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for
The National Transport Secretariat

INTRODUCING
THE TRANSPORT IMPACTS OF E-BUSINESS PROJECT

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EXECUTIVE SUMMARY

E-Business is expected to dramatically change the way business is conducted internationally, nationally, within states and at the local area level. Moreover, these changes are very likely to happen well within the planning time frames required for provision of transport infrastructure and services. This paper introduces a study to investigate: how will the transport task change; what will be affected; and how can the transport system respond?

The work, a joint initiative of the National Transport Secretariat [NTS], and the CSIRO/QUT Built Environment Research Alliance, in collaboration with Queensland Department of Public Works, is intended to assist Australian business and government pro-actively address the transport issues arising from e-business.

E-commerce is growing exponentially: worldwide e-commerce revenues are estimated to reach $US1300 billion by 2003. Growth in electronic communications within companies which, together with e-commerce between companies, B2B, or between business and consumers, B2C, make up e-business, is even more significant. The magnitude and speed of both these changes increase the urgency of planning, for their impacts provide forecasting challenges.

A study approach is described to consider direct impacts from e-business on Australian transport, derived demand for travel or delivery as other businesses prosper and transport related constraints to e-business in the next five to ten years.

Base line information collection: includes a review of literature and information about trends in e-business then transport and e-Business; interviews with stakeholder/experts in planning agencies, e-business companies and transport/logistics firms across Australia; appraisal of data available for on-going assessment; and contact with international experts.

Trends and impact assessment: National trends will be estimated and very important impacts or very urgent impacts selected via a ranking and rating process. Transport related productivity gains will be assessed; trends in regional Australia and international trends and experience will be reported with a final assessment of opportunities and threats for Australia.

Outputs: A series of working papers and final reports; a user friendly database of contacts, publications and data availability information for update; a research framework for identification of policy and planning levers to maximise benefits to Australia from national and global e-business activity.
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1 INTRODUCTION

1.1 A Study of e-Business Impacts on Transport

E-Business is expected to dramatically change the way business is conducted internationally, nationally, within states and at local area level. Moreover, these changes are very likely to happen well within the planning time frames required for provision of transport infrastructure and services. Suggestions about the impacts of such changes on the transport system abound. They range from e-business limiting the needs for deliveries and travel to e-business significantly increasing delivery of goods and services. These differences stem from differing assessments of trip reduction due to more efficient planning or new virtual services, compared to extra trip generation due to growth in business. Commentators have often considered the impact of business to consumer [B2C] transactions rather than the equally or more significant business to business [B2C] impacts. Systematic research of e-business impacts has concentrated on legal and accounting issues and technical solutions for business. A similar concentration on the likely impact of e-business on the transport system is needed to answer:

- How will the transport task change;
- What will be affected; and
- How can the transport system respond?

The National Transport Secretariat [NTS], established to advise the Australian Transport Council [ATC] on transport issues that are of cross-modal, cross-jurisdictional, strategic and national significance, has included a research project “E-business Impact on the Transport System” to address these questions, in its initial portfolio of projects.

At the same time, CSIRO and QUT Built Environment have provided seed funding to establish projects in new areas of research of strategic importance to government and industry. One of the first projects funded under this initiative is an investigation of Transport Sustainability of E-Commerce: Assessment of Impacts. The Queensland Department of Public Works has also offered support for the work. These two initiatives have been combined in a study to provide a first national assessment of transport impacts by early 2001. The outputs are intended to assist Australian business and government pro-actively address the issues arising from e-business. This paper, the first in a series documenting the research, describes the scope of the study, the issues which need to be considered in the assessment task and our approach to the task. Figure 1 shows the series of working papers planned for the project.
Figure 1: Working Papers From This Project.
1.2 E-business and E-commerce

This study uses the term e-business to consider changes due to electronic communications within companies as well as electronic commerce between companies. The following operational definition explains the distinction:

"Electronic commerce [e-commerce], the buying and selling of goods and services on the net - or worldwide web - is growing at a phenomenal rate as companies and consumers discover the benefits of instant access to data and the ability to make on-screen transactions. But e-commerce is not the whole story. Through the rapid development of information technology, businesses can link up all their internal and external activities - from supply and purchasing to sales and marketing - into a single seamless operation. This is defined as e-business, although the two terms are often used interchangeably." [Fisher, 1999]

E-business and e-commerce include i-commerce, the term sometimes used to describe distinctly Internet based commerce, and m-commerce the newer and growing field of mobile communications. Figure 2, one of the more conservative among the forecasts available, shows, the rapid growth of e-commerce and the growth in e-business which has arguably been, even more significant.

![Figure 2: Growth in Worldwide E-Commerce Revenues.](Source: IDC, 1999)

The rise of e-business is one of the changes involved in a shift to a global information economy. This has been described as “ the third great societal transition in human history” comparable with the first, the introduction of agriculture and the second, the move to manufacturing industry in the industrial revolution, see for instance, Brotchie et al., [1999].
The global information economy in general and e-business in particular, are already making differences to Australian business, industry and society. Both the magnitude and speed of change mean planning and policy decisions are necessary now, to accommodate change and take advantage of new opportunities. Expected growth of Internet use in our region plus the competitive pressures due to growth worldwide, add even greater urgency as can be seen in Figure 3.

![Growth in Adult Internet Users by Region 1995-2005.](source)

Figure 3: Growth in Adult Internet Users by Region 1995-2005.
[Source: The Computer Almanac, 2000]

2 CHALLENGES IN ASSESSING IMPACTS

2.1 Forecasting E-Business

Both the rapid speed of change and the changes in society due to the information revolution in general, pose special challenges for forecasting the future of e-business and assessing its impacts. The traditional process of collection of information over time, description of a base case and projection of future trends, or assessment of change scenarios, encounters problems in all stages. Problems arise in comparing information year-to-year, where scope and scale change. Description of “the numbers of users and uses” at a point in time rapidly becomes outdated. Projection of trends, which resemble exponential growth curves rather than a linear trend, is difficult. Change scenario assessments are based on impacts of a particular change of interest “if other things are unchanged”, yet the only certainty about the future at the moment is that many things will change.
These challenges apply to studies of impacts on the economy in general but are greater in studies of impacts in specific industries, such as transport. More detailed information is required and more detailed outputs are expected. Almost always such studies are looking for sufficiently detailed insights on future conditions to allow plans to be put in place. This requires predictions to be linked to time frames and localities.

All industries and business will be subject two types of e-business changes in two types of context:

- **Generic Changes** that apply to business and industry in general, such as those applying in general office automation and communication;

- **Industry or Business Specific Changes**, purpose specific developments such as vehicle tracking for freight and delivery companies;

- **Internal Application** of e-business within organisations and industry groups; and

- **External Applications** by suppliers and customers will also have impacts.

Thus there are a great many effects to consider in even a small industry. It is therefore particularly important to be able to identify important influences among the multiplicity of changes, allowing that these may differ over time and with place. The best way of address this is to provide an assessment system which gives information on what is happening here and now, add reliable insights on what is about to happen, rate and rank impacts of change and at the same time provide an on-going process for updating the assessments. In the following sections we propose such a system for assessing e-business impacts on Australian transport.

### 2.2 Specific Transport Issues

Assessing the impacts on e-business on Australian transport faces all the challenges noted above with three additional complications:

- **Complexity** - The term “Australian Transport” was used above to describe in a single term the many transport industries and organisations related to provision and regulation of freight and passenger transport services and infrastructure, which together provide the Australian transport system. They range in size from road authorities overseeing infrastructure across states to local area delivery contractors and have perhaps even a greater range in diversity.

- **Indirect Impacts** - Transport is a derived demand. It stems from the need for travel or delivery of goods or services. Thus impacts of e-business in many areas will impact transport demand. These can range from increases in trade or sales as businesses prosper,
extend to extra construction activity to support growing enterprises; and spread further to encompass societal impacts, such as changes in employment patterns, lifestyles or even city form and structure.

• **Reverse Impacts** – While e-business impacts the transport system, the transport system will also impact e-business. While e-business involves some “virtual services” supplied electronically rather than physically, the majority of transactions will still require some movement of goods or people. The ability of the transport system to accommodate those demands will impact on the viability of new-business enterprises and initiatives.

A complete enumeration of even all direct effects would require more than the entire time available for this study and the complete consideration of all indirect effects is clearly a mammoth task. Thus, it is important to delineate the scope of the assessment so that it provides sufficient breadth of coverage for the task but can still offer enough depth to be used for priority setting in transport policy and planning.

### 2.3 Setting the Study Scope

**Temporal Scope**: The time period for assessment is a difficult decision. On the one hand, major transport infrastructure decisions can need a twenty-five year lead time and on the other hand communications technology is advancing so rapidly that only the very brave or very foolish are willing to make long term predictions. We have set a five to ten year time horizon as a viable compromise, although a process for on-going assessment could continue to provide information on a moving time horizon.

**Spatial Scope**: While much e-business operates in a global market, it is important that national and international activities are considered. However, we consider them as they may relate to Australia in particular, rather than impact on other areas of the world. It is equally important that regional issues of importance to all states and territories be considered. E-business impacts on the transport system will vary with the industry mix in the area, the existing transport infrastructures and services, growth profiles, characteristics of the people in the area and the priorities of business and government. While the issues are clearly cross-modal and cross-jurisdictional, they must encompass regional diversity.

**Consideration Scope**: It is a particular concern of NTS that this work should not “reinvent the wheel” and take into account available work from state and federal investigations. In particular, we do not attempt to assess the current state of the information economy in Australia, which has been the subject of recent reports from the National Office for the Information Economy.
[NOIE] and the Australian Bureau of Statistics [ABS]. Similarly we recognise the NOIE work estimating the overall impacts of the information economy on Australia’s economic position. Moreover, to provide timely outputs from this study it is important that we limit our investigations to the many direct and indirect e-business impacts on transport, rather than try to assess the impacts of all changes stemming from global change to an information economy on transport.

3 STUDY APPROACH

3.1 Base-line Information

As noted, baseline information in this context is required about both what is happening and equally or more importantly what is soon to happen. This is acquired through four processes:

**Literature and Information Review:** This is required to address two areas: Trends in E-business and Transport Impacts of E-Business. It is particularly important that the trend information be recent. Many early predictions have proved inaccurate. Thus, in addition to material available in recent academic publications, we look to company web sites and other sources of electronic information particularly suited to tracking e-business. The research literature will not provide sufficient information of direct relevance to Australia especially at state level. Investigation will look to less conventional sources such a newspaper archives. An extension of this approach would look to reports in trade magazines and publicly available company reports. Additionally information available from existing reports in various government jurisdictions is incorporated as appropriate papers/report chapters. The results of these reviews are to be reported in Working Paper Two “E-Business Trends”, and, Working Paper Three “Transport and E-Business”.

**Stakeholder/Expert Interviews:** To augment our knowledge and information gained from the literature, we should tap into the wealth of expertise available across the country from stakeholders, with expertise in either transport trends, e-business or both. This allow us to collect evidence from planning agencies, relevant e-business related companies and transport/logistics firms across Australia, regarding current state-of-play and likely future trends re:

- Current and future plans for e-business take-up/development rates;
- Experiences/expected transport impacts and constraints.

The process involves first identifying relevant people, an ongoing process as experts recommend other important stakeholders. Semi structured telephone interviews tailored to the
particular respondent are then carried out. The system allows Australia wide access to stakeholders. This is probably one of the best methods available for finding up to date information in a short time. We list the people interviewed and report their views in Working Paper Four. The opinions are summarised and not attributed to specific people, unless we are specifically attributing some comment to a particular person.

**Data Availability Appraisal:** A realistic appraisal of data availability matched to data needs is required. It was hoped that stakeholder interviews would provide helpful information about the availability of data. However, follow up is needed to check actual data status and extra searches are required. This task is ongoing throughout the project, as both data availability and data needs are resolved. Time and resources are not available for a complete study of all possible data sources. However, identification of, and access to, sufficient relevant sources of data will be important as we seek to quantify impacts. Working Paper Five will review data issues illustrated by examples from available data.

**International Information:** Just as stakeholder interviews are needed to augment written information about Australian experience, direct sources of information on international experience and trends is required. This is particularly important for obtaining information about impacts outside urban areas.

The first strategy employed e-mail correspondence with international colleagues and contacts via transport lists in the UK and USA asking for their opinions in response to a short set of questions/issues. We will to augment this by a second strategy specific targeting of government or business at the USA Transportation Research Board Meeting in January 2001. Transport planners and policy makers from all over the world attended the TRB meeting. Short interviews with some people with particular experience in e-business especially in regional areas would be helpful.

This second strategy is one of the final areas of this study is still under consideration at the time of writing. To accurately show out full study design we also include some extra key tasks in the following description of trends and impact assessment methodologies, noting that they are study extensions.

### 3.2 Trends and Impact Assessment

**National Trends Assessment:** The results of the literature and information review and stakeholder interviews will be used to establish trends to be investigated. Data assembled will be used to extrapolate trends to assess likely impacts at the national level, in terms of induced
trips and substituted trips due to Business to Business [B2B] and Business to Consumer [B2C] activities. This will include estimates of, for example:

- Total vehicle travel: passenger and freight trips;
- Logistics of freight distribution and services delivery; and
- Impacts on greenhouse emissions as a result of e-business take-up rates.

The trends will be selected as either having very important impacts or very urgent impacts and via a process of ranking and rating impacts using South East Queensland as a case study area. This ranking and rating will be reported in Working Paper Seven.

While identification of impacts on and of e-business on transport systems, as just described, is important, it is equally important that productivity gains resulting from e-business activities are identified at the same time. An understanding of such potential advantages is needed for cost benefit analysis of plans to relieve transport constraints and for prioritising initiatives. One of the three final reports from the project to identify opportunities for transport related productivity gains is planned.

To address the concern that any trend assessment will have limited “shelf life” in view of rapid changes a macro-level spreadsheet based model could be developed to assess national impacts. The model is to be used to test alternative assumptions about future e-business. It would be developed in the form of a user friendly scenario tool using readily available and inexpensive software such a Microsoft Excel with point and click menus allow the user to test scenarios and output results to an excel workbook for reporting or further analysis.

The model would be specifically designed to consider changing contexts in the external environment, such as increased economic growth or lower than expected take up of communication technology.

**Impact Assessment for Regional Australia:** The literature relevant to regional issues; regional stakeholder information together with other stakeholder information about regions; experience and evidence on impacts overseas in non-urban areas; and available regional data will be used to identify generic B2B and B2C impacts for regional Australia. For example, regions dependent on mining or cattle growing regions will have some similar e-business issues, whether they are on the eastern seaboard or in the centre of the country. These findings will be provided as Working Paper 6 reporting on e-business impacts for regional Australia.
However, we strongly believe that regional impact assessment needs to incorporate the diversity of regional Australia. The challenge is how to address this issue without undertaking a comprehensive study of all Australian regions. As a study extension we propose to assemble information relating to e-business in different types of regions. These would be based on industries, existing transport infrastructure and services, remoteness, town and city types. It should be possible to assemble such information for regions with, for example, tourist resorts, mining enterprises, regional cities etc.

A relational data base approach would be used to link these likely e-business impacts/constraints and issues to regional areas at census Statistical Division Level based on Census and other information available for linking into a Geographic Information System. Of course this would not be as good as assessing every individual region but we believe it would provide a good first approach to investigation of regional impacts.

There would be numbers of reporting advantages. A simple Excel map based tool could allow the user to either point and click on, for instance, Beaudesert or Kalgoorlie and list likely e-business impacts and constraints. Alternatively thematic maps of places likely to face particular impacts could be produced.

While the proposed mapping has advantages in term of breadth of coverage it would not provide in depth understanding of regional issues. A further extension would be a case study of a particular region. Available local government reports for the area would be collected, and regional stakeholders targeted. The aim would be a good qualitative analysis of the full range of e-business issues that might apply in that area. An assessment of which impacts might be generally important in regional Australia would be included.

**Report on International Experience and Trends:** The final strand of the study will analyse the literature and information search results together with e-mail and, if available, face to face interviews with international experts to compile a report on International Trends and Experience in E-business and Relevant Transport Impacts. We will compare the experience in different countries. The globalisation impacts of e-business will be especially considered to assess opportunities and threats for Australia.

### 3.3 Expectations and Outputs

The study provides outputs designed to both provide information immediately and have ongoing value. Figure 4 shows the entire set of study outputs, those still to be funded are grey rather than black:
**Working Papers** record each stage of the early investigation process. While following the conventions of academic working papers with full documentation of all sources, the papers are written in a style to be accessible to all interested readers. Additionally, executive summaries are provided for a quick overview of findings. As it is impossible to describe e-business without some use of e-jargon, glossaries are included.

**User Friendly Information Base:** As this project is at the start of ATC consideration of e-business impacts, it is important that the research is provided in such a way that it can be used and updated by others after completion of this project. E-business is evolving and growing very rapidly, making update vital. This is addressed by provision of a user-friendly database in Access software containing the references obtained in the literature search, the contact details of experts/stakeholders and a listing of relevant data sources.

**Assessment Tools:** To allow ongoing access to analysis results, the previously mentioned model to address e-business scenarios and a map-base tool to identify regional issues could be provided.

**NTS Reports:** Final Reports to NTS, to be delivered in March 2001 will draw together the important issues from all aspects of the project informed by comments and review from the study reference group and other stakeholders. The main report will cover:

- Key National Impacts and Trends, with two associated reports considering;
- Opportunities for Transport Related Gains; and
- Global E-business and Transport Opportunities and Threats.

**Research Framework:** Finally, the aim of this work is to go beyond an initial analysis of probable trends in e-business and their impacts on transport. We put forward a research framework of suitable methodologies for ongoing tracking of trends, forecasting expected impacts and identification of policy and planning levers to maximise benefits to Australia from national and global e-business activity.
Figure 4: Transport Impacts and E-Business Research Outputs.
BIBLIOGRAPHY


GLOSSARY

ABS – Australian Bureau of Statistics.

ATC – Australian Transport Council.

B2B – Business-to-Business; online transactions conducted between companies.

B2C - Business-to-Consumer; online transactions, conducted between a company and individual consumer.

CSIRO – Commonwealth Scientific Institute and Research Organisation.

e-Business – All business transactions conducted on the Internet.

e-Commerce – All transactions involved with the trade of goods and/or services, and payment conducted over the Internet.

i-Commerce – Internet Commerce; commerce transactions conducted over the Internet.

m-Commerce – Mobile Commerce; commerce transactions conducted over devices such as mobile phones.

NOIE – National Office for the Information Economy.

NTS – National Transport Secretariat.

QUT – Queensland University of Technology.

TRB – Transportation Research Board.