard to Optimize Empty Container Movement in the NY-NJ Region, UTRC Research Initiative, October 2007; Gateway Cities Council of Governments, Empty Ocean Container Logistics Study, May 2002
The Virtual Container Yard (VCY) is a web-based platform to post information and to enhance direct empty container interchanges between importers and exporters to avoid empty trips to/from the port.

This concept envisages a virtual exchange market as an alternative to actual container yards.

The virtual container yard concept has recently been launched in Southern California and is being investigated in a number of other ports.

The key purposes of virtual container yard are to:
- post critical information on cargo and containers status (location, characters);
- facilitate communication between participated parties (motor carriers, ocean carriers, leasing companies and chassis pool operators);
- permit container interchanges and other document process take place without moving a container to the port.

*Note: Further information on empty container movement logistics and virtual container yards can be found in Appendix H*

Sources: Theofanis and Boile, *Investigating the Feasibility of Establishing a Virtual Container Yard to Optimize Empty Container Movement in the NY-NJ Region*, UTRC Research Initiative, October 2007

A report prepared by The University Transportation Research Centre (UTRC) suggests that one of the most efficient ways to minimise unproductive empty trips and the related problems is to facilitate the direct interchange of empty containers.
Any successful applications of web-based information depends on the willingness of all participants to share business information on a timely basis, and this particularly requires cooperation among ocean carriers.

- Ocean carriers are a major component of the supply chain and link information on empty containers with owners, final customers, final port etc. – their involvement would therefore be critical to the overall success of a system.
- In global shipping terms Australia is a relatively small player and has little opportunity or ability to influence major changes in container management processes.
- The recent work outlined on previous studies on major US Ports, (all of which handle significant container volumes) suggest that they have enough leverage to initiate change and encourage Ocean carriers to become involved in projects improving landside management of freight, and in particular movements of empty containers.
To assess the attractive of any such system, three web-based freight matching options, with varying costs, were considered ranging from a simple extension to existing freight matching services to a purpose built solution

- System implementation costs were generated as a result of meetings with potential service providers including Sydney Ports Corporation, 1-Stop, Tradegate and FreightNow
- General estimates of implementation costs are shown below
  - **Option 1: $100,000** – Simple non-interactive web posting board. Shippers and freight operators could post loads and vehicle availability, however the system would be unlikely to automatically match users together (i.e. a basic message board and users would need to contact each other separately). System could be developed as part of another website (e.g. Sydney Ports)
  - **Option 2: $200,000** – Web posting board with basic functionality (e.g. user accounts, email alerts, real time updating of postings). Likely to be developed as part of existing website e.g. FreightNow or 1Stop building on their existing functionality and service offering
  - **Option 3: $1,500,000** – Purpose built comprehensive freight matching system with high degree of functionality and interoperability incorporating value added features (e.g. links to VBS, route planners and load matching optimisation, links to customs systems, etc). System likely to be developed as stand alone website with customised interface
- No ongoing operating and maintenance costs were assumed as these were expected to be either the same for same option or insignificant. We also assumed that the systems would only have a 5-year commercial life
- The systems’ viability was also tested for a mid-term refresh, equivalent to the same upfront implementation costs
- These figures should be considered initial estimates only and may vary according to the level of functionality, user interface etc. Further discussions with suppliers would be needed to develop a more formal system specification.
The benefits of a web-based freight matching option were viewed essentially through reductions in truck kilometres on the assumption that the service could reduce the number of vehicles travelling to and from the port.

While it is not possible to determine whether web-based freight matching options will by themselves reduce truck kilometres (i.e. without other supporting policies), our analysis assessed the breakeven point necessary to justify the options assuming no other influences.

This is expressed by assigning an economic value to the number of truck kilometres which need to be reduced to equate to the present value of the web-based freight matching options:

- Economic vehicle operating cost – commercial cost less taxes
- Externality cost – environmental cost (pollution, congestion, etc)

The working assumptions were as follows:
- Number of two-way Port Botany truck movements: 3,500 in 2005 and 4,700 in 2025 (Sydney Ports)
- Average one-way truck distance from Port Botany: 20 kilometres
- Semi-trailers: 70% and B-Doubles: 30% (Sydney Ports, Saha)
- Weighted economic vehicle operating cost: $6.07 per vehicle kilometre (Saha from earlier work for Sydney Ports)
- Weighted externality cost: $0.25 per vehicle kilometre (Saha from earlier work for Sydney Ports)
Very little improvement in truck efficiency is required to justify the low-cost options, with even only modest reductions required to justify the more expensive option.

- A reduction of only around 1% of truck kilometres would be sufficient to justify the lower cost options.
- Even the most expensive nominated option would only require a 10% reduction in truck kilometres to justify the option.
- Over 95% of the savings would accrue to truck operators.
- As a sensitivity test, if the average distance is raised to 30 kilometres, there is little difference for Option 1 and 2 while Option 3 would require a reduction of over 12%.
- These options may be necessary but not sufficient conditions for achieving these kilometre reductions. However, the modest savings required to justify the options would suggest that there would be few financial constraints if other institutional and marketing conditions were favourable.

<table>
<thead>
<tr>
<th></th>
<th>Base Case</th>
<th>Option 1</th>
<th>Option 2</th>
<th>Option 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital Costs 2008</td>
<td>-</td>
<td>$100,000</td>
<td>$200,000</td>
<td>$1,500,000</td>
</tr>
<tr>
<td>Refresh 2010</td>
<td>-</td>
<td>$100,000</td>
<td>$200,000</td>
<td>$1,500,000</td>
</tr>
<tr>
<td>Present Value:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capital Costs</td>
<td>-</td>
<td>$193,458</td>
<td>$386,916</td>
<td>$2,901,869</td>
</tr>
<tr>
<td>Vehicle Costs</td>
<td>$29,979,491</td>
<td>$29,979,491</td>
<td>$29,979,491</td>
<td>$29,979,491</td>
</tr>
<tr>
<td>Net Present Value</td>
<td>$29,979,491</td>
<td>$30,172,949</td>
<td>$30,366,407</td>
<td>$32,881,360</td>
</tr>
<tr>
<td>Difference</td>
<td>-</td>
<td>0.065%</td>
<td>1.29%</td>
<td>9.68%</td>
</tr>
</tbody>
</table>
However, any new web based solution must address users’ concerns regarding information and functionality as well as financial and regulatory issues if it is to be successful in contributing to reduced empty truck movements.

Users are likely to have a variety of issues and needs covering including:

**Financial**
- Little or no transaction cost
- No cost as barrier to entry
- Penalties
- Rates and payment
- Liability and insurance cover

**Information**
- Quality, accuracy and reliability
- Timeliness
- Responsibility for managing
- Monitoring
- Information security
- Compatibility and interfacing

**Regulatory**
- Tracking
- Equal access
- Chain of Responsibility
- Competitive situation
- Quarantine and customs
- Liability

**Functionality**
- User friendliness
- Training
- Flexibility
- Ownership and management
- Electronic information exchange must mirror physical exchange

Sources: Adapted from Theofanis and Boile, *Investigating the Feasibility of Establishing a Virtual Container Yard to Optimize Empty Container Movement in the NY-NJ Region*, UTRC Research Initiative, October 2007
Sydney Ports Corporation have investigated including a freight matching capability within the port community system and have researched other Port Authority initiatives to create open IT port community groups

- Sydney Ports Corporation have proposed an extension of the port community information system to include a freight matching capability
- They believe that any freight matching capability should have a broader focus and include a range of services but particularly cater to empty as well as loaded containers in and out of the port
- Lack of transparency in information, particularly through the current design and management of the VBS is a particular issue that restricts current freight matching opportunities
- Overseas ports which Sydney Ports investigated include:
  - Chile - Port of Valparaiso
  - Finland – PortNet
  - Malaysia – Port Klang
  - UK – Felixstowe Cargo Processing
- They examined the key success factors to success of other systems and concluded the following factors were important to a successful implementation:
  - open internet technologies
  - low transaction costs for users
  - government leadership to educate the community on benefits

A discussion paper prepared by Sydney Ports Corporation outlining their vision for a National E-Commerce Communication System for Port Communities is available on request.

Sources:  Interview with Sydney Ports Corporation 10 August 2007
Can a freight matching system reduce road congestion – our conclusion is that it might but current market structure and practice does not lend itself to significant opportunities to match loads into and out of the port.

- While the market for a web based freight matching system is expanding and appears commercially attractive, effective implementation requires buy in from both domestic and international parties
- Given Australia’s relatively small role in international trade, gaining support of international shipping companies may prove difficult
- A simple product nevertheless appears to be technically feasible and could be developed at a low cost to test the concept further
- Contractual terms and relationships however, will still determine majority of empty container movements, hence the location of physical facilities remains a key issue
- If the market structure changes as intermodal terminals relocate, and industry trust and information sharing increase, the potential improves for such an initiative
- There is a need to consider the scheme in the context of virtual container yard concept if US is successful in influencing global shipping lines to consider changing
Technology trends

- Systems have become more affordable as mobile communication technology has improved and become cheaper. There is also an increasing trend for suppliers to provide web based IT solutions for the freight logistics industry, which means up front investment costs have come down in many cases.

- While many systems are more affordable (e.g. vehicle tracking solutions), anecdotal evidence suggests that small companies lag behind larger ones when it comes to investing in systems to improve productivity – this is a critical issue in an industry which is made up of a very large number of small companies.

- There is increasing use of electronic data interfaces to maintain data integrity and remove duplication and re entry of data. Focus to date is on the information exchange between parties but it is evolving to transfer the information with the cargo and equipment e.g. RFID etc.

- Industry standards are evolving but a significant amount of work is being done in parallel.

Our preliminary assessment suggests that while it appears that many systems are becoming more accessible, there are varying levels of technology uptake across particular transactions and activities.
Innovation is only a means to an end – government intervention can help, but must be appropriate

- Innovation is an umbrella under which various improvements and refinements to existing products and services can be defined but it is essential to remember that innovation itself is a means to an end and not an end in itself.
- The breadth and depth of new technology being applied across supply chains and modes is vast and government’s role within that development must be to support the development and application of new technologies whilst being careful not to preempt the market by trying to pick the winners.
- While it would be inappropriate for government to promote a specific product or supplier, there may be merit in promoting the general benefits of IT systems that have been proven to increase freight logistics productivity as a means of increasing take up.

*This approach is used in UK, where the general benefits of freight logistics IT systems (including vehicle tracking, routing and scheduling, and web based freight matching systems) are actively promoted through a targeted industry efficiency program (www.freightbestpractice.co.uk). The program is aimed at small and medium sized freight logistics companies and provides independent advice on the advantages and disadvantages of different systems, as well as general steps that should be taken to investigate costs and benefits prior to purchasing.*
RECOMMENDATIONS
This report represents the first steps towards a path to innovation - further work to benchmark, measure and support key supply chains is required.

- An agenda must be developed for actions that can be taken by Government to help increase innovation in this vital sector.
- We recommend that the following actions be considered as early priorities within stages 2 and 3 of the Innovation Strategy Project:
  - **Gather improved and additional data on the NSW freight logistics industry**
    - *In particular developing a strategic vision and agenda for next steps and taking steps to establish a freight database for Sydney (Recommendations 1A and 1B)*
  - **Focus on integrated infrastructure planning**
    - *Progressing AusLink projects (2A) IPART recommendations for Port Botany (2B) and addressing issues surrounding Sydney Airport (2C)*
  - **Help industry make more informed decisions**
    - *Development of toolkits, case studies and reviews of new products and technologies to encourage greater take up of industry best practice (4A to 4D)*
  - **Establish benchmarking programs for the sector**
    - *Develop indicators and programs to benchmark the sector against other jurisdictions and industries to gauge the relative success of any actions (4E and 4F)*
- Finally we would suggest the need for more comprehensive strategy and policy development to direct the most appropriate support to NSW’s target supply chains.
A range of actions can be taken to resolve productivity issues and remove barriers to innovation. There is a role for both Government and industry.

<table>
<thead>
<tr>
<th>Objective</th>
<th>Short Term Actions</th>
<th>Medium Term Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Improving policy making through better information</td>
<td>1-A Develop strategic vision for NSW freight logistics industry, including an agenda for further actions 1-B Develop a freight database for Sydney 1-C Investigate systems which could gather information on container movements within Sydney (e.g. RFID)</td>
<td>1-D Improve freight modelling capability and work with other states to develop a comprehensive integrated freight model for future planning</td>
</tr>
<tr>
<td>2) Increasing efficiency of transport system though better infrastructure planning and provision</td>
<td>2-A Implement proposed and approved AusLink projects 2-B Investigate short term solutions to key infrastructure capacity issues (e.g. IPART solutions for Port Botany, solutions to improving rail freight access into and out of Sydney) 2-C Establish partnership group to identify and address freight issues surrounding Sydney Airport 2-D Research on the potential usefulness of urban consolidation centre(s) in Sydney</td>
<td>2-E Examine feasibility of developing air freight hubs outside Sydney 2-F Work with state and federal government to: – Increase standardisation of rail gauges – Develop long term plans for container double stacking on interstate rail – Prioritise development of intermodal rail freight terminals</td>
</tr>
<tr>
<td>3) Improving competitiveness and productivity through better regulations</td>
<td>3-A Continue to work closely with National Transport Commission to harmonise freight transport regulations and accreditation and approval schemes between states 3-B Investigate any local authority or government issues which may impede the operation of 24 hour supply chains</td>
<td>3-C Work with state and federal bodies to: – Standardise rail accreditation – Harmonise OH&amp;S legislation between states</td>
</tr>
</tbody>
</table>
Further actions specifically dealing with industry best practice and technology should also be considered

<table>
<thead>
<tr>
<th>Objective</th>
<th>Short Term Actions</th>
<th>Medium Term Actions</th>
</tr>
</thead>
</table>
| 4) Help industry and Government make informed decisions | 4-A Review new technology and advise on capabilities  
4-B Identify best practice programs and assist industry with assessment of costs and benefits  
4-C Develop operational toolkits for improved efficiency  
4-D Develop systems and tools to help industry monitor and improve environmental performance (e.g. assistance with external benchmarking, carbon footprinting) | 4-E Develop a set of relevant quantitative and qualitative indicators to assist both industry and Government to analyse the impact of policies upon innovation and improve performance in the long term  
4-F Establish a framework for regular measurement of innovation and productivity improvement across the sector |
| 5) Encouraging development of new solutions to address short term problems and long term efficiency | 5-A Remove barriers for a successful web based freight matching system to make it an attractive option for industry, i.e.: undertake work to  
- Address issues in relation to location of empty container parks  
- Improve ability to match slots at freight terminals  
- Investigate potential role of pricing instruments  
5-B Consider the potential role of freight matching systems and improvements in interfacing between supply chain members in relation to all new freight hubs and intermodal terminals | 5-C Participate in global technology initiatives in freight logistics  
5-D Research and establish standards for frequencies, platforms and system networks used in freight transport  
5-E Examine tax incentives that could be used to support investment in best practice technology solutions and R&D of solutions to improve productivity  
5-F Promote industry partnerships and knowledge clusters to encourage ongoing innovative technological solutions |
APPENDICES
**Table of Contents**

### Appendices

<table>
<thead>
<tr>
<th>Appendix</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Explanation of business types</td>
<td>131</td>
</tr>
<tr>
<td>B</td>
<td>Supply chain mapping</td>
<td>137</td>
</tr>
<tr>
<td>C</td>
<td>Productivity issues and innovation barriers and drivers</td>
<td>156</td>
</tr>
<tr>
<td>D</td>
<td>Innovation examples</td>
<td>167</td>
</tr>
<tr>
<td>E</td>
<td>Interview notes</td>
<td>169</td>
</tr>
<tr>
<td>F</td>
<td>Examples of technological innovation</td>
<td>176</td>
</tr>
<tr>
<td>G</td>
<td>Sample of US freight matching sites and load boards</td>
<td>188</td>
</tr>
<tr>
<td>H</td>
<td>Container movement logistics and virtual container yards</td>
<td>190</td>
</tr>
</tbody>
</table>
APPENDIX A:
EXPLANATION OF BUSINESS TYPES
(ANZSIC 1993)
<table>
<thead>
<tr>
<th>Business Type</th>
<th>Description</th>
<th>Primary Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road Freight Transport</td>
<td>Transportation of Freight by Road</td>
<td>Delivery service, road (except courier); Furniture removal service (road); Log haulage service (road); Road freight transport service; Taxi truck service (with driver); Truck hire service (with driver)</td>
</tr>
<tr>
<td>Rail Transport</td>
<td>Operation railways for passenger and freight including operating railway terminal, depot facilities for receiving and dispatching or transferring rail freight</td>
<td>Container terminal operation (railway); Freight transport service (railway); Locomotive leasing; Passenger transport service (railway); Railway station operation; Suburban railway transport service (except tramway transport); Terminal operation (railway)</td>
</tr>
<tr>
<td>International Sea Transport</td>
<td>Operation of vessels for transport of passengers and freight by sea between domestic and foreign ports</td>
<td>Freight transport service (international sea transport); Ocean cruise services (between domestic and foreign ports); Passenger transport service (international sea transport); Ship management service for international sea transport (i.e. operation of ships on behalf of owners)</td>
</tr>
<tr>
<td>Coastal Water Transport</td>
<td>Operation of vessels for transport of passengers or freight by sea between domestic ports</td>
<td>Boat charter, lease or rental (with crew; for any period; for coastal water transport; except recreational); Freight transport service (coastal sea transport); Island ferry operation (in coastal waters); Ocean cruise services (between domestic ports); Passenger transport service (coastal sea transport); Ship charter, lease or rental (with crew; for any period; for coastal sea transport); Ship management service for coastal sea transport (i.e. operation of ships on behalf of owners); Vehicular ferry operation (in coastal waters); single voyage permits between East and West coast of Australia when using international ships</td>
</tr>
</tbody>
</table>

Sources: ABS Australian and New Zealand Standard Industrial Classification (ANZSIC), 1993
<table>
<thead>
<tr>
<th>Business Type</th>
<th>Description</th>
<th>Primary Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inland &amp; Water Transport</td>
<td>Operation of vessels for the transportation of freight or passengers in harbours or inland waters (except tug boats or lighters)</td>
<td>Cruise operation (river, harbour or lake; with or without restaurant facilities); Freight transport service (river, harbour or lake); Passenger ferry operation (river, harbour or lake); Passenger transport service (river, harbour or lake); Water taxi service (river, harbour or lake)</td>
</tr>
<tr>
<td>Scheduled International Air Transport</td>
<td>Operation of aircraft on scheduled routes for the transportation of passengers or freight between domestic and foreign ports</td>
<td>Aircraft charter, lease or rental (with crew; for use in scheduled international air transport); Air transport service (scheduled international); Air transport terminal operation (for scheduled international air transport; except airports); Freight transport service (scheduled international air transport); Passenger transport service (scheduled international air transport)</td>
</tr>
<tr>
<td>Scheduled Domestic Air Transport</td>
<td>Operation of aircraft on scheduled routes for the transportation of passengers or freight domestically</td>
<td>Aircraft charter, lease or rental (with crew; for use in scheduled domestic air transport); Air transport service (scheduled domestic); Air transport terminal operation (for scheduled domestic air transport; except airports); Freight transport service (scheduled domestic air transport); Passenger transport service (scheduled domestic air transport)</td>
</tr>
<tr>
<td>Non-Scheduled Air &amp; Space Transport</td>
<td>Operation of aircraft on other than scheduled routes for the transportation of passengers or freight. Also includes units mainly engaged in operating flying schools</td>
<td>Aircraft charter, lease or rental (with crew; for use in non-scheduled air transport); Air transport terminal operation (for non-scheduled air transport; except airports); Freight transport service (non-scheduled air transport); Passenger transport service (non-scheduled air transport); Space transport service (non-scheduled)</td>
</tr>
</tbody>
</table>

Sources: ABS Australian and New Zealand Standard Industrial Classification (ANZSIC), 1993
<table>
<thead>
<tr>
<th>Business Type</th>
<th>Description</th>
<th>Primary Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport (Other)</td>
<td>Transportation of passengers or freight not else where classified (n.e.c.)</td>
<td>Cable car operation (except tramway); Chair lift operation; Freight transport operation n.e.c.; Monorail operation; Over snow transport operation; Passenger transport operation n.e.c.; Transport operation n.e.c.</td>
</tr>
<tr>
<td>Service to Road Transport</td>
<td>Providing services to road transport n.e.c.</td>
<td>Container terminal or park facilities provision (for road freight on a fee or contract basis); Terminal facilities provision (to road freight or passenger transport units on a fee or contract basis); Toll bridge operation; Toll road operation; Vehicular ferry or punt operation (in inland waters); Weighbridge operation</td>
</tr>
<tr>
<td>Stevedoring</td>
<td>Provision of labour for the loading or unloading of vessels</td>
<td>Ship loading or unloading service (provision of labour only); Stevedoring</td>
</tr>
<tr>
<td>Water Transport Terminals</td>
<td>Operation of ship mooring facilities or of passenger or freight sea transport terminals (including sea cargo container terminals and coal or grain loaders) used for the loading or unloading of vessels</td>
<td>Coal loader operation (sea transport); Container terminal operation (marine cargo); Freight terminal operation (sea transport); Grain loader operation (sea transport); Passenger terminal operation (sea transport); Ship mooring service; Terminal operation (sea transport)</td>
</tr>
<tr>
<td>Port Operators</td>
<td>Maintenance and leasing of port facilities to facilitate the land- sea transition of goods and passengers</td>
<td>Port operation; Wharf facility leasing; Wharf provision</td>
</tr>
</tbody>
</table>

Sources: ABS Australian and New Zealand Standard Industrial Classification (ANZSIC), 1993
<table>
<thead>
<tr>
<th>Business Type</th>
<th>Description</th>
<th>Primary Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Services to Water Transport n.e.c.</td>
<td>Providing port and harbour services n.e.c. or services to water transport n.e.c.</td>
<td>Distressed vessel towing service; Harbour services n.e.c.; Lift span bridge operation; Lighterage service; Navigation service, water transport; Pilotage service; Port services Waterways, navigable, operation; Salvage service, marine; Ship registration service; Shipping agency service; Ships agency service; Towboat operation; Tugboat operation; Waterways, navigable, operation</td>
</tr>
<tr>
<td>Services to Air Transport</td>
<td>Providing civil airport and space port facilities, aerospace navigation, and other services to air or space transport</td>
<td>Airport operation (civil; except air transport terminals); Airport services; Navigation service, air transport; Space port operation</td>
</tr>
<tr>
<td>Road Freight Forwarding</td>
<td>Contracting to transport goods and using one or more different enterprises to perform the contracted services by way of road freight transport. (In these cases the ‘forwarding’ unit takes on prime responsibility for the entire transport operation, specified in each contract, for a charge or fee which covers the total transport operation and, in turn, pays the actual carriers for the transport services rendered to it.)</td>
<td>Freight forwarding service (road)</td>
</tr>
<tr>
<td>Freight Forwarding (Except Road)</td>
<td>Contracting to transport goods for other enterprises, and using one or more different enterprises to perform the contracted services by way of rail and/or air and/or sea freight transport.</td>
<td>Freight forwarding service (except by road)</td>
</tr>
</tbody>
</table>

Sources: ABS Australian and New Zealand Standard Industrial Classification (ANZSIC), 1993
<table>
<thead>
<tr>
<th>Business Type</th>
<th>Description</th>
<th>Primary Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customs Agency Services</td>
<td>Providing customs services</td>
<td>Customs agency service; Customs clearance service; Export documentation preparation service; Import documentation preparation service</td>
</tr>
<tr>
<td>Services to Transport n.e.c.</td>
<td>Provision of services to transport n.e.c.</td>
<td>Crating or packing service (for transport); Freight brokerage service; Transport container repair or refurbishing; Wool dumping</td>
</tr>
<tr>
<td>Grain Storage</td>
<td>Storage of cereal grains</td>
<td>Grain elevator operation; Grain silo operation; Grain storage; Storage service (grain)</td>
</tr>
<tr>
<td>Storage n.e.c.</td>
<td>Providing storage or warehousing services n.e.c</td>
<td>Bond store operation; Free store operation (storage of goods not under bond); Controlled atmosphere store operation; Furniture storage service; Storage service n.e.c.; Warehousing n.e.c.</td>
</tr>
<tr>
<td>Postal Services</td>
<td>Businesses engaged in picking up, transport, and delivery (domestic or international) of addressed or unaddressed mail, packages and parcels. The activity includes the sale of postage stamps, collection of mail from public letter boxes or from post offices, sorting of mail, and distribution and delivery. It includes the activities of post office agencies.</td>
<td>Mail services; Mailbox rental services; Post office operation; Postal agency operation</td>
</tr>
<tr>
<td>Courier Services</td>
<td>Businesses engaged in the express door-to-door pick up, transport, and delivery of letters and mail-type articles, usually packages and small parcels. The activity may involve the use of one or more modes of transport which may be privately or publicly owned</td>
<td>Customised express pick up and delivery service; Messenger service</td>
</tr>
</tbody>
</table>

Sources: ABS Australian and New Zealand Standard Industrial Classification (ANZSIC), 1993
APPENDIX B: SUPPLY CHAIN MAPPING AND OBSERVATIONS
## Supply Chain 1
**Domestic Movement of Aggregates - Hanson Pre mix Concrete Supply Chain**

<table>
<thead>
<tr>
<th>Players</th>
<th>Road Movements</th>
<th>Concrete Producers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Done in-house</td>
<td>Hanson, Cement Australia, Blue Circle Southern, Boral</td>
<td></td>
</tr>
</tbody>
</table>

### Physical Movement
- **Quarries** (Aggregate, sand etc)
  - Raw material collected from the quarries
- **Cement Plant**
  - Raw material received at batching plant where it is processed into concrete
  - Transport by road to **Batching Plant**
  - **“Bin” Level**
    - “Bin” level at the Batching Plant is monitored to ensure that the concrete is above the safety stock level based on orders
- **Premix concrete delivered to customer’s site**
  - Customer (Construction Site)
  - Light freight cost from **Quarries to Plant**: $10-$15/m³
  - Light freight cost from **Plant to Customer**: $26/m³

### Transaction
- **Customer orders concrete via Brisbane call centre**
  - **SAP System**
    - Sales consultant enters order on Enterprise Resource Planning (ERP) system i.e. SAP
    - SAP system feeds information to the Allocation System where a Bill Of Materials (BOM) is generated
  - **Allocation System (Tesys)**
  - **Automatic Racking**
    - Quarry order is made based on the safety level at the Bin

### Cost
- **Road freight cost from Quarries to Plant**: $10-$15/m³
- **Road freight cost from Plant to Customer**: $26/m³
Emerging observations about the characteristics of the domestic aggregate supply chains

- Typically a low margin business
- Logistics and supply chain management is provided in-house
- Freight cost in NSW tend to be higher than in other states due to congestion and high labor cost
- Vehicle utilisation is crucial in reducing overall cost i.e. increase vehicle load capacity
Supply Chain 2
Domestic Movement of Groceries - IGA Distribution

- Domestic manufacturer (e.g. Colgate) transports finish product from the production line to its warehouse facility.
- Order is received from IGA Distribution and product is delivered either to the Regional DC or the National DC.
- Fast moving product is delivered to the RDC and slow moving product is delivered to the NDC.
- Product is either delivered to supermarket by IGA Distribution or picked up at DC by supermarket operator.
- Road Freight: Linfox Toll.
- EANnet: EDI.
Emerging observations about the characteristics of the grocery supply chains

- Consolidated customer based i.e. only three major customers – IGA consortium, Woolworths and Coles:
- Each operating very separate and distinct supply chains
- No co-opetition at any point
- Market share of retailer is largely price driven
- Significant pressure on supply chain costs
- Chains are moving towards FOB and bringing the logistics task in house
- Industry fragmented on bar coding technology e.g. GS1
- Operations and movements across Australia
- Rail freight is not well utilised in the supply chain
- IGA uses real time voice pick and camera to reduce errors
  - best practice and innovation gleaned from overseas conventions
  - 50% of pick up is done by the independent retailer
  - purchasing from manufacturer FIS
  - fast moving products are delivered to the Regional Distribution Centre (RDC) while slow moving product are delivered to the National Distribution Centre (NDC)
- NSW is losing its appeal to businesses
  - Infrastructure constraint: - mega centre not being built in NSW
  - Road Congestions
  - Land too expensive and surrounded by mountain
- Carbon footprint - lack of Government details
Supply Chain 3
Domestic Movement of Beer - Lion Nathan Tooheys Extra Dry Domestic Supply Chain

<table>
<thead>
<tr>
<th>Players</th>
<th>Road Freight:</th>
<th>Retailers:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lion Nathan (In house)</td>
<td>Bevchain is a JV company form by Lion Nathan and Linfox</td>
<td>Woolworths Coles</td>
</tr>
</tbody>
</table>

**Management**
- **Lion Nathan (In house)**: Special bottle screen printing at ceramic factory in Penrith
- **Bevchain**: Ingredients and printed bottle transport by road to brewery

**Physical Movement**
- Glass bottle purchased from local manufacturer (ACI) in Botany and overseas suppliers (China / Indonesia)
- Transport by road to print factory
- Transport by road to distributor (Bevhain)
- Transport by road to domestic retailer

**Transaction**
- Brewing ingredients purchased from farm
- Ingredients malted at Tamworth
- Bottles filled at the brewery and finished products sent to on site warehouse facility via forklift

**Cost**
- Bottle and printing: 20%
- Ingredient: 10%
- Road Transport: 20%
- Warehouse: 20%
- Excise: 20%
- Retailer Margin: 5%

*Cost components as a percentage of retail price*

Retailers:
- Woollworths
- Coles

Road Freight:
- Linfox Toll

EDI between major customers

Automatic Racking

Smart Trans/Trans Odyssey system facilitating road movements

Farm

Ceramic bottle print factory (Penrith)

Malting plant (Tamworth)

Bottles filled at the brewery and finished products sent to on site warehouse facility via forklift

Smart Trans and Trans Odyssey system facilitating road movements

EDI between major customers

Retailers in Metro and Country NSW

Supply Chain 3
Domestic Movement of Beer - Lion Nathan Tooheys Extra Dry Domestic Supply Chain
Emerging observations about the characteristics of the domestic brewery supply chains

- There is some co-opetition amongst the broader liquor industry e.g.
  - Bevchain supplying Lion Nathan, Brown Brother and IDA
  - Bevchain would like to leverage further Fosters volume to achieve economy of scale
- There are views that T&L represents a competitive advantage within the supply chain
- Consolidation at both the supplier and retailer ends is evening out the negotiating power for both
- And placing pressure on who controls T&L and therefore the T&L margin e.g. FOB v’s FIS pricing
- Best practice ideas stemming from the wine industry are being shared with the beer chain
- Large end users, such as bars and clubs, are not motivated to reduce supply chain costs, as greater margin from pokies
- Impact of carbon footprint not fully understood by supply chain members
- Differing State legislation adding costs to business E.g. OHS
- Technology still not fully integrated along the supply chain e.g. GS1
- Technologies that have been adopted in the supply chain include:
  - Smart Trans (In-vehicle navigation, GPS vehicle tracking, routing optimisation), Trans Odyssey (Dynamic Load Planning) and Swisslog (Warehouse solution, automatic racking), EDI (with larger customers)
Supply Chain 4
Export Coal - Hunter Valley Coal

<table>
<thead>
<tr>
<th>Players</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>30 Coal Mines</td>
<td>17 Producers</td>
<td>2 Above Rail Operators</td>
<td>2 Track Operators</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Management</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>HVCCLV (through assigned CDS)</td>
<td>Exporter</td>
<td>End Buyer</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Physical Movement</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal is mined and stored at railway siding located at the mine or at a coal loading facility</td>
<td>Coal is then transported to the port via rail, Pacific National performs 87% of the task</td>
<td>Coal is offloaded onto stockpiles in the Port Waratah Coal Services facilities</td>
<td>Coal is loaded onto vessel via conveyor belts</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transaction</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Through the CDS, the Hunter Valley Coal Chain Logistics Team (HVCCLT) allocates current capacity of coal supply to existing coal exporters</td>
<td>Exporter has commercial contracts with: end buyer, above rail operator and port operator – transactions and freight schedules are organised between these parties</td>
<td>Phone or Web Query</td>
<td>Shipping Arrangement</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cost</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Available</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Emerging observations about the characteristics of the export coal supply chains

- Macro environment - demand exceeding supply
- Newcastle Port is the world’s largest coal export port
- Infrastructure is currently constrained Eg: Port, Track, Rolling Stock, Terminal
- Competition is not necessarily amongst local producers but rather global suppliers - focus is on supply
- Coal exports is underpinned by critical trading relationships i.e. 85% of NSW coal exports are shipped to three countries – Japan, Korea & Taiwan
- Supply chains are cooperating from a planning and asset utilisation perspective
- Commercial arrangements remain separate
- Independent group (HVCCLT) is responsible for the planning but the implementation of the plan remains with the individual members
- Hunter Valley Coal Chain Logistics Team (HVCCLT) was established in 2003 to improve the movement of coal from Hunter Valley, its members include all organisations responsible of transport of coal from the mines to the port i.e. above operators, track owners and port operators
- Multiple coal grades placing additional stresses on available capacity and adding complexity to the system
- Coal exports is underpinned by critical trading relationships i.e. 85% of NSW coal exports are shipped to three countries – Japan, Korea & Taiwan
## Supply Chain 5
**Export Grain - AWB**

<table>
<thead>
<tr>
<th>Players</th>
<th>Storage and Handling:</th>
<th>Rail Freight:</th>
<th>Rail Infrastructure:</th>
<th>Port Terminal Operator:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AWB</td>
<td>Independent Rail, PN, Transrail, GrainCorp, Elzoro</td>
<td>RIC ARTC RailCorp</td>
<td>GrainCorp</td>
</tr>
<tr>
<td></td>
<td>GrainCorp</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ABA</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private (Farmer)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Physical Movement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crop is harvest and stored on site (Farmer)</td>
</tr>
<tr>
<td>Transport to super site by truck</td>
</tr>
<tr>
<td>Super site/bulk holder consolidates grain from local farms (AWB)</td>
</tr>
<tr>
<td>Transport to Port by rail or road train</td>
</tr>
<tr>
<td>Grain is consolidated and stored in silo at the port until ship arrival where it is moved onboard via conveyor belt</td>
</tr>
<tr>
<td>Ship to overseas customers</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organise truck movement by phone backed with paper invoice</td>
</tr>
<tr>
<td>Complete Shipping &amp; Inventory IT system</td>
</tr>
<tr>
<td>Organise truck or rail movement by phone with contracted transport provider</td>
</tr>
<tr>
<td>Request ship movement and communication with customers</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Available</td>
</tr>
</tbody>
</table>
# Supply Chain 6

## Export Containerised Grain - MIST

### Players

<table>
<thead>
<tr>
<th>Storage and Handling:</th>
<th>Rail Freight:</th>
<th>Rail Infrastructure:</th>
<th>Metro Rail:</th>
<th>Stevedore:</th>
<th>Shipper:</th>
</tr>
</thead>
<tbody>
<tr>
<td>AWB</td>
<td>Independent Rail, PN, Transrail</td>
<td>RailCorp</td>
<td>Patrick Porlink, QR Southern &amp; Silverton, IR, DP World</td>
<td>Patrick Terminals 20 shipping Line and consortia</td>
<td></td>
</tr>
<tr>
<td>GrainCorp</td>
<td>GrainCorp, Elzoro</td>
<td>ARTC</td>
<td>(Australian Rail Group),</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ABA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Management

<table>
<thead>
<tr>
<th>Private (Farmer)</th>
<th>Grain Handler</th>
<th>Grain Marketer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crop is harvest and stored on site (Farmer)</td>
<td>Super site/bulk holder consolidates grain from local farms</td>
<td></td>
</tr>
</tbody>
</table>

### Physical Movement

- **Farm**
- **Super Site**
- **Super Site/bulk holder**
- **Inverter used at Intermodal terminal to transfer grain from domestic container to export container**
- **Macarthur Intermodal Terminal**
- **Empty domestic container sent to Super Site, filled and sent back to Macarthur**
- **Shipped to overseas customers**
- **Port Botany**

### Transaction

- **Phone Call**: Organise truck movement by phone backed with paper invoice
- **Paper Invoice**: Organise truck movement by phone
- **Road or Rail Contract**: Organise truck or rail movement by phone with contracted transport provider
- **Phone or Web Query**: Request ship movement and communication with customers
- **EDI**: Not Available

### Cost

- **Not Available**
Emerging observations about the characteristics of the grain export supply chains

- The condition of regional grain lines is sub optimal e.g. different line classes for different axle loads limits efficiency
- Return on capital does not justify continued investment in the track
- Road is competitive versus rail which typically requires high tonnage over a long distance. Or in the case of containerized grain, full containers in each direction
- Significant manual processes associated with containerised grain e.g. inverter process
- Differing State gauge limits rail entrants
- Potential for optimisation of the silo positioning to facilitate rail and road economics
- Potential for HVCCLT style efficiencies as capacity for available train paths closer to port competes with coal and passenger services
- Potential for integration of containerised grain assets and operations with the broader general freight task
- Chain of responsibility placing significant pressure on available trucking resources e.g. $82M fines to Graincorp increases supply chain costs
Supply Chain 7
Export Fresh Meat Air - Chilled Pork Air Export

Players

<table>
<thead>
<tr>
<th>Road Freight</th>
<th>Freight Forwarder</th>
<th>Air Freight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scotts</td>
<td>DHL</td>
<td>Qantas</td>
</tr>
<tr>
<td>Linfox</td>
<td>Linfox</td>
<td>Singapore Airline</td>
</tr>
</tbody>
</table>

Management

<table>
<thead>
<tr>
<th>Shipper</th>
<th>Freight Forwarder</th>
<th>Shipper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pig slaughtered at the abattoir, cut into two halves and stored for 24hrs at 4degrees</td>
<td>Cold meat is discharged at the warehouse where it is loaded to airline container/pallet/unit load device (ULD)</td>
<td>ULD handed over to consignee or agent at overseas terminal subject to customs and health procedures</td>
</tr>
<tr>
<td>Transport by refrigerated trucks</td>
<td>Transport by refrigerated trucks</td>
<td>ULD transferred onto aircraft 1hr prior to departure</td>
</tr>
</tbody>
</table>

Physical Movement

<table>
<thead>
<tr>
<th>Abattoir (Albury Wodonga Southern NSW)</th>
<th>Warehouse (Alexandria Sydney)</th>
<th>Loaded ULD stores approx 4 tonnes of chilled pork, dry ice and temperature gauges inserted in various parts of the ULD</th>
</tr>
</thead>
</table>

Transaction

<table>
<thead>
<tr>
<th>Shipper prepares certificate and has it stamped by Chamber of Commerce</th>
<th>Freight forwarder communicates with AQIS 48hrs prior physical movements</th>
<th>Freight forwarder reports shipment to Customers EDN electronically</th>
</tr>
</thead>
<tbody>
<tr>
<td>Certificate of Origin</td>
<td>AQIS Freight forwarder arranges AQIS to inspect ULD at Warehouse</td>
<td>HAWB Freight forwarder prepares House Airway Bill (HAWB)</td>
</tr>
</tbody>
</table>

Cost

Not Available
### Supply Chain 8
Import Parcel Freight Air – Bush Logistics and Sydney Airport Corp.

<table>
<thead>
<tr>
<th>Players</th>
<th>Freight Forwarder</th>
<th>Air Freight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exporter</td>
<td>Federal Express, DHL, TNT, UPS</td>
<td>Qantas, British Airways, Virgin, Jetstar</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Management</th>
<th>Freight Forwarder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exporter needs to send two sets of documents to Australia (one to Sydney and one to Melbourne)</td>
<td>Freight forwarder receives documents and SLI, documents are consolidated with other export parcels and loaded to ULD (Unit Load Device)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Physical Movement</th>
<th>Freight Forwarder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exporter (London)</td>
<td>Freight Forwarder (London Site)</td>
</tr>
<tr>
<td>Transport by road</td>
<td>ULD delivered to Cargo Terminal Operator (CTO)/Airliner, ULD processed through CTO express handling hub prior to loading onto aircraft</td>
</tr>
<tr>
<td>Transport by road</td>
<td>ULD handed over to consignee or agent at overseas terminal subject to customs and health procedures</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transaction</th>
<th>Freight Forwarder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exporter organises pick up by phone with freight forwarder and populates SLI</td>
<td>Freight forwarder prepares export documents, organises export custom clearance and flight before electronically communicating information to Airliner and Australian offices</td>
</tr>
<tr>
<td>Documents</td>
<td>Electronic data</td>
</tr>
<tr>
<td>Shippers Letter Of Instructions (SLI)</td>
<td>Satchels receive custom clearance and freight forwarder pays duty and GST</td>
</tr>
</tbody>
</table>

| Cost | Not Available |

**Not Available**
## Supply Chain 9
### Import General Freight Air – Bush Logistics

<table>
<thead>
<tr>
<th>Players</th>
<th>Freight Forwarder</th>
<th>Air Freight</th>
<th>CTO</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Importer</strong></td>
<td>DHL, Linfox</td>
<td>Qantas</td>
<td>Qantas, Toll</td>
</tr>
<tr>
<td>(United Kingdom)</td>
<td>Toll, TNT</td>
<td>British Airways</td>
<td>Menzies</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Virgin, Jetstar</td>
<td>AAE</td>
</tr>
</tbody>
</table>

### Management
- Importer receives an urgent parts order for delivery to Sydney in 3 days. Importer contacts overseas supplier, freight forwarder and customs broker for an Urgent Pending Order.

### Physical Movement
- Supplier receives electronic order, prepares the order and contacts Exporter’s freight forwarder.
- Freight forwarder receives cargo and label with flight details. X ray screening is conducted at CTO and the freight is packed into ULD by CTO before being loaded on board via dolly.
- Aircraft arrives and ULD is discharged to CTO where it is unloaded and placed on pallet awaiting custom clearance.
- Supplier organises pick up by phone with freight forwarder and populates SLI.
- Freight forwarder prepares export documents, organises export custom clearance and flight before electronically communicating information to Airline and CTO; and alerts Australian Office regarding the urgency of the delivery.
- Importer receives an urgent parts order for delivery to Sydney in 3 days. Importer contacts overseas supplier, freight forwarder and customs broker for an Urgent Pending Order.
- Custom has been pre-alerted and conducts inspection once the goods arrive at CTO warehouse.
- Deliver by road to importer, goods are received within 3 days of order.

### Transaction
- Phone Call, Shippers Letter Of Instructions (SLI), Documents, Electronic data

### Cost
- Not Available
Emerging observations about the characteristics of the export perishable air supply chain

- Passenger network dictates freight routes and pricing Eg: INT exports lower than INT imports
- Hubbing required to access non direct trade routes - multiple handling / INT airports similarly congested / delays
- Dedicated airfreight carriers are constrained by all of the following at Sydney Airport:
  - Allocated landing slots
  - Curfews
  - Crewing hours
  - Apron space and time
- Sydney Airport infrastructure is focused on growth of passengers at the expense of freight
- Lack of competition in domestic air freight increases rates above INT movements
- Cost of domestic landside logistics inhibits opportunities for air freight
- The introduction of A380 with less freight belly space
- Fragmented industry and in particular refrigerated transport
- Significant interfacing between multiple participants in the chain
- Most freight forwarder provide custom brokerage services
- Freight tracking is available to freight forwarder, suppliers and customers via web based software packages such as Pangaea
- Australian Custom has a strong reputation
- Australia Custom is light years ahead of the rest of the world
Supply Chain 10
Import Component for Manufacture - Electrolux

Players
- **Shipper:** 40 shipping Line and consortia
- **Stevedore:** Patrick Terminals DP World
- **Intermodal Terminal Operator:** Linfox

Management
- **Maersk Logistics**
- **Freight Forwarder (Linfox)**

Physical Movement
- Electrolux orders refrigerator and freezer componentry from overseas
- Containerised componentary transport by sea
- Stevedore and custom clearance at Port Botany
- Container transport by Linfox
- Components transported to Toyota Tsusho Site
- Container is collected by Linfox
- Componentary is discharged at factory (Linfox)
- Empty container transported back to Blayney
- Empty container is either Dehired at Blayney or railed to nominated empty container park

Transaction
- Customer Clearance and AQIS container inspection
- Driver Documentation
- Delivery Order from Shipping Company

Cost
- **Shipping cost:** $3,000 – 40ft container
- **Road and Rail Cost:** $850 – 40ft container
- **$700 – 20 ft**
## Supply Chain 11
### Export Manufactured Appliances - Electrolux Refrigerators and Freezer Export

<table>
<thead>
<tr>
<th>Players</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freight Forwarder (Linfox)</td>
</tr>
<tr>
<td>Intermodal Terminal Operator: Linfox</td>
</tr>
<tr>
<td>Stevedore: Patrick Terminals DP World</td>
</tr>
<tr>
<td>Shipper: 40 shipping Line and consortia</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrolux receives order</td>
</tr>
<tr>
<td>Loaded container transported by Road to Blayney Intermodal Terminal</td>
</tr>
<tr>
<td>Loaded container transport by Rail to Port Botany</td>
</tr>
<tr>
<td>Shipped to overseas customers</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Physical Movement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrolux distributes order</td>
</tr>
<tr>
<td>Loaded container transported by Rail to Port Botany</td>
</tr>
<tr>
<td>Shipped to overseas customers</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrolux nominate container park, container collection, shipping company, ship and voyage number when order is received</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road and Rail Cost: $900 – 40ft container, $750 – 20 ft</td>
</tr>
<tr>
<td>Shipping cost: $3,000 – 40ft container</td>
</tr>
</tbody>
</table>
Emerging observations about the characteristics of the import/export of manufactured goods supply chain

- Domestic supply chains compete with import supply chains e.g. 60% of purchase are domestic manufacture goods, 40% are imported goods
- End customer base (retailers) are extremely fragmented – however National Australian Retailer Trading Association (NARTA) buying consortium consolidates retailers buying power (over 60 members)
- Majority of chain still outsourcing 3PL logistics task
- Freight forwarding industry is dominated by a few major players – as a manufacturer Electrolux is losing its bargaining power with freight forwarders
- Electrolux tenders its sea line haul requirements through a global tender
  - Electrolux enjoys lower cost by consolidating its buying power from around the world
- Rail infrastructure constraints make it prohibitive from a cost and time sensitive perspective
- Tightening labour market
- Impact of carbon footprint not fully understood by supply chain members
- Congestion at the Port is having a flow on affect on production cost
  - Electrolux has doubled its inventory holdings
APPENDIX C:
PRODUCTIVITY ISSUES AND INNOVATION BARRIERS AND DRIVERS
There is currently a developing “State Freight Vision”. There are individual plans i.e. Auslink funding submissions, however the Government could prepare an integrated freight plan, with a short (12month -2 years), medium (2- 10years) and long term (10 – 50 year) time horizon.

Congestion around the Port Botany / Airport precinct requires immediate planning attention as the:

- M5 tunnel is already congested
  - Competing local traffic, airport traffic, port botany traffic and through traffic all utilising the same road network, and
- Port Botany continues to service container movements predominantly by road adding to the congestion. The State has set a target of 40% container movements into/from the port to be moved by rail by 2025, however to achieve this the State needs to confirm;
  - What is the appropriate rail interface required at each of the stevedoring ports – in particular, DP World has inadequate rail infrastructure – what plans exist to develop these rail sidings?
  - Movements of containers away from the port requires intermodal terminals with adequate capacity and rail connections. Enfield and Moorebank are critical proposed developments.
- However rail freight paths onto the passenger network are currently limited as the passenger network continues to grow. The Southern Sydney dedicated freight line is another medium term development that will help facilitate freight movements within metropolitan Sydney.
- In addition, what plans are in place to accommodate a growing air passenger traffic into this precinct?
- And how will air freight activities compete for all available infrastructure including roads, office accommodation, warehousing, apron and landing slots?
  - Is there an opportunity for Government to consider a dedicated freight airport infrastructure away from this precinct i.e. revisit Newcastle and/or Goulburn as longer term options?

The majority of these proposed developments are medium term solutions

- What innovative short term reform processes or procedures could ease congestion in the interim?
  - Refer IPART draft report – this will either help spread out the demand for peak capacity or simply increase the price of peak capacity slots
  - Can the Government play a greater role in assisting the entire supply chain to adopt 24 hour operations, and look to utilise non peak infrastructure capacity across the entire system?
Interstate rail movements are interdependent on all State Governments and more cooperative innovative thinking is required to resolve the more difficult rail productivity issues

- Interstate Rail Movements - General Freight
  - Rail freight remains uncompetitive in comparison to road on the short haul corridors E.g. SYD-MEL, SYD-BNE from a cost and time perspective, primarily due to:
  - the restricted movement of freight trains within State metropolitan areas as preference on shared lines is given to the passenger network. The SSFL will assist in NSW however all States need a similar dedication to facilitate freight movements?
  - no opportunities for double stacking - electrification of passenger network within all States. This requires some innovative thinking to determine a longer term solution
  - intermodal terminal capacity restrictions within most States. The development of Enfield and Moorebank will assist in NSW however all States need a similar solution
  - rail interfacing at the port in all States – how are Governments working with the Stevedores to improve port terminal rail infrastructure?
- Regional Grain Lines
  - The grain lines within NSW have different axle load gradings, a consequence of the condition of the lines, which in turn is limiting the speed and length of trains
  - This increases the cost of transport as tasks are limited to the specifications of the lowest grade line
  - In addition, the number of collection points historically owned by multiple parties (since consolidated to a few) could under go further rationalisation and bulk up the task at central locations for both road and rail operators
  - However there is little cooperation along this supply chain limiting the opportunities for rail operators and grain consolidators to work through best practise solutions
  - Could the Government play a role in facilitating discussions?
  - Finally, the different gauged lines across all of the States limits the above rail competition within each State, as operators are unable to cascade rolling stock
Technology uptake across the industry has been slow

- There is limited integration of supply chains utilising technologies
- There is still a significant number of transactions required across multiple supply chains
- The lack of technology and the availability of electronic data is impeding the usability of information and opportunity for innovative solutions
- Cost of some systems and the scale required to support the software has been a major issue in some chains
Potentially the Government needs to play a more active role in supporting air freight productivity improvements even though the majority of supply chain assets and activities are operated by the private sector

- Air freight is reliant on the assets and activities of the passenger network
  - Flying network and schedule determined by passenger demand
  - Aircraft fleet and design determined by the passenger demand profile i.e. the A380 will have a reduced belly space for freight but a greater capacity for passengers
  - Apron space at Sydney airport is prioritised to passenger aircraft
  - Peak landing slots are prioritised to passenger aircraft
  - Airport land is prioritised to higher yielding activities
  - Maintenance facilities are prioritised to passenger aircraft
- As a result air freight productivity is influenced by;
  - dedicated freight carriers waiting offshore for “off peak” landing slots
  - dedicated freight facilities being built further away from high land cost areas around airport
  - councils being reluctant to approve SACL freight development plans in preference for high value development opportunities i.e. conference facilities
  - freight is being hubbed through passenger network three or four times before reaching final destination
  - freight is being hubbed through already congested international passenger airports
  - The cost of regional domestic air freight is modally non competitive as there is limited competition?
  - capacity for in-bound freight is restricted as reliance on passenger network / prices are subsequently escalating
The Government needs to be more proactive in providing information to the industry on the policies surrounding “carbon footprint”

- The impact of global warming is known and concerning all within the transport sector. The business sector wants to know:
  - How can we plan for this?
  - The Government needs to undertake research to understand what the industries contribution to carbon emissions is?
  - How will the industry measure this?
  - How can it be reduced?
  - What voluntary or involuntary Government policies/legislation will be put in place
  - How will Government be coordinated on the issues – who will be the “freight champions” within Federal and State bureaucracies
With Australia’s freight task forecast to double between 2000 and 2020 the NTC undertook a major study to identify ways to support this growth – inconsistent regulation was identified as a major area for reform. ALC has commissioned a report to further identify these areas and plans for reform – the table below presents the preliminary results from Phase 1 of their project.

<table>
<thead>
<tr>
<th>Area for Reform</th>
<th>Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance Base Standards</td>
<td>• Prescriptive standards seen as too restrictive and inhibitive to innovation and efficiency in supply chains&lt;br&gt;• Newer Performance Based Standards (PBS) seen as a way to encourage innovation and efficiency&lt;br&gt;• Some up take of PBS in the States but there is still inconsistency (lack of mutual recognition)&lt;br&gt;• Other prescriptive standards and laws still exist meaning PBS satisfaction is not enough – not a “one stop shop”</td>
</tr>
<tr>
<td>High Mass Limits</td>
<td>• The move to Higher Mass Limits (HML) across the States is hampered by additional restrictive regulations&lt;br&gt;• Instances of particular vehicle classes permitted on one side of a State border and not the other&lt;br&gt;• May require reform of design standards for infrastructure on major freight routes – area of regulation traditionally outside NTC’s remit&lt;br&gt;• Need to focus on interstate highways, major urban freeway and arterials</td>
</tr>
<tr>
<td>OH&amp;S</td>
<td>• Double regulation under transport sector and general employment laws&lt;br&gt;• Potential for conflicting regulations, dual coverage and overlapping enforcement duties&lt;br&gt;• Associated with excessive administrative costs for no material safety gains&lt;br&gt;• Lack of certainty leads to cautious approach and reduce labour productivity</td>
</tr>
<tr>
<td>Over-Mass Vehicles</td>
<td>• Mass-limits intended to cover the entire road network may be too restrictive for some high mass/small distance movements&lt;br&gt;• Relevant where road transport is ancillary to large rail and sea movements – i.e. important for intermodal usage&lt;br&gt;• Increases costs of rail and sea legs of a supply chain by forcing more small truck movements&lt;br&gt;• Discourages use of rail and sea for long distance haulage&lt;br&gt;• Overall more truck movements with leading to increased crash exposure – actually increase safety through Over-Mass exceptions</td>
</tr>
<tr>
<td>Inconsistent Rail Regulations</td>
<td>• Rail regulation harmonisation continues to lag behind road regulation&lt;br&gt;• Interstate operators have different technical standards for various states – e.g. axle load limits, communications and gauge profiles&lt;br&gt;• Additional operational and administrative costs&lt;br&gt;• Delays service innovation and provides additional barriers to entry in the market</td>
</tr>
<tr>
<td>Over-Dimension Vehicles</td>
<td>• Special oversize vehicle freight movements are forecast to increase e.g. imported plant, development in congested urban environs&lt;br&gt;• Presently a very fragmented area of regulation amongst the States&lt;br&gt;• Will lead to delays in delivery of essential productivity improving equipment&lt;br&gt;• Reduced interoperability and productivity and restricting investment in fleets</td>
</tr>
</tbody>
</table>

The Government needs to take a more proactive role in ensuring there is more efficient interaction between its own departments and those of local council.

- E.g. Higher Mass Limit Vehicles – approval needs to be sought from both the RTA and multiple local councils for use of State and council roads respectively.
  - There is no centralised process to obtain these approvals (incredibly time consuming)
  - There is no common framework for granting approvals (approval may be granted by RTA but not by councils)
  - There is significant silo mentality between these bureaucracies (limits information sharing)
  - There is no “bigger picture” productivity considerations given by local councils, only “what are the cost implications for us”
Other Productivity Issues

- **Human Capital**
  - There is a view that NSW is less user friendly than some other States. This is preventing flexibility in labor rates and working schedules, impacting on the cost to build roads in NSW.
  - There is an ongoing view that there is still a dearth of appropriately skilled labor for the industry.
  - There is a view that the industry is “unattractive” from a career perspective.
  - TALC and others are making good progress on implementing logistics qualifications into educational institutions.

- **Fuel**
  - Some businesses are independently investigating alternative fuel products and others are looking to import fuel directly.

- **24 Hour operations**
  - 24 hr operations would ease some of the congestion and capacity issues currently being experienced at the port, rail paths and road infrastructure.
  - Total supply chain alignment is required to enable the practical implementation of this initiative.
  - Government could play a vital role in coordinating support across the various stakeholders including local councils.

- **Bar Coding**
  - There are a number of competing bar code products throughout the market.
  - The competing products exhibit little interoperability as there is no industry standard.
  - This leads to excessive administration pressure i.e. re-entering the differing bar codes for the same item.
  - Is there an opportunity for regulation in this space? Or greater cooperation within the chain to encourage standardization.
Through the interviews and desktop research, five innovation “drivers” were identified – the Harvey Ball analysis below compares the instances of each driver against the selected supply chains.

<table>
<thead>
<tr>
<th>Supply Chain</th>
<th>Innovation Drivers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Price driven market</td>
</tr>
<tr>
<td>1 Domestic – Aggregate</td>
<td>☐</td>
</tr>
<tr>
<td>2 Export – Bulk Grain</td>
<td>☐</td>
</tr>
<tr>
<td>3 Export – Containerised Grain</td>
<td>☐</td>
</tr>
<tr>
<td>4 Domestic – Brewery</td>
<td>☐</td>
</tr>
<tr>
<td>5 Import – Manufactured Goods</td>
<td>☐</td>
</tr>
<tr>
<td>6 Domestic – Grocery</td>
<td>☐</td>
</tr>
<tr>
<td>7 Export – Bulk Coal</td>
<td>☐</td>
</tr>
<tr>
<td>8 Export – Air Perishable (Meat)</td>
<td>☐</td>
</tr>
</tbody>
</table>

“Drivers” of innovation are characteristics within a supply chain that present a desire for the chain members to look for innovative solutions to maximise their end user position.
Various “barriers” to innovation were also identified which, when present, impede the progress of innovation – the Harvey Ball analysis below compares the instances of each barrier within the selected supply chains.

<table>
<thead>
<tr>
<th>Supply Chain</th>
<th>Barriers to Innovation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Co-opetition is Impeded</td>
</tr>
<tr>
<td></td>
<td>Simple/ low-tech end users</td>
</tr>
<tr>
<td>1    Domestic – Aggregate</td>
<td><img src="1" alt="Circle" /></td>
</tr>
<tr>
<td>2    Export – Bulk Grain</td>
<td><img src="1" alt="Empty" /></td>
</tr>
<tr>
<td>3    Export – Containerised Grain</td>
<td><img src="1" alt="Empty" /></td>
</tr>
<tr>
<td>4    Domestic – Brewery</td>
<td><img src="1" alt="Circle" /></td>
</tr>
<tr>
<td>5    Import – Manufactured Goods</td>
<td><img src="1" alt="Empty" /></td>
</tr>
<tr>
<td>6    Domestic – Grocery</td>
<td><img src="1" alt="Empty" /></td>
</tr>
<tr>
<td>7    Export – Bulk Coal</td>
<td><img src="1" alt="Empty" /></td>
</tr>
<tr>
<td>8    Export – Air Perishable (Meat)</td>
<td><img src="1" alt="Empty" /></td>
</tr>
</tbody>
</table>
APPENDIX D: INNOVATION EXAMPLES
The productivity benefits of a more coordinated and cooperative approach across supply chains can be significant

- A recent report estimated the lack of capacity and cooperation within the Goonyella coal supply chain system cost the Queensland Government over $1 billion in GDP.
- The South Australian Wine industry “cluster” or “cooperative” approach to “R&D”, supply chain coordination, sustainable alliances between growers and producers, integrated public and private sector infrastructure and a unified approach to export marketing, has seen the number of wine exporters in SA reach 77% (or 41% of sales) while in NSW it has remained at around 43% (or 23% of sales).
- Independent Liquor Group (Suppliers) Co-operative Ltd (ILG) - In 1975 there was "just an idea" with the Independent Liquor Group (Suppliers) Co-operative Ltd having, as its genesis, a small contingent of liquor retailers buying as a group. From what the industry would term modest beginnings, ILG has become a significant player in the business of wholesaling and distribution of wine and spirits, and other merchandise, to members across New South Wales. When this buying group became a co-operative in 1977, it had 30 members who owned 50 retail outlets consisting of liquor stores, hotels and a small number of restaurants. It began operations with four staff. In its first year of trading, ILG realised $1 million in sales, with assets of around $300,000 and a market share of one per cent. Today more than 25 years on, the co-operative has 600 members who own 650 outlets. The business is operated by 75 staff. In its most recent financial year, ILG's assets totalled $37.6 million with an annual turnover of $134 million and a market share of 12 per cent.
- The Bega Cheese cooperative is another example of the benefits of supply chain cooperation, with the business tripling in size in the last three years.

APPENDIX E: INTERVIEW NOTES
Consultation with selected industry representatives took place across a range of sectors

<table>
<thead>
<tr>
<th>Industry</th>
<th>Company</th>
<th>Comments</th>
<th>Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freight Forwarding</td>
<td>ViSA</td>
<td>• Visa’s key focus is getting day to day operations to work more efficiently</td>
<td>Web based freight matching</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Aware of 1 interstate web based freight matching system and believe there is worth in examining potential further.</td>
<td>• dehire cartage is included in total cartage price quoted.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Mismatch of hours, particularly with regard to dehiring empty containers is a major issue.</td>
<td>Cannot foresee how to manage potential failure by third party to dehire</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Visa do not look for outside cartage work, prefer to control all aspects of the cargo management while in their care</td>
<td>• Would have concerns regarding payment – would not accept job off internet without being prepaid. Would not want to chase owner for payment if dehire penalty incurred</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• In response to customer requests and in an effort to reduce conflict and improve visibility Visa have recently introduced a time live track and trace “OneBook” (substantial investment) as part of the transport platform. The process has taken 2 years to develop.</td>
<td>New technology</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Visa could not buy the desired product off the shelf or modify an existing product.</td>
<td>• Still reliant on quality of information from other links in chain.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• However still reliant on quality of information entered. Wish to integrate across routing, cartage and paperwork functions.</td>
<td>• Driven by customers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Electronic transmission of information e.g. electronic import delivery orders can reduce time and cost substantially and expect that they will increase in usage.</td>
<td>• Had to be purpose built</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Note that two different technologies for trucks entering the stevedore terminals (DP use transponders) and (Patricks use PIN pad at Gate)</td>
<td></td>
</tr>
<tr>
<td>Infrastructure Provider - Airports</td>
<td>SACL</td>
<td>• Most notable new technology impacting on airport operations will be arrival of A380 passenger aircraft. Increased passenger volume and aircraft size will reduce belly capacity for freight and consume additional apron space.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• SACL do not measure or benchmark productivity on site (as per airport and waterline statistics)</td>
<td></td>
</tr>
<tr>
<td>Industry</td>
<td>Company</td>
<td>Comments</td>
<td>Issues</td>
</tr>
<tr>
<td>---------------------------</td>
<td>---------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Bulk Exports              | AWB     | • The grain industry is still segregated into older, labour intensive storage sites and new modern facilities with computer operated fast loading technology and accurate recording and product testing.  
• Wireless technology is being introduced into sites by AWB to collect and transmit data on volumes, carrier and product for updating central records.  
• Transparency and visibility of information has been increasingly important and AWB now has Golden Rewards system with differentiated product and pricing visible to all growers for planning and budgeting of harvests.  
• Inventory management and forecast harvest modelling is used widely with AWB to manage forward supply chains however there is limited transfer of data beyond grain characteristics. Phone and email are still commonplace for communication with carriers (both road and rail) | Lack of investment by some players in the industry in new technology can restrict efficiency of other supply chain members                                                                                                               |
| Infrastructure Provider – Ports | SPC | • Shipping industry lives with its legacy e.g. Bills of Lading etc but has incrementally changed over time. The systems in place have to generate confidence in the market and across borders to ensure trust and payment.  
• Believe that more recent evolution of the airfreight industry has lead to the introduction of waybills and legally, much simpler transactions. Multiple cargo owners within a single consignment (e.g. container) causes greater complexity whilst large volumes of airfreight are inter-company movements and simple to administer.  
• Payment has never been part of the physical process so “belts and braces” systems have evolved to ensure trust is retained. Bank use of Bolero has now become its own undoing as global payment systems emerge.  
• Technology applications much more interoperable now but still lack of clarity about roles and responsibilities. Transactional messaging within the industry is quite advanced and shipping has lead the way in this area.  
• Port roles in supply chains and technology are varied. Most do not see themselves as a supply chain manager. SPC have taken steps in recent years to suggest development of an integrated electronic port community to enable increased e-commerce and electronic communication based on EDI and the internet.  
• Information availability and visibility are still key issues for work planning by all supply chain parties. RFID and GPS information are not widely used on containers yet – could be issue of passive vs. active transmission. Electronic container seals are most common application | Web based freight matching  
See key challenges arising from:  
• Complexity of the container movement  
• Need to dehire empty containers  
• Issues of terminal access i.e. coordination of slots and maritime security (MSC) certification.  
Suggest exploring opportunities to optimise truck efficiency within a single stevedore before extending to both stevedores. Should expand concept to include broader precinct, depots and intermodal terminals.  
New technology  
• Still reliant on quality of information from other links in chain.  
New information collection i.e. RFID etc is likely to be driven by a global imperative and will be linked to value of the cargo (eg reefer cargo vs grain) |
Stevedores have delayed the expansion of the VBS because unresolved ACCC clearance issues 1-Stop could develop a freight matching capability for the port traffic but would prefer partnering with an existing service provider in freight matching.

- Would like to see more visibility so that parties can transact better. Currently looking at providing booking visibility for both terminals at once in diary format to improve coordinated movements.
- Have been considering options to facilitate matching 2 way movements with the port precinct but key issue will be the business rules that apply.
- Each stevedore currently operates under different business rules within the VBS.
- Technology and hardware is capable of expanding the service offering but would be in a business case basis.
- The 1-Stop system is capable of providing website service, messaging, pre-receival advice, payment and track & trace.
- 1-Stop already transacts with intermodal terminals and have assisted with building train consist systems for South Australian operator and prepare PRAs and consist messaging.
- VBS can also interface with depots and IMTS’s with rules to determine whether box in for consolidation/deconsolidation.
- 1-Stop have integrated vessel manager messages in their other software.

Current researching bodies funded by Government have been immensely bureaucratic. Recent downsizing in the CSIRO has severely impacted on research in this area so onus now on cooperative research with industry – see a role for Government in assisting with turnkey grants.

<table>
<thead>
<tr>
<th>Industry</th>
<th>Company</th>
<th>Comments</th>
<th>Issues</th>
</tr>
</thead>
</table>
| Research Body                 | TALC      | - TILIS has been developed at a cost of $2.0m as a digital shared infrastructure.  
- TILIS is envisaged as an industry gateway to enable many to many connections and though it has focused on learning management it has the scope for additional modules (70 currently) within the portal and is due to go live within the next 6 months.  
- TILIS is capable of handling encrypted commercial transactions.  
- TILIS is capable of interfacing with 3G and SMS mobile technology and will datastream on RSS feed.  
- TILIS sees a role in the industry without a vested interest.  
- Currently 30-40 cooperative research centres with only 3-4 focused on transport research.  
- TALC suggest that TILIS can deliver gateways for the market in three areas: People (HR certification, training and learning management); Freight matching and e-Commerce (including consignment tracking). | Current researching bodies funded by Government have been immensely bureaucratic. Recent downsizing in the CSIRO has severely impacted on research in this area so onus now on cooperative research with industry – see a role for Government in assisting with turnkey grants. |
| EDI Technology and e-commerce Supplier | 1-Stop    | - Would like to see more visibility so that parties can transact better. Currently looking at providing booking visibility for both terminals at once in diary format to improve coordinated movements.  
- Have been considering options to facilitate matching 2 way movements with the port precinct but key issue will be the business rules that apply.  
- Each stevedore currently operates under different business rules within the VBS.  
- Technology and hardware is capable of expanding the service offering but would be in a business case basis.  
- The 1-Stop system is capable of providing website service, messaging, pre-receival advice, payment and track & trace.  
- 1-Stop already transacts with intermodal terminals and have assisted with building train consist systems for South Australian operator and prepare PRAs and consist messaging.  
- VBS can also interface with depots and IMTS’s with rules to determine whether box in for consolidation/deconsolidation.  
- 1-Stop have integrated vessel manager messages in their other software. | Stevedores have delayed the expansion of the VBS because unresolved ACCC clearance issues.  
1-Stop could develop a freight matching capability for the port traffic but would prefer partnering with an existing service provider in freight matching. |
<table>
<thead>
<tr>
<th>Industry</th>
<th>Company</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food and Beverage</td>
<td>Toohey’s</td>
<td>Toohey’s have recently moved away from 3PL logistics providers to create a joint venture, BevChain which is 50% owned by Lion Nathan and 50% owned by Linfox. This represents the first time the company will be going back to direct brewery delivery in a number of years.</td>
</tr>
<tr>
<td></td>
<td>Lion Nathan</td>
<td>As an organisation they are currently looking at various transport optimisation tools to improve load allocation. Previous technology used included Transit Odyssey and TransitPlan but going to dynamic load planning with an optimisation engine.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>They will identify the shortest distance and allocate manning for unloading equipment on site with the ability to differentiate different customer sites, requirements and capabilities.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lion Nathan use EDI to communicate with major customers including Woolworths and Coles and are progressively looking to introduce EDI with their own suppliers. It was noted that challenges can emerge dealing with large players in the market as those elements may optimise their subsystems to the detriment of other supply chains. Regional freight consolidation has been one such casualty.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bevchain is building its own warehouse management system to enable differentiation between the needs of beer and wine including product lines, vintages, the need for different stock turn regimes and potential increases in value of stock (i.e. as older wine appreciates). Lion Nathan do not currently have good systems to manage stock age control and location of product and still rely heavily on manual recording.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lion Nathan are currently building a Greenfield brewery will be looking to incorporate state of the art technology including automatically guided vehicle systems, RFID (to pallet level) for inventory control purposes and Swisslog technology. Their vision would be to achieve implementation of a trackable voice pick system similar to that of Metcash.</td>
</tr>
</tbody>
</table>
Lack of commonality regarding OH&S
High cost of compliance with Chain of Responsibility
Carbon footprints and difficulty measuring carbon neutrality
Infrastructure issues and land availability in NSW have deterred establishment of mega centres however freight hubs could be a good solution.
Lack of long term planning (beyond 20 yr and out to 50yr) particularly with regard to major infrastructure connections to avoid bottlenecks such as the M5
Technology
Lack of collaboration along the supply chain can hinder improvement and efficiency opportunities for all parties.
NSW Government could deliver a major breakthrough for industry if it were able to broker to regulate the introduction of GS1.

<table>
<thead>
<tr>
<th>Industry</th>
<th>Company</th>
<th>Comments</th>
</tr>
</thead>
</table>
| Retail Distribution | Metcash | • In the liquor industry at least 70% of hotel owners still order by fax and phone because that is the way they have always done it.  
• Outsource the physical transport and scheduling as not a core competency however technology systems and stock control is controlled in house to create a competitive core competency  
• Customers drive everything.  
• Taking out errors is a key focus as fixing an error is more expensive than fixing the process.  
• Have recently introduced real time voice pick order technology and linked to camera record to address key issues of increasing accuracy and driving cost out. The problems have driven innovation in this area. Metcash drove the development for real time which is now 1st in the world.  
• Look at best practice anywhere (e.g. Wal-Mart for voice pick, Tesco’s for mini loaders) to adapt to implement in Australia as US labour rates much lower and transport distance much greater than UK.  
• Presently frustrated with the lack of progress in the industry regarding agreement on GS1 standards as no party has the leverage to “get the three big parties in the room”. See agreement on GS1 as having major potential to improve collaboration and efficiency along the supply chain.  
• Note: The GS1 (Global Standard One) System is composed of four key product areas: Barcodes (used to automatically identify things), eCom (electronic business messaging allowing automatic electronic transmission of data), GDSN (Global Data Synchronisation Network which allows partners to have consistent item data in their systems at the same time) and EPCglobal (which uses RFID technology to immediately track an item). It is an international initiative to improve the efficiency and visibility of supply and demand chains globally and across multiple sectors. The GS1 System of standards is the most widely used supply chain standards system in the world.  
• Metcash do get contact from technology researchers including CRC’s and NICTA but contact is irregular and little output evident.  
• Question why R&D particularly in technology innovation is not allowable as a rebate on P&L |

<table>
<thead>
<tr>
<th>Issues</th>
</tr>
</thead>
</table>
| • Lack of commonality regarding OH&S  
• High cost of compliance with Chain of Responsibility  
• Carbon footprints and difficulty measuring carbon neutrality  
• Infrastructure issues and land availability in NSW have deterred establishment of mega centres however freight hubs could be a good solution.  
• Lack of long term planning (beyond 20 yr and out to 50yr) particularly with regard to major infrastructure connections to avoid bottlenecks such as the M5  
• Technology  
• Lack of collaboration along the supply chain can hinder improvement and efficiency opportunities for all parties.  
• NSW Government could deliver a major breakthrough for industry if it were able to broker to regulate the introduction of GS1. |
<table>
<thead>
<tr>
<th>Industry</th>
<th>Company</th>
<th>Comments</th>
<th>Issues</th>
</tr>
</thead>
</table>
| Road Freight  | Toll Linehaul | • Toll have been keen to trial new quad axle vehicles in NSW and have built two units but are currently unable to operate them.  
• The biggest productivity gains through technology recently have been the introduction of B-Doubles with have enabled a 50% increase in freight capacity. New units are being manufactured to be as high and as low as they can with legal limits and new methods of loading, i.e. installation of shelving are being implemented to maximise the utilisation of the cubic capacity.  
• Toll have built tri drive (3 axle drive units) to improve weight distribution for distribution of motor vehicles but limited ability to operate in NSW  
• Toll have preregistered for Intelligent Access Program (IAP) as a precondition to operate HML in NSW. They have enrolled 300 individual trucks but has been very labour intensive as the databases used by the Transport Certification Authority and Toll could not interface.  
• Additional new development include: installation of data readers in all cabs and track and trace systems for cargo. Toll have a large IT department which they believe would be difficult to duplicate for smaller operators  
• Toll currently have GPS capability on all trucks and can log into onboard computers to monitor fuel consumption, braking, speed and locations. This data can be monitored via the web using a third party provider my-fleet.com.au which downloads and reports the data via the web and services a number of large fleets in the market  
• Compliance with IAP will require additional black boxes which are capable of being tamper proof, self checking and able to provide data to a standard to be used as evidentiary proof.  
• Potential fatigue management regulation may also drive other new technology with the need for electronic diary data (as opposed to current paper diary records) to be collected. At this stage the NTC are recommending voluntary compliance but Toll challenge the effectiveness as it will effectively measure the truck and not the driver. | • Perceived disconnect between local Government and Roads and Traffic Authority regarding HML routes.  
• Toll wish to see:  
  • one regime for fatigue regulation  
  • Harmonisation of definitions  
  • Independence in monitoring  
  • Government engage with trucking associations  
  • Faster response times to introduction of HML and other innovations  
  • Toll can see a role for government in addressing new technology by taking the lead in identifying and educating on new technology, sharing the expertise across the industry and reducing the need for duplication. |
APPENDIX F:
EXAMPLES OF TECHNOLOGICAL INNOVATION
Paper-Free Air Freight Era Begins - IATA Launches Six E-Freight Pilots
(05 November 2007)

- The International Air Transport Association (IATA) working with seven key cargo airlines, freight forwarders and ground handling agents kick-started the move to a paper-free air cargo environment with the launch of six e-freight pilot projects. Starting today, cargo on key trade routes connecting Canada, Hong Kong, the Netherlands, Singapore, Sweden and the U.K will be processed electronically.

- This first wave of pilots will pave the way for a global rollout of e-freight that will eliminate the paper that costs this industry $1.2 billion every year. Combined, these documents could fill 39 B747 cargo freighters each year making e-freight—a win for the business and for the environment.

- “E-freight pilots will systematically test for the first time common standards, processes, procedures and systems designed to replace paper documents that typically accompany air freight with electronic information. During the initial phase, selected shipments will travel without a number of key documents that make up the majority of the paperwork, including the house and master air waybills. Results from the pilots will be used to expand e-freight to other territories.

- IATA e-freight requires that business, technical and legal frameworks are in place to allow airlines, freight forwarders, customs administrations and governments to seamlessly exchange electronic information and e-documents. The six pilot locations were selected based on their ability to meet these criteria along with offering network connectivity and sufficient cargo volumes.

- At each location cargo experts from participating airlines, freight forwarders, ground handling agents, local customs administrations and airport authorities worked together closely over the past 10 months to prepare the pilots.

- High oil prices and cumbersome processing requirements are handicapping air transport’s competitiveness with sea shipping,” said Bisignani. “Sea shipping is expected to grow at 6% annually over the next five years, compared to 4.8% for air cargo. E-freight makes a four-decade leap, bringing strengthened competitiveness by cutting costs and improving transparency and consistency throughout the supply chain. This good news for the customer will help shore-up air transport’s competitiveness with sea shipping and other modes of transport.”

- E-freight is one of five Simplifying the Business projects being led by IATA to improve service and cut costs. The industry has set a deadline of the end of 2010 for the implementation of e-freight wherever feasible.

- For more information on IATA e-freight and other Simplifying the Business projects, please visit: www.iata.org/stbsupportportal

- IATA has over 240 members that comprise 94% of international traffic.

- Other Simplifying the Business projects include 100% electronic ticketing by end 2007, the use of bar coded boarding passes, common use self service check-in and RFID for baggage management.

Overview – Telematics Systems

Vehicle Performance
With the pressure to improve asset utilisation and reduce costs several freight operators have moved to introduce systems that can measure and monitor vehicle performance including: monitor brakes, lights, tires, air pressure, speed, steering, and the electrical system and alert drivers when these components fail or require maintenance. The location and distance travelled can be automatically logged using onboard GPS and then transmit data to head office and/or the driver.

New technologies, currently appearing in passenger vehicles such as radar technologies to "cruise control" features, allow trucks to adapt their speed when they detect an object in its path. Email systems have been developed that can send warning signals to drivers, such as "roadside assistance needed" or "fuel purchased"

Onboard Safety Monitoring
An onboard safety system senses and monitors the safety status of the vehicle, driver, and cargo of a commercial vehicle. Although these systems are not yet widely implemented, many commercial trucking companies and government-sponsored research groups, particularly in the US have been testing prototypes. While truck manufacturers have focused their efforts on creating devices that monitor vehicle performance, government research groups have been investigating technologies that monitor driver performance.

Driver Performance
Complementing technologies that strive to ensure vehicle functionality are those designed to measure driver alertness and fatigue. In the most comprehensive study of driver fatigue conducted to date, the Driver Fatigue and Alertness Study (coordinated by the Essex Corporation), a significant finding was that driver alertness and performance were more consistently related to time-of-day than to time-on-task; episodes of drowsiness were eight times more likely between midnight and 6 a.m. than during other times. Included in this study was the U.S. DOT's research on technologies that could be used to detect driver fatigue. Of these, the most promising index of fatigue was PERCLOS, the video-based scoring of eye closures by trained observers.

Implementation Barriers
Drivers often fear that electronic monitoring of their vehicles' performance is an invasion of their privacy; vehicle monitoring technologies are primarily created within the development units of private, truck manufacturing companies, so that widespread implementation is dependent on CV companies choosing to invest in safety monitoring research and testing.
Route Optimisation is a method adopted by freight carriers to plan the most efficient route given loads, destinations and times

In the past two years, DHL has invested heavily in its network and launched several technology initiatives to boost customer service and increase efficiency. Through one of its most recent initiatives — route optimisation — DHL Express now can model and execute both optimal service areas and optimized local routes that align closely with reality, says Steve Sanchez, senior manager of industrial engineering for DHL.

The new initiative, which the company announced in March, will be implemented in about 340 DHL facilities across the United States by September. Some of the benefits DHL plans to achieve are decreases in drive time, route length and fuel consumption. It also plans to increase the efficiency at each facility by quickly mapping out optimum delivery routes, streamlining sorting processes and balancing daily loads. In turn, DHL says its U.S. customers will benefit from better service.
Fuel Optimisation is similar to route optimisation in that based on given factors such as destinations, fuel prices, loads and traffic conditions, the most fuel efficient route can be calculated – this is often a component of larger Route Optimisation packages.

An extract from E Trucker magazine in the US recently covered the topic of fuel and route optimisation:

Planning truck routes to get the lowest possible fuel costs is no small feat. The pump price can fluctuate wildly, but that’s only one of many considerations. Truly sophisticated fuel purchasing takes into account fuel rebates, surcharges, taxes, km per litre, distance, fuel levels, tank size, route schedules, truck stop preferences and other factors.

Fuel optimization systems are designed to resolve these various factors into a recommendation for each trip. Such systems have been on the market for nearly a decade, but vendors are seeing greater interest in recent years as fuel prices are dramatically higher and fleets look for new ways to squeeze out more miles from their fuel expenses.

“Usage is up tremendously,” says Chris Lee, marketing manager for ProMiles, a mapping and mileage software provider. The company has offered fuel optimization for eight years, and for the past three it has included fuel optimization at no extra cost in the ProMiles XF mapping and mileage system — both in online and client-installed versions.

Today, nearly 70 percent of ProMiles’ customers use its fuel optimizer, Lee says. As with all fuel optimization software, ProMiles calculates routes by using current fuel price information through direct feeds of fuel transactions from vendors of fuel purchasing cards.

ALK PC Miler and Rand McNally IntelliRoute also offer fuel optimization in their latest mapping and mileage solutions through an interface with FuelAdvice.com, a Web-based fuel optimizer from Integrated Decision Support Corp. (IDSC). Users pay the same monthly price, per truck, as they would to use FuelAdvice.com separately (US $9.95 per truck per month). The interface with FuelAdvice.com provides the convenience of using one package.

Overview – Radio Frequency Identification (RFID)

Radio Frequency Identification (RFID) Tags

- One type of transponder, the Radio Frequency Identification (RFID) tag, has the potential for widespread application across a number of platforms.
- RFID is an alternative to traditional automatic identification and data capture applications (such as barcodes) and can be applied to varying levels of cargo consolidation from a single item to a truck or container (see slide 5 in this appendix for further details).
- An RFID tag consists of an integrated circuit chip and antenna encased in a protective shell. Tags can be embedded in or attached to objects and range in cost from 20c to $200 depending on the information requirement and transfer method.
- Three types of RFID tag have evolved – passive, inductor and two way (see slide 3 in this appendix for further details).
- The application of RFID technology is spreading across supply chains and is being driven by the cargo owner and the customer. RFID provides a number of positive benefits over barcodes. For example, RFID:
  - Eliminates human error
  - Improves data accuracy and asset visibility
  - Performs in rugged, harsh environments
  - Provides a dynamic, multiblock read-and-write capability
  - Facilitates source data collection
  - Permits simultaneous reading and identification of multiple tags
- Over the past 3 years some of the US’s largest supply chain drivers (Wal-Mart and Target) have separately required their top suppliers to introduce the use of RFID tags. Major consumers of componentry and parts such as Boeing and Airbus now require it on all aircraft and engine parts. In 2004 the US Department of Defence issued a policy requiring all suppliers to install RFID tags and technology on goods moving through Defence Supply chains (see slide 4 in this appendix for further details).
Overview – Radio Frequency Identification (RFID) (cont)

The key barriers

• In the past, incompatibility factors have posed a problem for fleets using RFID and other transponder technologies as carriers operating in different markets (particularly internationally) had to maintain different transponders.

• Cost was also suggested as a key barrier within the context that most RFID labels were considered disposable or lost once they had moved through the supply chain.

Findings:

• A number of manufacturers and retailers have implemented RFID technology but feedback from others was that the costs were currently prohibitive below pallet level.

• RFID can be used to track shipments by transmitting information via radio frequencies as vehicles move freight through gates and docks. Using RFID, fleets can ensure that the correct products are shipped at the correct times.

• While some fleets, generally in the retail area, now use RFID to track shipments, RFID's application to tracking shipments has yet to become widespread. Studies have shown that RFID may not yet be ready for widespread application to shipment tracking due to accuracy and interoperability factors.

• RFID has not been adopted within the shipping industry for container tracking. Our research suggested that the issues of container ownership, lack of network readers and standard frequency adoption across key markets are contributing factors.

• There may be opportunities for this technology to be applied at a container level within the NSW market at a relatively low cost. Further investigation may be warranted particularly to enhance data collection within the port precinct, on rail and through the intermodal terminal network.

• Logica CMD have led the way in NSW and have developed a showcase warehouse in Sydney to demonstrate the application of RFID technology to consignment and asset management.
There are three main types of RFID technology: inductive, back scatter and two way. The key differences are the amount of information they can hold and whether they can actively send information or are only passive – costs will vary accordingly.

**Inductive Tag**

Inductive tags are passive tags which are excited by the electromagnetic field generated by the interrogator. The tag resonates at the frequency of the field causing a measurable disruption. Inductive tags cost between US$3 to $8 per tag.

**Back Scatter Tag**

Back Scatter tags may be either passive or active. They reflect a small portion of the RF energy of the interrogator. The reflected signal is modulated or encoded with information stored in the tag. Back Scatter tags cost US$5 to $40 per tag.

**Two-Way Tag**

Two-Way tags are active tags which incorporate a miniature transmitter and/or receiver. The tag may be polled or transmit freely. Data may be read only or programmed by the interrogator. Two-Way tags cost between US$75 to $190 per tag.
This chart illustrates how the US Dept of Defense sees RFID technology playing a role throughout their supply chain – there is a great deal of similarity with many of the commercial domestic and international supply chains operating in NSW.

- **Manufacturers /Suppliers**: Items/cases/pallets are labelled with passive RFID-enabled labels. A parent-to-child relationship exists.
- **Depots /Distribution Centres**: Items/cases/pallets are read as they are received and new shipments are labelled. Orders are verified for accuracy.
- **Ports of Embarkation /Disembarkation**: Items/cases/pallets are associated with active RFID to provide in-transit visibility.
- **Transportation /Supply Theatre Depots /Distribution Centres**: Data are timely and accurate via network of linked readers, allowing asset visibility along the entire supply chain.
- **Customers**: Timely and Accurate Data
  - When shipments are reconfigured, a new RFID tag is created for the pallet and associated with cases on that pallet.
  - The captured consolidated shipment information is input into the automated information systems.
  - Items/cases/pallets are received automatically with few disputes and information is shared with the automated information systems. Reconfigured shipments receive a new passive RFID tag.
  - Customers have visibility of requisitions and are confident in the status provided by the system.

Sources: Adapted from *RFID Vision in the DOD Supply Chain*, Alan F Estevez, Army Logistician: Personal Bulletin of United States Army Logistics, May-June 2005
RFID - Applications in the Movement in Import and Export Containers

- Research by (NYNJ) suggest that data collection from container movements could result in faster rates of industry efficiency improvements.
- They state that “Active RFID has the capability to deliver what other technologies such as passive RFID and GPS cannot”
- Issues around standards, both nationally and internationally are slowly being resolved and it is expected that a frequency standard for both the US and Europe will be agreed by 2007
- The continuing reduction in the cost of tags (as low as 20c for single use paper tags) is assisting with penetration of the technology in the broader market
- Motorola and IAS are developing the concept of a container visibility system that would:
  - Deploy a reader network around the world
  - Partner with the lines, carriers and equipment lessors to tag the global container fleet within 3-4 years.

Applying the Container Chain Visibility system to all of the world’s ISO containers will provide a broad base of powerful information at the actionable points, founded on three key principles:

- A focus on commercial benefits whilst also satisfying security needs
- A low cost “license plate” that can leverage off a large, deployed and sophisticated network
- An open technology architecture that supports full scalability.

Automated data flow to carriers and logistics providers improving visibility and accuracy
Overview – Dedicated Short – Range Communications

Dedicated Short-Range Communications (DSRC) Transponders
Several types of technologies are used to facilitate roadside screening. Most commonly, trucks are equipped with a transponder that sends the vehicle and carrier ID, as well as time of last screening, via dedicated short-range communications (DSRC) to a roadside reader. Once this bundled information has been screened at the roadside, the driver is signaled via DSRC to either continue on or stop for closer inspection. This transponder can also be used to pay tolls electronically. These transponders are generally linked to the vehicle and do not provide information on the cargo that is being carried.

Findings:
Simple transponders such as e-tags for toll payment on the NSW road network are common but have not been used for application in other screening areas such as providing credentials or clearance to enter a facility. Tracking transponders for asset location have also been used in the rail industry to capture movement information and travel data.

Weigh-in-Motion
Weigh-in-motion (WIM) sensors are also used to screen commercial vehicles and are frequently used in conjunction with electronic screening systems. WIM technologies include plates and loop detectors that collectively measure a truck’s weight, axle weights, axle spacing, speed, gross weight, and vehicle height. This information can be processed while the truck is moving sent to the scale house within one second.

Findings
In motion weigh bridges are becoming more commonplace particularly at high volume locations such as the port. They can make a significant contribution to potential time savings (between 1 and 5 minutes per vehicle movement). Inspectors can then focus their efforts on high-risk carriers.

In motion weighing in conjunction with DSRD or Active RFID tags can reduce weigh station traffic (reducing queues at a station) and also assist in avoiding the cost of building newer, bigger weigh stations to accommodate increased vehicle congestion.
**Overview – Electronic Credentialing**

**Electronic Credentialing**

In its broadest form electronic credentialing can be used to check the status of a freight operators credentials. It entails the use of software to send credentials to a given agency and to retrieve credential status for evaluation at roadside stations. At the simplest level credentials include registration, licensing and liability insurance but can extend to include authorisation to carry certain types of cargo (e.g. hazardous materials), special permits operate vehicles that are over the standard legal weight or size. Electronic credentialing is in its infancy in Australia but recent steps by road transport agencies, including the RTA permit new access conditions, particularly for higher mass limit vehicles on selected routes is likely to increase the uptake of this type of system.

**Intelligent Access Program (IAP)**

The IAP is a new way of managing access and compliance for heavy vehicles within NSW, providing transport operators with the opportunity to obtain improved access arrangements, while providing the RTA with greater assurance over compliance.

**How does the IAP work?**

Developed in partnership between all Australian road agencies, the IAP uses satellite-based tracking technology to remotely monitor where, when and how heavy vehicles are operated on the road network. An in-vehicle unit is required to be installed in all prime movers by a certified IAP Service Provider.

The IAP will automatically record the time, date and position of any relevant non-compliant event associated with the access conditions of an IAP monitored vehicle, and will form the basis of any investigation initiated by the RTA.

**Roles and responsibilities**

The IAP involves the interaction of four separate parties, as detailed following.

1. **RTA**: will offer improved access conditions to enrolled carriers.
2. **Transport Operators**: operators apply for improved access conditions and enrol for the IAP in NSW via the RTA website. Once approval is obtained the operator needs to engage a certified IAP Service Provider who will provide IAP services on a fee-for-service basis.
3. **IAP Service Providers**
   IAP Service Providers will record the date, time and position of any breach of the access conditions and provide this information to the RTA for investigation and follow up action. The RTA won’t track all movements of a vehicle they will only receive information on relevant non-compliant events from the IAP service provider.
4. **Transport Certification Australia (TCA)**
   TCA (www.tca.gov.au) will certify and audit IAP Service Providers (only certified IAP Service Providers can supply services under the IAP), to ensure that all IAP services are accurate and reliable.
APPENDIX G:
SAMPLE OF US FREIGHT MATCHING SITES AND LOAD BOARDS
Sample List of US freight matching web sites and load boards. This list includes many of the Internet truck and load posting sites, freight boards and freight matching services that can receive loads and trucks through the PostEverywhere posting service.

123 Loadboard - www.123loadboard.com
Ajex (trucks only) - www.ajex.com
Allen Lund (trucks only) - www.allenlund.com
ALTTConnect (loads only) - www.alttconnect.com
Careers in Gear (loads only) - www.careerseingear.com
Cargotrans - www.cargotrans.net
Cyber-Freight - www.cyber-freight.com
DAT Partners (file export) - www.posteverywhere.com/help30/topic_about_export_dat.html
Direct Freight Services - www.directfreight.com
Expedite Loads - www.expediteloads.com
ez1020 Freight (loads only) - www.freight.ez1020.com
Find A Hauler (loads only) - www.findahauler.com
Freight Finder - www.freightfinder.com
Freight Getter - www.freightgetter.com
Freight Mail - www.freightmail.com
Freightnet - www.freightnet.com
Freight Revolution - www.freightrevolution.com
Freight Watcher - www.freightwatcher.com
GetLoaded - www.getloaded.com
Grab A Load (loads only) - www.grabaload.com
The Internet Freight Terminal - www.freight-terminal.com
Load Leaderboard - www.loadleaderboard.com
Load Match - www.loadmatch.com
Load Max - www.loadmax.com
Load My Truck - AATA (loads only) - www.loadmytruck.com
Load Search.net - www.loadsearch.net
The Trucker's Website - www.thetruckerswebsite.com
Load Solutions - www.loadsolutions.com

Load Up (loads only) - www.uscanadaloadup.com
My Trans Info - www.mytransinfo.com
NetTrans - www.nettrans.com
Never Sit (Trucker's Helper) - www.neversit.com
Pick a Truck Load - www.pickatruckload.com
Pro Trucker.net - www.protrucker.net
Quick Load Board - www.quickloadboard.com
RLT Exchange - www.rltexchange.com
Shipper Net (loads only) - www.shippernet.com
Shipping Gateway - www.shippinggateway.com
Teleroute – http://corporate.teleroute.com
The Freight Exchange - www.thefreightexchange.com
TransCore Exchange - www.transcoreexchange.com
Truck Buzz - www.truckbuzz.com
Truckinfo.net - www.truckinfo.net
TruckLoads.net - www.truckloads.net
Trulos - www.trulos.com
US Load Source (loads only) - www.usloadsourc.com
Can Haul - www.canhaul.com
Real Time Freight - www.realtimefreight.com
Right Now Loads - www.rightnowloads.com
Truck Load Rate (loads only) - www.truckloadrate.com
The Freeloader.net - www.thefreeloader.net
APPENDIX H: CONTAINER MOVEMENT LOGISTICS AND VIRTUAL CONTAINER YARDS
The possibilities presented by internet-based systems have given rise to a new concept: the “virtual container yard”

- This concept envisions a virtual exchange market as an alternative to actual container yards, a virtual place where container yard functions could take place without the necessity of moving containers to a physical container yard.
- The key purposes of virtual container yard are to:
  - post critical information on cargo and containers status (location, characters)
  - facilitate communication between participated parties (motor carriers, ocean carriers, leasing companies and chassis pool operators)
  - permit container interchanges and other document process take place without moving a container to the harbor
  - assist the parties to optimize decisions regarding container logistics (return, reuse, interchanges).
- To utilize the virtual container yard concept, detailed information on a container’s status and related business operation are required and must be made available to participating parties, most likely carriers and logistics providers.
- Research conducted for the University Transportation Research Centre study, suggests that these virtual container yards will find their market to be limited to small and medium-sized shipping lines. Often the larger shipping lines have better opportunities to match containers within their own system.
- In summary, (to the extent that existing, or yet to be developed, internet-based information systems can be successfully applied) successful applications of web-based information depends on the willingness of all participants to share business information on a timely basis, and this particularly requires cooperation among ocean carriers. Without satisfying these basic conditions, the role of these systems in rationalizing empty container movements in the SCAG region would be limited.

Source: Adapted from www.mettrans.org/research/final/01-05_Final.htm Theofanis and Boile, Investigating the Feasibility of Establishing a Virtual Container Yard to Optimize Empty Container Movement in the NY-NJ Region, UTRC Research Initiative, October 2007
Internet Based Support Systems

- Most carriers are interested in reducing the cost of moving empty containers.
- Most third-party strategies proposing to do so have focused on improving the means of matching export cargo with empty containers.
- Using the internet as a tool, these strategies require information regarding export cargo and available empty containers as a crucial element to facilitate potential matches.
- These third-party strategies, or systems, are fundamentally different than the existing in-house information systems, known as Electronic Data Interchange (EDI), which have been widely established to facilitate communication between ocean carriers, marine terminal operators and their customers and logistics providers.
- These newly established third-party systems, several of which are being developed, are predicated on the sharing of containers between different carriers.

**InterBox**

- An online trading system that enables subscribing container owners (carriers), operators and transport service providers to search information on the availability or need for containers posted by other subscribers to the service.
- Developed by International Asset Systems Limited (IAS), the system functions as an online “notice board” where carriers and participants can post their requirements for, or availability of, vessel slots and containers.
- The system is expected to be able to provide global equipment visibility, the exchange of equipment (containers) and vessel slot capacity, and other services using integrated data from diverse carrier and vendor systems within the transport chain.
- Similar to EDI systems, this system enhances communication and coordination between carriers and their customers along a transport chain.
- IAS claims to have 75 subscribers world-wide and a daily posting of information on over 2,000 containers; however, the usefulness of this system in reducing empty container movements on the landside port environs remains to be demonstrated.

Source: Adapted from http://www.metrans.org/research/final/01-05_Final.htm
eModal

- eModal is an on-line database management system designed to track and provide container information to terminals and truckers operated in the SCAG region.
- The structure and purpose of eModal is to:
  - Integrate container tracking between marine terminals and the eModal website for multimodal use.
  - Provide benefits to terminal and trucking companies by increasing productivity and reducing “turn time” through the use of coordinated availability planning.
  - Properly coordinate modal planning to improve the efficiencies in the harbor area.
  - Improve multimodal coordination using a standardized data system.
- The system is a single Portal and contains a significant amount of Information. The Community System brings the entire transportation industry together within a single, working portal. Registered members can:
  - Query container and booking status at participating terminals
  - Pay terminal fees online with Fee Payment tool
  - Register truckers in Trucker Check
  - Comply with Marine Terminals Security Facility Plans
  - eModal Scheduler provides appointment options to optimise a schedule

This system is not designed to enhance container interchange and reuse in SCAG region.
- The major feature of this system is the ability to track information on container status and thus provide better scheduling ability for truckers in coordinating with terminals for pick up and drop off of containers. In this regard, the system helps to reduce traffic congestion at terminal gates as well as in the port’s vicinity.
- At present, the application of eModal still focuses on intermodal transport, and particularly the trucking community.

Source: www.emodal.com
eModal and the Long Beach Los Angeles Virtual Container Yard

The SoCal (Southern California) VCY (Virtual Container Yard) has been developed as an easy-to-use and cost efficient way to perform street turn interchanges in Southern California. The VCY aims to reduce truck trips to the ports, saves fuel, time and hours of operation. Sponsored by the ports of Long Beach and Los Angeles and the Alameda Corridor Transportation Authority, the VCY is now operational. In cooperation with the ports and ACTA, eModal interfaces with IAS (International Asset Systems) for the SoCal VCY. The SoCal VCY is one of many applications offered with the eModal Port Community System.

Quick overview of how it works:

**Step 1:** From the VCY drop-down menu, the carriers elects to register. The trucking company is then presented with a Terms of Service, known as the "Rule Book". Participating Ocean Carriers will review for approval the company to interchange their containers with other participating trucking companies.

**Step 2:** There are two ways to post a container for a VCY interchange:
Select the box of a container number in a personalised eModal Activity Folder; select the VCY tab at the top of the Activity Folder page. The container number will be carried over to the post.
Post by selecting VCY Container Posting from the VCY drop down tab. This step is for those containers that may not already be listed in the eModal Activity Folder.

**Step 3:** A message of all posted containers selected for interchange in the VCY program is then sent to the carrier.
SynchroNet

**SynchroNet:**
- Different from the systems mentioned previously, the SynchroNet system is designed to assist only ocean carriers in exploring and cooperating opportunity for match up empty containers, interchange of equipment (container), and asset management. There are several specific service features provided by this system.

**SynchroBox**
- Provides real-time online information on the status of containers controlled by participating carriers. In principal, this information provides ocean carriers with the ability to monitor and identify potential container interchanges as well as to make logistics decisions on empty containers.

**SynchroSlot**
- Provides information on ship slot capacity which assists ocean carriers as well as customers to market and identify available empty slots on any particular shipping route. This feature is particularly successful since, unlike the case for containers, ocean carriers often share ship slots between alliance members and use the information to minimize the cost of repositioning empty container.

**SynchroSource**
- Similar to the synchroBox, this service provides carriers the ability to explore available container capacity that meets specific origin and destination requirements.
- the major feature of SynchroNet is to support ocean carriers seeking to rationalize worldwide container surpluses and deficits, and to manage the international flow of container capacity through its database called Cooperative Access System (CAS). Recently, SynchroNet Marine, Inc. has developed a new system called SynchroMet, which is designed specifically to facilitate street turns and empty container reuse.
- While the business plans of these various third-party information services appear promising, their eventual success will depend on the willingness of subscribers to use and post information on the availability and status of containers under their control in the current market circumstance.

Source: Adapted from http://www.metrans.org/research/final/01-05_Final.htm