

Airport Metropolis Research Project 2007-2010



Final Report 2011



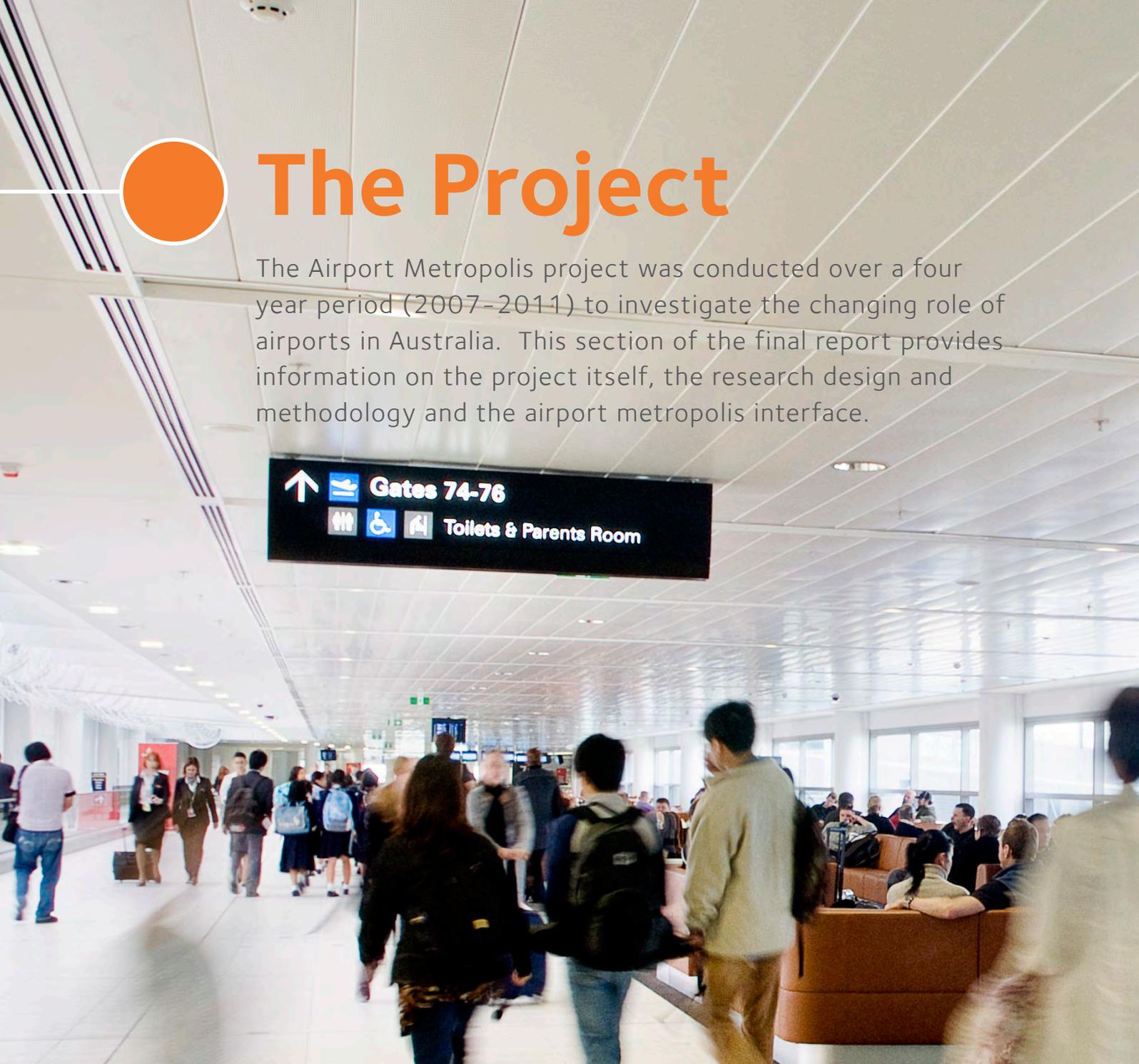
Contents

THE PROJECT	2
Summary	4
Introduction	5
Project Background	6
Research Design and Methodology	7
Understanding the Airport Metropolis Interface	10
FINDINGS	16
Major Themes	18
Key Theme: Aviation	21
The National Aviation Policy White Paper Response	22
Key Theme: Airport	27
Spatial Analysis	28
Land Use	37
Airport Metropolis Research Themes: Overview and Highlights	46
The Planning Support System	48
Key Theme: Stakeholders	58
Stakeholder Engagement	59
Key Theme: Decision-making	70
Governance	71
PROJECT OUTPUTS	80
The Airport Metropolis Colloquium 2011	82
Airport Cities, Singapore 2007	83
Professional Reports	83
The National Aviation Policy White Paper Response	85
The Stakeholder Engagement Tool	85
The Planning Support System	86
The iPad Airport Metropolis Library	87
GLOSSARY	92

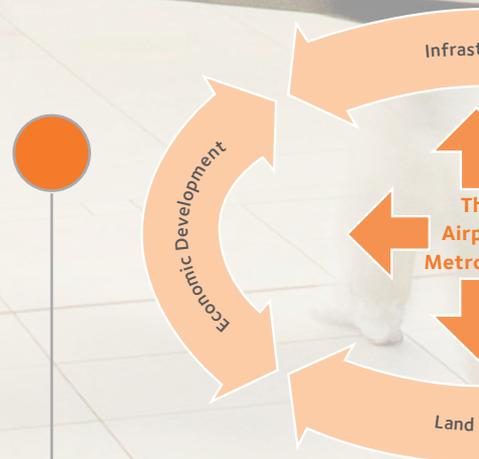


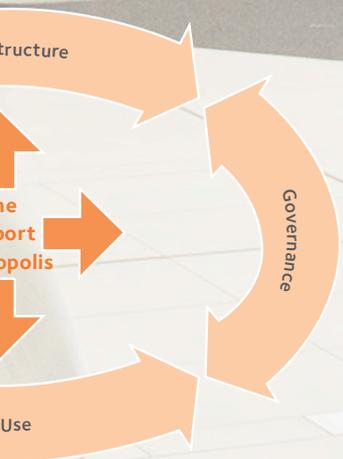
The Project

The Airport Metropolis project was conducted over a four year period (2007-2011) to investigate the changing role of airports in Australia. This section of the final report provides information on the project itself, the research design and methodology and the airport metropolis interface.



Over **1 million** aircraft movements were recorded passing through **8 capital cities from 2008-09**, predicted to grow to **1.7 million** in 2029-30.





“It is clear that the future of aviation is a complex issue and one in which the best way forward is for the triple helix of government, business and academia to work collectively and leverage from their individual strengths.”

TOWARDS A NATIONAL AVIATION POLICY STATEMENT,
RESPONSE PAPER

Summary

The Airport Metropolis project was conducted over a four year period (2007-2011) to investigate the changing role of airports in Australia. The project was funded by the Australian Commonwealth government, state and local governments, and private industry under the Australian Research Council Linkage scheme. During this period, a change in aviation policy was undertaken by the Commonwealth government and the first aviation policy in Australia was undertaken. The project was influenced by the changing environment surrounding airports, and in turn, influenced policy direction for Australia.

This report summarizes the research findings. The research focused on specific parameters of the changing role of airports in Australia and around the world. The Airport City phenomenon or the Aerotropolis construct provided the impetus for the research to investigate the role of airports in the global economy and the changing function of the airport within the urban region. At a larger scale

the project investigated the evolution and characteristics of various forms of planned and unplanned airport-metropolis relationships and related this to contemporary theories of urban form and structure that understate the role of the airport in metropolitan globalisation. An international survey was completed to assess land use planning, airport governance, and regional planning around the world.

Within Australia, three primary case studies were developed with partner airports in Brisbane, Canberra and Adelaide. Within the cases, one focus of the research resulted in the completion of two networked-based diagnostic tools: the first to assess infrastructure project governance decision making, and the second to assess effective stakeholder approaches.

Secondly, a comprehensive analysis of land use planning and stakeholder issues was completed. The changing role of airport commercial development in Australia was investigated within the Commonwealth and

Local Government planning frameworks. Three PhD students completed their research using the case studies as a basis for their empirical analysis.

Lastly, within the Brisbane case study, a Planning Support System (PSS) was developed to model transport scenarios and integrate an economic input-output model to provide an analysis of different development scenarios around the airport. The research examines the airport within the Brisbane region and integrates a number of methods and materials to develop a prototype PSS which involved primary data collection, modelling, scenario development, sustainability indicator development, policy inclusion and piloting.

The project evolved considerably from the first year to its final year. Changes were primarily driven by the movement of personnel to and from the research team, evolution in partner priorities, and the development of aviation policy. This report provides a comprehensive overview of the project and its final outputs.



Introduction

In the 10 years from 1995 to 2005 passenger movements on domestic aviation routes increased in Australia by an annual average of 4.6%, while international passenger movements increased by 5.9%. From 2002 to 2005 domestic passenger movements increased from 50 million to 68 million, representing an increase of 36%. This growth continued to 2010 at an annual rate of 5%. Over one million aircraft movements were recorded passing through the eight capital city airports in 2008–2009, and the growth rate is predicted to increase at a rate of 2.2% over a forecast period (2029–2030) to 1.7 million.¹ It is clear that the steady growth reflects a growing importance of aviation to the Australian economy and to Australians.

In addition to passenger movements, the importance of airports as global gateways of low weight/high value and just on time trade continues to grow: in 2003/04 while only 0.1% of Australia's total international freight was carried by aircraft this equated to \$65.5 billion worth of freight—some 26.4% of the total value.²

Without doubt, the role, scale and importance of airports worldwide have changed over the past decade as the result of a number of influences—most notably privatisation, commercialisation and globalisation. With the rise of the airport from a traditional transport node into a more complex form of 'airport city' or 'aerotropolis', airports are now established as an important component of the transport infrastructure of modern cities and have proven increasingly influential to urban structure. As a result, airports can no longer be managed in isolation to the metropolis they serve. This increasing complexity resulting from transport hub to major business centre has combined with increasing urban encroachment of airport boundaries to create increasingly contested spaces, often governed by separate—and competing—planning jurisdictions spanning multi-levels of government. This in turn creates increasing challenges for airport operators and the surrounding urban and regional environments. These challenges are further complicated by the conflict which often arises when airports and their surrounding regions do not coordinate their growth, planning or infrastructure.

Rather than being individual enclaves, there is in fact a symbiotic relationship between the airport and its surroundings, and increasingly governments, airport operators and regional planners are recognising the need to better manage the interfaces between airports and the regions they serve.

However, despite the change in role of the airport and the increasing airport–region interdependence our current understanding of this new airport form is insufficient to understand the complex roles and relationships now associated with airports.

It is against this backdrop that *The Airport Metropolis—Managing the Interfaces* research project was born. The Airport Metropolis Project was established to develop a theoretical and empirical basis for understanding the new airport metropolis by investigating the range of impacts, interactions and conflicts between airports and their regions; conceptualised as *interfaces* and initially identified as land use planning, economic development, infrastructure and governance. It aimed to fill the gap evident in existent work which failed to sufficiently capture the multi-dimensional aspects of airports within their regional settings or suggest better ways of managing these interactions. In particular the project sought to:

- assemble a unique, committed set of public and private industry partners representing a spectrum of airport interests in Australia and overseas;

- fill managerial and knowledge gaps in planning across the airport–region interfaces, enhancing critical evaluation of infrastructure options and facilitate political decision-making;
- integrate airport planning with broader urban and regional strategies; and
- chart the changing role of the airport metropolis in documenting and understanding the fundamental paradigm shift that is occurring within the international airport sector.

This final report for the project encapsulates the findings from the four years of ground-breaking research, conducted by five universities on three continents in partnership with 13 government and industry partners including three major Australian airports—Adelaide, Brisbane and Canberra. The report findings are drawn from the Airport Metropolis research outputs, a complete list of which can be found in the Outputs section. The principle research material referenced for each research theme is provided at the end of each section.

In addition to reporting on the emergent key areas of research—spatial planning, land use, stakeholders and governance—the report also provides an overview of the tools created to assist airports and regions to achieve better integration and planning outcomes with the Planning Support System (encompassing transport, infrastructure and economic development planning concepts) and the Stakeholder Analysis Tool.

1 DOTARS (2010) Bureau of Infrastructure, Transport and Regional Economics. (BITRE) Research Report 117.

2 DOTARS (2005) Bureau of Infrastructure, Transport and Regional Economics. (BITRE) Australian Transport Statistics. June. <http://www.btre.gov.au/statistics/general/trnstats05/ATS05.pdf>.



Project Background

Airports have increasingly become privatised, sub-regional activity centres characterised by growing complexity in land use, infrastructure, transport and stakeholder relations with considerable environmental impacts and sustainability concerns. Australia is no stranger in this regard—concerns over airport expansion and its impact are evidenced in the environmental impact statements and responses to airport master plans and most recently in the responses to the Australian Commonwealth Government's *National Aviation Policy* Green and White papers released in 2008 and 2009 respectively. In addition, the highly privatised arrangement within Australia presents unique challenges.

In 2007, while this changing role of airports in aggregate economic terms was well documented, there was an urgent need to better understand the complex roles and relationships surrounding airports and their regions. In particular a broader understanding of trends, problems, challenges and policy solutions was needed to inform public policy and industry decision-makers. In response to this the Airport Metropolis project proposed an integrating, ground-breaking multi-disciplinary investigation into the four identified interface issues of the airport metropolis. The project proposal, led by the Queensland University of Technology (QUT), was subsequently approved and received financial support from the Commonwealth of Australia's Australian Research Council's (ARC) Linkage Projects funding scheme (project number LP0775225) from 2007–2010 and additional financial and in-kind support from project partners.

Project partners

The research team comprised five universities spanning three continents: Queensland University of Technology, Southern Cross University (SCU) and the University of New South Wales (UNSW), Australia; University of North Carolina, (Chapel Hill) the United States (US); and Technische Universiteit Delft (TUDelft), The Netherlands. In addition to the multi-disciplinary research team, the project partners were a unique and committed set of public and private industry partners representing a spectrum of metropolitan, airport and regional interests in Australia and overseas, including airport operators, government departments and bodies and transport organisations.

The project received financial and in-kind support to the value of \$AUD3.8 million over the four years.

Project partners include:

- Industry: Brisbane Airport Corporation (BAC), Canberra International Airport, Adelaide Airport Ltd., Port of Brisbane Corporation, Airbiz Aviation Strategies, Airtrain Citylink, Commerce Queensland, PTV Asia Pacific Pty. Ltd., Transport and Tourism Forum and UDIA Queensland.
- Government: Queensland Department of Transport and Main Roads, Brisbane City Council (BCC), Queensland Department of State Development and Innovation, the Office of Urban Management.

Two key reference groups—the Research Advisory Committee and the Core Management Team—were established to ensure the effective management and administration of the project.

The Research Advisory Committee (RAC) acted as an advisory panel consisting of executives and senior managers from our industry partners. Their expertise and experience enabled them to provide informed advice and offered stakeholder perspectives and reviews on the functions and operations of the research, ensuring partner organisation ownership and accountability of the project.

The 2009–10 RAC Members were:

- Mark Willey, BAC
- John McArdle, Adelaide Airport
- Mark Pattermore, BCC
- Noel McCann, Canberra Airport
- Rick Morton, Port of Brisbane
- David Welsby, Queensland Transport
- Helen Gannon, Department of Infrastructure, Transport, Regional Development and Local Government
- Douglas Baker, QUT
- Kerry Brown, SCU
- Robert Freestone, UNSW

The RAC meetings were held twice a year for 5 years with 10 in total. In particular the RAC meetings provided a forum for the team to present research progress reports and test tools such as the Planning Support System (PSS) prototype and the iPad Stakeholder Engagement Tool.

The Core Management Team was a university based initiative which oversaw the implementation of the Research Plan

and Program, incorporating the Work Plan, Project Management Plan and Publication Strategy. It was primarily strategic in focus and, via the Research Director, reported on progress, areas of strength, weakness and improvement with respect to the research project.

Both reference groups consulted on the strategic and timely development of the research project.

The Core Management Team members were:

- Douglas Baker, QUT
- Kerry Brown, SCU
- Robert Freestone, UNSW

Research team

Chief Investigators:

- Prof Douglas Baker
- Prof Kerry Brown
- Prof Robert Freestone
- *Partner Investigator*:
- Prof John Kasarda

Research Team

- Assoc Prof Robyn Keast, Senior Research Fellow/Project Research Director
- Dr Muhammad Nateque Mahmood, Senior Research Associate (replacement for Dr Arron Walker in the final year of the project)
- Dr Md. Kamruzzaman, Lecturer
- Anne Krupa, Project Coordinator
- Postgraduate Students
- Nicholas Stevens, PhD Land Use Planning
- Timothy Donnet, PhD Governance
- Robbert Kivits, PhD Airport Governance, Stakeholder Engagement

Team changes throughout the course of the project

The Airport Metropolis Project experienced a number of member changes to the research team over the course of the project. These included: a spatial analysis PhD position which remained unfilled; the resignation of several Chief Investigators; and the resignation of the Postdoctoral Research Fellow in 2010. However, despite these changes the project has delivered relevant and practical research, particularly in regards to the delivery of the PSS and stakeholder engagement tools.

Research Design and Methodology

The four-year project was divided into four overlapping components with the primary role of the project is, from a multi-disciplinary perspective, to investigate and make an integrated response to four major interface issues of the Airport Metropolis: economic development, land use planning, infrastructure and governance.

The first component—Spatial Analysis—develops the theoretical concept of the airport metropolis and its changing role in the urban pattern. The second—Interfaces—examines specific areas of the airport metropolis interface (infrastructure, economic development, governance and land use). Its design incorporates embedded and holistic case study analyses using content analysis, interviews with selected stakeholders and surveys to define the airport metropolis, interfaces, and the drivers and dynamics of the system. A third theme that has emerged since the project's conception is stakeholder engagement, the focus of which is on mechanisms to identify key stakeholders and the development of strategic management tools. The Planning Support System (PSS) is the fourth component that has evolved over the last year to focus on spatial analysis and scenario building to assist decision-makers (see Figure 1).

While individual research projects carried out as part of the project each had their own methodology, the project overall adopted a mixed-method approach involving qualitative and quantitative methods to interrogate each of the research themes including case study

analyses, in-depth interviews and stakeholder workshops combined with a comprehensive document analysis. The resulting data was analysed using social network analysis (SNA) and thematic and computer aided analysis (leximancer). An overview of the primary research and analysis methods are provided below. For more detailed descriptions please consult individual project written outputs (listed in the Outputs section of this report).

Methods

Case studies

A case study methodology utilising three holistic Australian case studies was used to evaluate the context and impact of modern Australian airports as catalysts for economic and social prosperity within a regional context. The four substantive interface areas (land use planning, economic development, infrastructure and governance) were investigated across three holistic Australian case studies—Brisbane, Adelaide and Canberra (all industry partners of the AMP)—with embedded case study research of international airports from Asia, North America and Europe for comparative analyses. Schiphol Airport, Amsterdam, was also developed as an in-depth, detailed, holistic case study as an example of an advanced airport metropolis.

The findings of these case study analyses underpin much of the AMP research in relation to the changing role of airports and the interface issues.

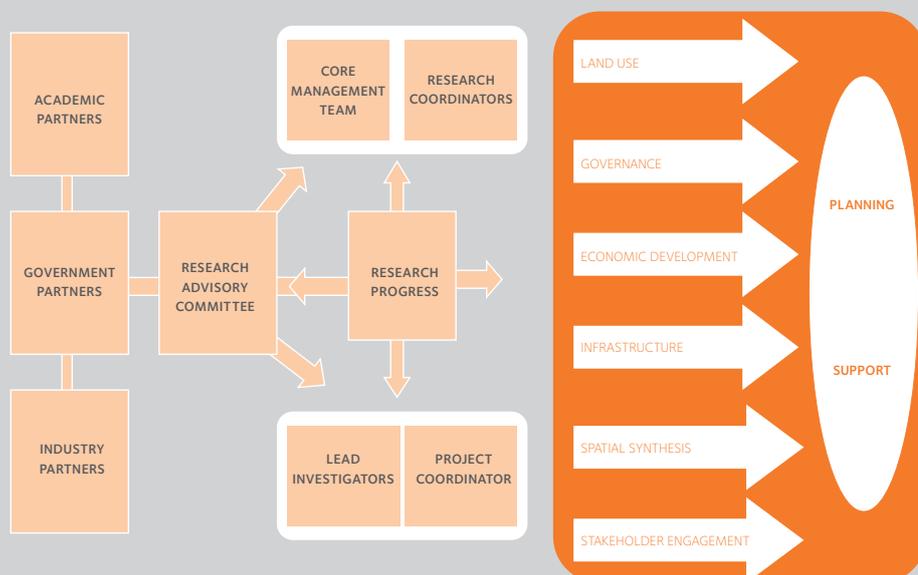
In-depth interviews

In addition to the insights gained through the Australian and international case studies, key informants were used at various stages of the project as core sources of information from within governance networks of each airport region including airport managers, airport representatives as well as relevant stakeholders such as local planning authorities, government representatives and, in one key project, stakeholders in major on- and off-airport infrastructure development projects. These informants provided considerable information about the history and needs of past and current airport arrangements as well as project-specific governance arrangements.

Stakeholder workshops

Engaging with project industry partners was a key component of the research project. In order to better understand industry issues from an industry partner perspective a series of workshops were held with stakeholders to discuss a range of issues related to the research program. In total five primary workshops were held: two in Brisbane, two in Adelaide and one in Canberra. The outcomes from these workshops formed the basis for a large number of individual research projects throughout the life of the Airport Metropolis Project. A brief overview of the purpose of each workshop and the key outputs where applicable are provided in Table 1 (over).

Figure 1. The Airport Metropolis Project Structure



The Airport Metropolis Project Structure:

The primary role of the project was to investigate and make an integrated response to four major interface issues of the Airport Metropolis.

While individual research projects had their own methodology the project overall adopted a mixed-method approach involving qualitative and quantitative methods to interrogate each of the research themes.

Table 1. Overview of AMP Stakeholder Workshops

Workshop	Purpose	Outcome
Brisbane Stakeholder Workshop, September 2006	Workshop held with all stakeholders to discuss issues prior to the project beginning.	Workshop discussions used to formulate the project research agenda
Adelaide Workshop, <i>Airport Metropolis: Managing the Interfaces Workshop</i> , April 2008	This workshop was intended as an opportunity for stakeholders to examine and review the complexity of relationships relating to airport and regional planning in the vicinity of Adelaide and Parafield airports. In addition it was hoped that this engagement would yield serious reflections on the key issues and stakeholder priorities for cooperative airport and regional development. The workshop explored the relationships between the development of an airport and its economic, land use, infrastructure and policy interfaces with the surrounding region.	This workshop culminated in the report <i>Adelaide 2008 Workshop Questionnaire Results</i> . The findings were used to inform individual research projects in stakeholder and land use PhD's.
Brisbane Workshop, <i>Airport Metropolis: Managing the Interfaces Workshop</i> , August 2008	The intention of this workshop was twofold: for researchers to present interim results from the project to all our research partners; and to workshop strategies and objectives to undertake cooperative and integrated land use planning for airport and regional development in the vicinity of Brisbane Airport.	The findings were used to inform land use PhD research
Canberra workshop, <i>Airport and Regional Development Research Forum</i> , December 2008	The research forum was intended as an opportunity for airport and regional stakeholders to examine and review the complexity of relationships relating to airport and regional planning in the vicinity of Canberra Airport. It was hoped this engagement would yield serious reflections on the key issues and stakeholder priorities for cooperative airport and regional development.	The findings were used to inform PhD research in the land use planning interface.
Adelaide Master Plan Workshop, <i>Beyond Consultation Towards Collaboration</i> , July 2009	The purpose of the workshop was to brief core stakeholders on the Draft Master Plan and provide the opportunity for feedback and discussion on the future of the airport as part of a broader and ongoing strategy of community engagement by Adelaide Airport Limited. The desired outcomes were: identification of areas of agreement with the Draft Master Plan; identification of areas of uncertainty or misunderstanding; greater understanding of the future vision for Adelaide airport; and engendering of a shared commitment to the role and significance of Adelaide Airport.	This workshop culminated in the final report: <i>Adelaide Airport: Integrated Airport Master</i> . The findings were used to inform project research and support the Adelaide Airport Master Plan.



Stakeholder workshops
Stakeholder workshops were an integral part of the research project and provided a wealth of information.

Conducted in Adelaide, Brisbane and Canberra, the workshops allowed the team to inform stakeholders about the project and provided an opportunity for stakeholders to examine and review the complexity of relationships relating to airport and regional planning.

Computer-aided thematic analysis

To aid in the determination of themes and offer both thoroughness and validity, the Leximancer computer program was employed. Leximancer draws on both thematic (conceptual) and relational (semantic) analysis to inform investigators of the strength of association and semantic similarity between concepts. Leximancer clusters together concepts that occur in

very similar semantic contexts. It also uses this information to create a picture or map of the relational (semantic) characteristics of the concepts. This visualisation technique highlights the important concepts in the data set and the relationships between these concepts.

In particular Leximancer was used to determine and confirm the themes for the Final Report by specifically considering

all research material (both excluding and including two major work outputs these submitted in fulfilment of the requirements for the award of the degree Doctor of Philosophy) produced by team members. The results can be found in the Findings section of this report.

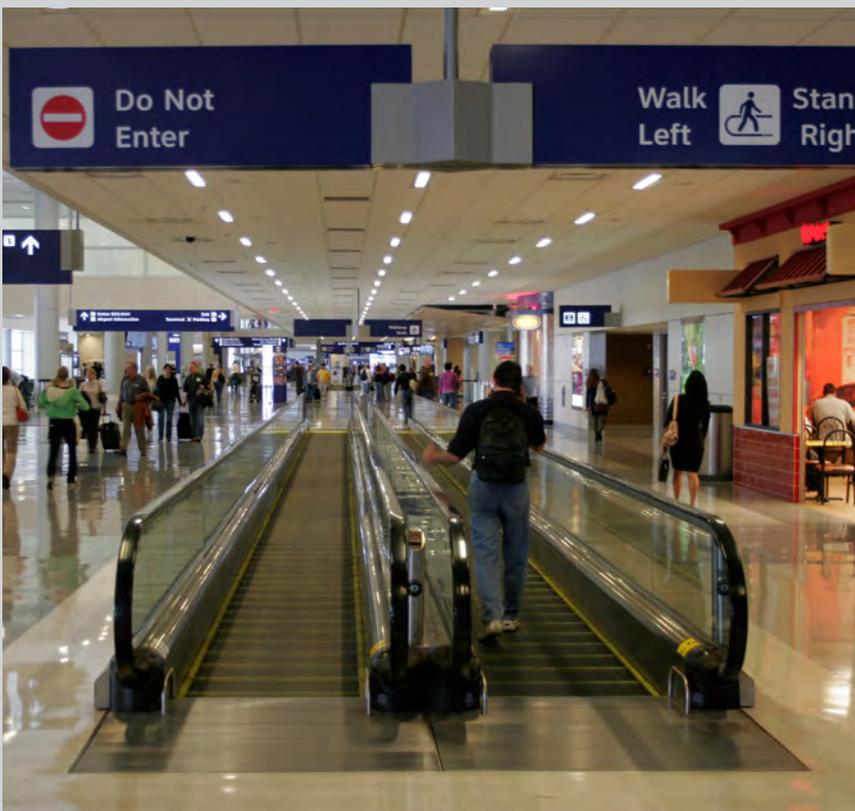
Understanding the Airport Metropolis Interface

Airports are a vital component of the transport infrastructure of modern cities and have proven increasingly influential in shaping urban form and structure. The growth of cities has also impacted on airports, their scale and operations.⁹ This reciprocity of impacts has intensified in the last 30 years with the expansion in air travel and as a result of the forces of privatisation, corporatisation and globalisation.¹⁰ Market forces, corporate strategies and government policies have given rise to new types of airports far more complex and interactive in their metropolitan settings than the isolated landing fields of the past.¹¹

The resultant changes in Australia's aviation scene have been profound. Twenty-two of Australia's major airports were privatised between 1997 and 2002 under a 99 year lease arrangement with the Australian federal government. These lease arrangements, under the *Airports Act 1996* (the Act), have given control of all airport development to the airport-lessee but under an approvals systems controlled by the federal government, with consultative reference to the planning policies of state and local governments. Many of these airports have become major business centres and are well placed to advance

opportunities for broader commercial development. In the process, airports have shifted from public good transport interchange nodes to profit-orientated commercial ventures where aviation revenue is only a part of airport business. As a result of such changes and with traditional environmental impacts being an ongoing issue, new challenges are being posed for both airports and their surrounding urban and regional environments.¹²

As a response to these issues, the project team set out to consider ways of looking at the development and impact of airports within their urban and regional context based on the concept of the interfaces that exist between airports and their surrounding metropolitan environment. Underlain by notions of sustainability, this conceptual model sought to capture the many issues generated by the modern airport within a robust framework to aid description, understanding and research applications. Four fundamental interfaces were initially identified: economic development, land use, infrastructure and governance, described below in more detail along with the sustainability criteria deemed critical to operationalising this holistic research approach.



- 9 Kasarda, J.D., 2001. From airport city to aeropolis. *Airport World* 6, 42–47; and Schaafsma, M., Amkreutz, J., Güller, J., 2008. *Airport and City – Airport Corridors: Drivers of Economic Development*. Schiphol Real Estate, Schiphol.
- 10 Graham, A., 2003. *Managing Airports*, second ed. Elsevier, Oxford. Conway, M., 1993. *Airport Cities* 21. Conway Data, Atlanta.
- 11 Conway, M., 1993. *Airport Cities* 21. Conway Data, Atlanta; and Güller, M., Güller, M., 2003. *From Airport to Airport City*. Litogama, Barcelona.
- 12 Freestone, R., Williams, P., Bowden, A., 2006. Fly buy cities: some planning aspects of airport privatisation in Australia. *Urban Policy and Research* 24 (4), 491–508.

Current pressures reshaping Australian Airports

The ebb and flow of aviation traffic lies at the heart of airport development issues. The scale of passenger and freight movement at Australian airports has increased significantly in recent decades—a trend likely to continue an upward projection in line with global trends despite recent economic shocks and environmental challenges. The expected growth of passenger traffic internationally is forecast to reach 5 billion by 2010, and surpass 9 billion passengers annually by 2025. The highest global passenger growth of 7.9% (2005–10) is forecast for the Asia Pacific region. The volume of global air freight is expected to outperform the passenger market with a tripling to 214 million tonnes by 2025. The Asia Pacific region is again forecast to grow the most, averaging 6.5% per annum.¹³

In addition, with the predicted rise in freight and passenger movement, fuel price volatility and the introduction of an emissions trading scheme add to the fundamental un-sustainability of the industry.¹⁴ Australian airports maintain they are relatively modest producers of greenhouse gases and indeed distinguish between the business of aviation (and associated emissions impacts) and that of airport operations and airport commercial development within their legislatively mandated environmental strategies.¹⁵

Another issue of concern for airport operations worldwide is the encroachment of residential development into approach and departure flight paths. Pressures within urban and regional planning systems to support medium density development are adding further to the conflict between airports and local communities.¹⁶

This type of conflict is one of many complex issues that continue to shape airport–regional development. As a result a new set of interdependent factors needs to be recognised, including:

- Understanding the catchments and catalysts for industrial, commercial and residential development within airport regions.
- Compatibility of land uses through policy and plans recognising the motivation of all stakeholders and the needs of the broader community.
- Regional direct, indirect and catalytic economic impacts and dependence.
- Recognising and understanding expectations of immediacy and equity in the delivery of goods, services and people.



CASE STUDY

The conflict between airports and developers has been illustrated most clearly at Canberra Airport, located close to the border between the Australian Capital Territory (ACT) and the state of New South Wales (NSW). While the growth of office and retail space promoted by privatisation has seen the airport factored into the metropolitan spatial plan for the national capital as a mixed-use activity centre, there is no cross-border agreement to bind local and state planning in NSW into an airport-orientated spatial framework. A dispute between the Village Building Company (VBC) and Canberra Airport Ltd. (CA) centred on a proposed residential expansion in the town of Queanbeyan, just across the NSW border. Village's development proposal involved a residential subdivision of more than 4,000 homes in the new suburb of Tralee on a site which the airport wanted to remain residential-free as part of a proposed (50 year) ultimate capacity aviation forecast for Canberra Airport creating a high noise corridor in response to the location of arrival and departure flight paths. Air services Australia (the government corporation providing air navigation and airside aviation services) endorsed the ultimate capacity aviation forecast for Canberra Airport. The developer commenced proceedings in the Federal Court against CA and Airservices Australia (ASA) alleging that CA and ASA (it) had engaged in misleading or deceptive conduct in trade or commerce, in contravention of s52 of the Trade Practices Act 1974. The essence of the complaint was that CA had inflated its estimates of future noise levels with a view to inhibit future planning approvals so as to limit possible consequential constraints upon the airport's operations. The Federal Court and the Federal Court of appeal rejected VBC's case. The developers then argued that the proposed development fell outside the published noise contours and was therefore well within the land use planning guidelines. Canberra Airport, with the support of Airservices Australia, counter-argued that many complaints about noise still come from residents outside these boundaries and that the development should not proceed.¹⁷ The public campaign involved full and half page advertisements within the Canberra Times from both parties.¹⁸ In December 2008 the NSW Government endorsed Queanbeyan's residential and economic strategy paving the way for residential planning by the Queanbeyan Council to proceed at Tralee. Queanbeyan City Council has now drafted a rezoning of the land for residential, commercial and recreational use. The Draft rezoning is with the NSW Planning Minister for decision. The NSW planning minister is in consultation with the Federal Minister for Transport, who has publically stated that the federal Govt does not support the rezoning of Tralee for residential purposes under the flight paths.

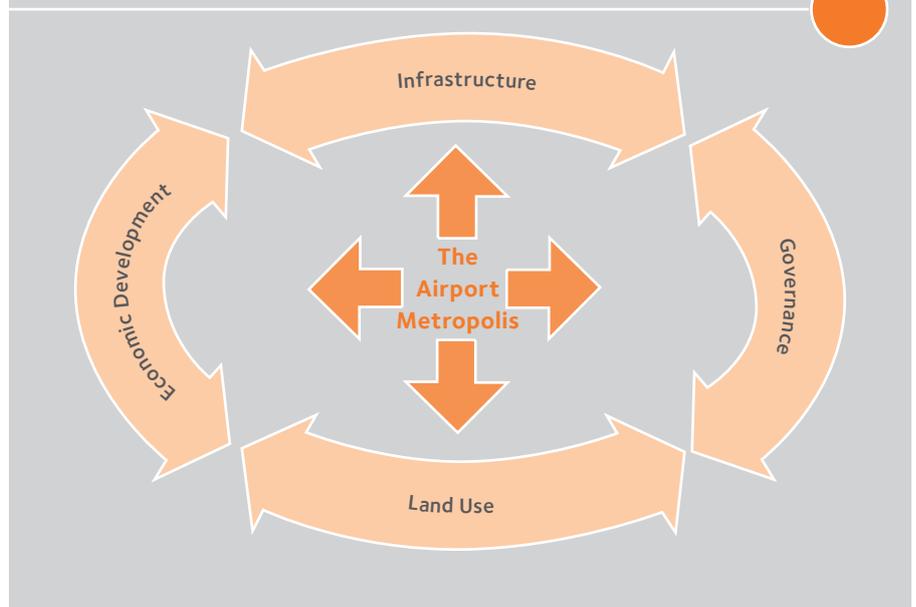
- Managing the strategic, financial, compliance, economic and operational risks associated with airport and regional relationships.
 - Understanding the impacts and trade-offs of increasingly shared decision-making through public and private sector partnerships.
 - Coordination of three tiers of government policy in consideration of community needs and expectations.
- 13 Airports Council International (ACI), 2007. Global Traffic Forecast 2006–2025. ACI Traffic Forecast Advisory Services. <http://www.airports.org/aci/aci/file/Press%20Releases/2007_PRs/ACI_Forecast_Executive_Summary.pdf>
- 14 Whitelegg, J., 2005. *The Economic Impact of Bristol International Airport*. Eco-Logica Ltd., Lancaster, UK.
- 15 Australia Pacific Airports (Melbourne) (APAM), Environment Strategy. Victoria, Australia; and Westralia Airports Corporation (WAC), 2004. *Perth Airport Environment Strategy*. Western Australia, Australia.
- 16 Uyeno, D., Hamilton, SW., Biggs, AJ., 1993. Density of residential land use and the impact of airport noise. *Journal of Transport Economics and Policy* 27(1), 3–18.
- 17 Federal Court of Australia (FCA), 2004. Village Building Company Limited v Canberra International Airport Pty Limited (No 2) FCA 133 <<http://www.austlii.edu.au/cgi-bin/sinodisp/au/cases/cth/FCA/2004/133.html?query=The%20Village%20-Building%20Company>>
- 18 May, M., Hill, S., 2006. Questioning airport expansion—a case study of Canberra International Airport. *Journal of Transport Geography* 14(6), 437–450.

A new research and policy framework: The Airport Metropolis Interface Model

In response to these factors, a new framework for research and policy is needed to identify and evaluate the changing role of major Australian airports in the regional context. In particular, a greater appreciation is needed of how airport and region must be considered as united, interdependent and integrated.¹⁹ An integrative model is required which recognises and attempts to understand the nature and importance of international, national, regional and local drivers of airport and regional growth and the need for sustainable balanced development given new corporate, public and institutional governance processes. The interface model initially developed by the project team draws on the meta-concept of interfaces of an 'airport metropolis' as an organising device for comprehending and recasting the complexity and planning aspects relating to the physical and institutional change associated with Australian airports as urban activity centres. The airport metropolis is the synergistic coupling of core airport functions and airport-orientated activities in a wider region. The focus of the framework is to provide a robust structure to assist researchers and policy makers to better apprehend airport–regional conflict and opportunity. By considering these issues while taking into account normative sustainability criteria, the research team aimed to clearly interpret the interactions that typify major airports, allowing for comparative analyses across a range of airport contexts and provide frameworks for research and policy development. A visual illustration of the initial model—which was subsequently redeveloped as a result of final research findings (discussed in the next section) can be seen in Figure 3.

The model recognises four interface domains as integral to the concept of an airport metropolis: Economic Development, Land Use, Infrastructure and Governance. The development of the interface areas and the sustainability criteria (outlined in detail below) were informed by five workshops held with Australian airport and regional stakeholders during 2008 in Adelaide, South Australia; Brisbane, Queensland; and Canberra, Australian Capital Territory.

Figure 3. The Airport Metropolis Interface Model



Economic development

Airports are widely acknowledged as having significant economic impacts. In Australia, all airports undertake economic impact studies to demonstrate the virtues of strategic airport investment in airport facilities and infrastructure, assess new commercial projects, and meet regulatory approvals and periodic reporting requirements. It is increasingly important for all stakeholders to understand the economic impacts airports may provide as generators of direct, indirect and induced economic activity, and as catalysts in supporting wider business and tourism activity.²⁰ The economic interface recognises airport and regional potential alongside other economic anchors such as universities, hospitals, national parks, arts and cultural centres which provide the intellectual, cultural, natural and civic assets of the region.²¹ Through strategic cooperation, economic benefits may be leveraged for both the airport and the region by nurturing and providing for appropriate commercial development and linkages in line with regional assets. When considering the economic development of the airport–region, there is a need to understand the optimal relationship between airport–related investment into infrastructure, office space, commercial and retail facilities,

and the surrounding region's present and potential economic prosperity. New models of cooperative governance need to be clearly articulated to establish the optimal capacities and trajectories of airport and regional investment over time. Through the recognition of the interdependencies of the interfaces we may be better able to determine economic activity and land uses which add more value being located at or near the airport than elsewhere. All stakeholders need to support, recognise and understand the importance of cooperative airport and regional economic development to foster equity and resilience. The balance of interface dimensions also constitute counterweights by which estimates of the socio-economic value of airport development can be most accurately assessed.²²

- 19 Stevens, N., 2006. City airports to airport cities. *Queensland Planner* 46 (1), 37. Wells, A., Young, S., 2004. *Airport Planning and Management*, fifth ed. McGraw-Hill, New York.
- 20 Graham, A., 2003. *Managing Airports*, second ed. Elsevier, Oxford. Conway, M., 1993. *Airport Cities* 21. Conway Data, Atlanta; and Wells, A., Young, S., 2004. *Airport Planning and Management*, fifth ed. McGraw-Hill, New York.
- 21 Adams, C., 2003. The meds and eds in urban economic development. *Journal of Urban Affairs* 25 (5), 571–588; and Maurrasse, D., 2007. *City Anchors: Leveraging Anchor Institutions for Urban Success*. CEOs for Cities, White Paper. September.
- 22 Whitelegg, J., 2005. *The Economic Impact of Bristol International Airport*. Eco-Logica Ltd., Lancaster, UK.

Land use

An integrated approach to land use planning for airports may trigger economic development and provide focus for the establishment of innovative and entrepreneurial approaches to cooperative governance. However at present the interface divides two separate planning systems. Considering the interdependencies of the interfaces can help uncover alternative viewpoints and provide opportunities which may otherwise be neglected by dependence on historical practices. Cooperative land use interface planning in particular will assist airport master planning to evolve from isolated statements of on-airport development to visions which interconnect with broader statements of local, city, regional and national planning intent. Similarly, state and local land use planning can react to airport planning issues; urban and regional planners may begin to recast the notion of compatibility and conceptualise air noise contours as not just limiting residential development, but providing a strategic opportunity for other types of compatible (noise tolerant) development benefitting from a near-airport location. This might facilitate the planning of industrial and commercial corridors associated with the airport.

Infrastructure

Infrastructure networks of all kinds determine how a city functions and how it is defined socially, technically and politically; they do not operate in isolation and a change in one is always reflected and reverberated through others.²³ The airport is dependent on various utility networks (power, water, sanitation, ICT) for its ongoing operation and at the same time is an integral part of a city, regional and national transport infrastructure networks. Airports require the assurance of continuity in supply chains and generic capacities to withstand disturbance yet remain functional.²⁴ Strong evidence exists internationally that as airport-related networks expand in size and interactive complexity, they become more vulnerable to catastrophic failure which can be often triggered by small and seemingly insignificant disturbances.²⁵ For example, traffic incidents on key Australian arterial roads are recognised as having a dramatic impact on access to the airport for air passengers.²⁶ The regional commercial strategies of airports are also recognised as having the potential to imperil airport access as transport connections are increasingly congested with retail and commercial traffic.²⁷ The interface evaluation of transport linkages allows for greater understanding of network-wide impacts by all stakeholders. If new and upgraded transport linkages around

Australian airports allow the movement of people and goods further and faster, this increases the airport's catchment. Increased capacity, in turn, may have significant socio-environmental impacts at the local and regional levels, such as on the availability and value of land. The successful operation of airports hinges on quality land-based regional access.

The effective delivery of the infrastructure network requires a clear understanding of land use activity patterns within the surrounding metropolitan region. Past attempts at modelling the interaction between land use and transportation networks have produced data-intensive models that are nonetheless limited in scope and interaction.²⁸ Consideration of airport and regional needs requires broad strategic options where the interrelationships between transportation networks and land use activities are modelled through the use of a transportation demand approach used iteratively with appropriate economic development, land use and governance inputs. Changes in the intensity of land use and infrastructure may occur very quickly as a consequence of external shocks (such as rising fuel costs), although the planning and the provision of both occur over long time horizons. The extended planning time frame for infrastructure provision and large investment costs pose considerable challenges for coordination strategies.



- 23 Graham, S., 2000. Introduction: cities and infrastructure networks. *International Journal of Urban and Regional Research* 24 (1), 114–119; Graham, S., Marvin, S., 2001. *Splintering Urbanism: Networked Infrastructure, Technological Mobilities and the Urban Condition*. Routledge, London; and O'Connor, K., 1998. The international air linkages of Australian cities 1985–1996. *Australian Geographical Studies* 36 (2), 143–155.
- 24 Ferreira, L., Stevens, N., Baker, D., 2006. The new airport and its urban region: evaluating transport linkages. In: *Proceedings International Conference of Transport and Traffic Studies*, Xi'an, China.
- 25 Lagadec, P., 2004. Crisis: a watershed from local, specific turbulences, to global inconceivable crises in unstable and torn environments. In: *Future Crises, Future Agendas: An Assessment of International Crisis Research International Workshop*, November 24–26, Nice, France.
- 26 Charles, P., Ferreira, L., 2006. *Costs of Major Traffic Incidents: Stage 1 Report*. Prepared for Queensland Department of Main Roads. Brisbane (Unpublished).
- 27 *Metropolis International Congress (MIC), 1999. Final Report. Commission 1: Airports and their Surrounding Zones as Catalysts of Metropolitan Development*. Barcelona; and SGS Economics Development at Canberra International Airport. (Prepared on behalf of the Chief Minister's Department), Australian Capital Territory Government, Australia.
- 28 Waddell, P., Ulfarsson, G., Franklin, J., Lobb, J., 2007. Incorporating land use in metropolitan transportation planning. *Transportation Research Part A: Policy and Practice* 41 (5), 382–410; and Badoe, D.A., Miller, E.J., 2000. Transportation and land use interaction: empirical findings in North America, and their implications for modelling. *Transportation Research Part D* 5 (4), 235–263.

These challenges may be better understood through the interface approach to airport development providing consistency and understanding of the issues by all stakeholders.

Governance

In the interface model, governance covers all aspects of airport operations that are the result of decision-making by both the airport operator (private) and administering authorities (public) including airport ownership; the commercialisation and privatisation of airports; consultative procedures and conflicts; airport and air transport security; legislation and policy; institutional arrangements and public private partnerships. The changing governance structures impacting airport ownership and operations are dynamic and have changed considerably in the past decade worldwide. A previous comprehensive evaluation of how various ownership forms and institutional structures affect the performance major airports worldwide highlights the sensitivity of airport efficiency and profitability to governance arrangements.²⁹ Traditional planning and administration of airports is being challenged where market mechanisms provide public goods. The role of the public has similarly evolved with these market-based reforms from that of participant to consumer.³⁰ The interface evaluation of governance issues acknowledges that stakeholder relationships have been recast in the wake of the commercialisation and privatisation of public infrastructure. There has been a fundamental change in the determination of decision-making which many stakeholders (public, private and community) do not fully recognise or appreciate. The emergence of consortiums of diverse interests as global airport operators presents challenges for the management of national assets—especially at the regional and local levels.

A larger context is required to understand the role of governance and how institutional arrangements need to be fashioned to support the airport metropolis within the region. In Australia, much conflict involving airports may be attributed to the legislative and policy arrangements under which airports are managed. Both the private airport operators and the local and state governments feel that the legislation could go further, albeit in different directions, in representing their respective interests. Both want the legislation to determine the appropriate roles of all tiers of government in relation to market discretion and the appropriate roles for airports in relation to social responsibilities.

Issues of governance are fundamental in considering the changing role of Australian airports, and in particular understanding and addressing present and future economic development, land use and infrastructure conflicts between the airport and the region. Effective governance and shared decision-making through consistent frameworks has the potential to ensure appropriate administration and delivery of those aspects and values of the changing airport that are universally shared and interdependent. The consensual mitigation of negative impacts and promotion of positive opportunity across the interfaces is only possible through improved governance and stakeholder relationships (this latter component was subsequently recognised as a research topic in its own right and is reported on later in the Findings section of this report).

Sustainability and airport development

A primary goal in developing the conceptual framework of the interface model for airport regions was to affect management and governance practices to promote a balanced and more sustainable approach to airport development. Sustainability,

although a much maligned concept and suffering from manipulation, is beneficial in assisting with establishment of benchmarks and indicators to move forward the normative objectives of the interface dimensions toward operational constructs. Each of the four substantive interface areas were recognised to be underpinned by multiple considerations impinging on the functioning and management of the Australian airport metropolis. These considerations influence and impact on the sustainability of the entire urban agglomeration. The interface areas provide a framework for the integration of best practice sustainability principles that can be organised into four criteria commonly found in sustainability studies: economic efficiency, environment, coordination and community.³¹

- **Economic efficiency**—is conceptualised as denoting the strategically-focused innovative evolution of economic activity that maintains and enhances a region's international competitive advantage in high value-adding growth and core industrial sectors and their support industries.
- **Environment**—the maintenance and enhancement of physical environmental systems in ways that permit productive use for existing and future generations.
- **Coordination**—institutional evolution mechanisms that permit and facilitate necessary changes in social structures in response to ongoing changes in global, technical and bio-physical environments.
- **Community**—resilient social and physical environments that maintain and create interactive and cooperative behaviours that enhance individuals' senses of worth, place, community and well-being.

Integrated within this framework, these criteria better capture the multivalent nature of the interfaces and the possibilities for grounding them in specific goals and outputs in ways which they might be operationalised.³²



Issues of Governance

Governance is vast becoming the key area for debate as to how to progress the practices of planning and development.

Effective governance and shared decision-making through consistent frameworks has the potential to ensure appropriate administration and delivery of those aspects and values of the changing airport that are universally shared and interdependent.

29 Oum, T., Adler, N., Yu, C., 2006. Privatisation, corporatization, ownership forms and their effects on the performance of the world's major airports. *Journal of Air Transport Management* 12 (3), 109–121.

30 Blanchard, L., Hinnant, C., Wong, W., 1998. Market based reforms in government – toward a social subcontract? *Administration and Society* 30 (5), 483–512.

31 May, A., 2003. *Developing Sustainable Urban Land Use and Transport Strategies: A Decision-makers' Guidebook*. European Commission, Community Research Institute for Transport Studies, University of Leeds.

Conclusion

The interface model developed by the research team draws from the Australian experience to re-conceptualise the changing and complex role of airports in the urban environment. The model was used as both a heuristic device to identify and organise key policy debates and as a potential decision-making tool for sustainable decision-making. The strength of the conceptualisation of the issues of the airport metropolis as a series of interfaces, and the potential application of cross-cutting sustainability criteria, lies in recognising and examining the relationships

between, and impacts of, multiple systems. The research that ultimately flowed on from the use of this model was directed at better understanding these systems. The overriding imperative was to move airport planning assessment beyond the compartmentalised analysis of issues to provide a robust solution acknowledging the conflict and opportunities of the new 'airport metropolis' of the early 21st century.

As can be seen from the following Findings section, this approach, at the very least, resulted in a clearer appreciation and interpretation of the interdependencies

that typify major airports, allowing for comparative analyses across a range of airport contexts. The research outcomes resulted in further development of the model, adding stakeholder identification as an additional key interface, as well as recognising governance as not just simply a component of the interface model but rather a key integrating component in addition to its significant role, critical to all airport–region interfaces.

32 Wijnen, R., Walker, W., Baker, D., 2008. Policy Analysis of an Airport Metropolis. REAL CORP 08, Vienna International Airport, May 2008.



The Airport Metropolis Project

The project evolved considerably from the first year to its final year. Changes were primarily driven by the movement of personnel to and from the research team, evolution in partner priorities, and the development of aviation policy.

Working closely with stakeholders — industry and research partners — the project has resulted in a clearer appreciation and interpretation of the interdependencies that typify major airports.

Primary research material:

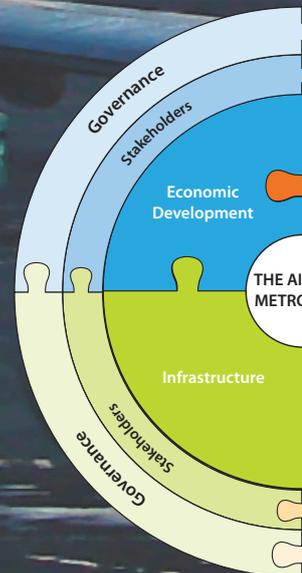
Stevens, Baker, & Freestone 2010 'Airports in their urban settings: Towards a conceptual model of interfaces in the Australian context' *Journal of Transport Geography*, 18(2), pp. 276–284

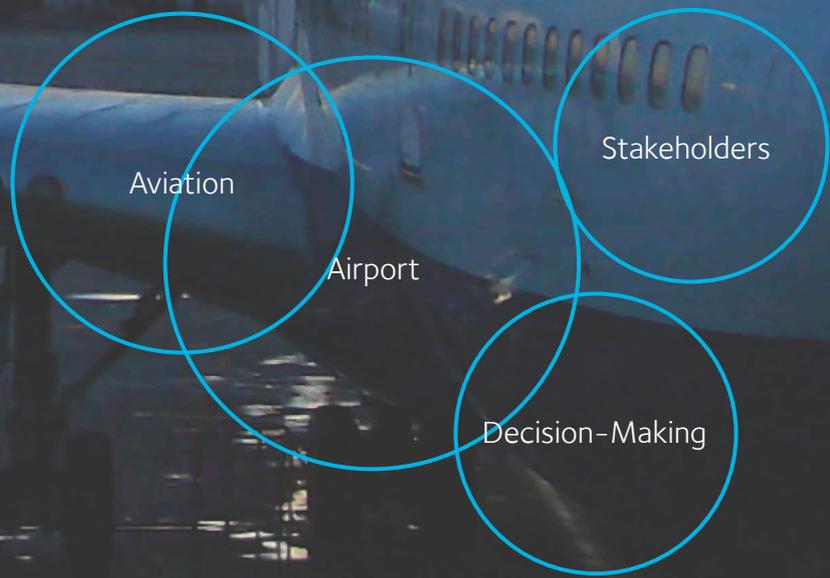
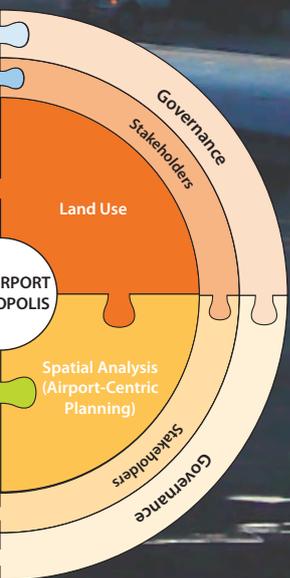


Findings

The Airport Metropolis project findings present a complex picture of the airport–region interface. In addition to the interface areas originally identified in the Airport Metropolis Interface Model an additional ‘Stakeholder’ theme emerged and governance was recognised as a major theme underpinning all the other interfaces.

There is an emerging realisation of the importance of sustaining a **safe, profitable, environmentally sensitive and equitable airport business** understood as an **evolving urban hub** in its own right.





Major themes

From 2007 through to 2011, the research collaboration produced 72 written outputs including 13 peer reviewed journal articles, 9 book chapters, 14 peer reviewed conference proceedings, 5 professional and other publications, 3 issues papers and 3 PhD theses (*The governance of inter-organisational decision-making, Integrated stakeholder analysis: A methodology applied to Australian capital airports, and Land Use Planning and the Airport Metropolis*) currently in the final stages of submission. The project also delivered 39 presentations including 5 workshops.

The data drawn from the research efforts presents a complex picture of the airport-region interfaces. In particular a key finding was the understanding that rather than being a separate interface issue, governance (decision-making) is in fact an *integrating* issue that spans spatial analysis, economic development, infrastructure and land use planning. Linked to decision-making is stakeholder analysis and engagement. While stakeholders are often seen as a homogenous group with similar interests, findings show that to achieve integrative

planning and the successful planning and implementation of airport plans requires a greater understanding of individual stakeholder interests and motivations in order to successfully engage and work towards a more collaborative, rather than consultative, approach.

This increased understanding of the complex interactions are highlighted in the revised Airport Metropolis Interface Model (Figure 4).

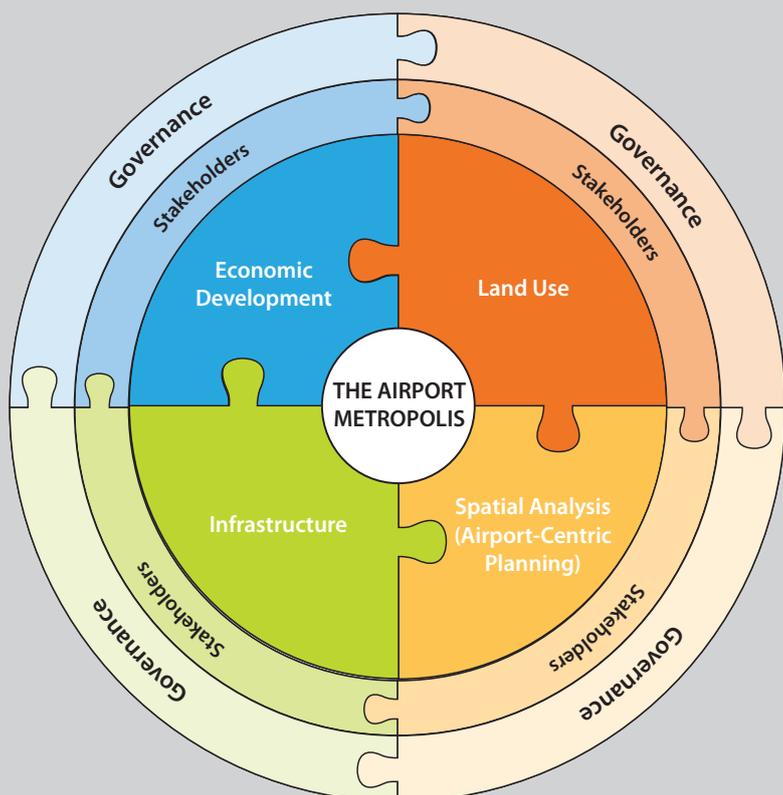
The results of the Leximancer analysis for all the Airport Metropolis research projects support these findings. Table 2 outlines the major themes and corresponding key words while Figure 5 illustrates the linkages between topics.

As can be seen from Figure 5, two of the four key themes overlap with the airport theme—aviation and decision-making—while stakeholders sits closely with the airport theme. Figures 6 to 8 illustrate varying degrees of analysis.

Table 2. Leximancer analysis results—major themes and keywords for all research material

Key theme	Keywords
Aviation	Aviation, industry, aircraft, noise, transport, major, airports, business, economic, commercial, growth, future, areas, land use
Airport	Airport, government public, land use, regional, issues, management, airports, business, major, transport, economic, commercial, growth, development, infrastructure, developments, areas, future, area, policy, planning, local, community, social, approach
Decision-making	Decision-making, interests, actors, project, governance, strategic, network, information, process
Stakeholder	Stakeholders, analysis, approach

Figure 4. Revised Airport Metropolis Interface Model

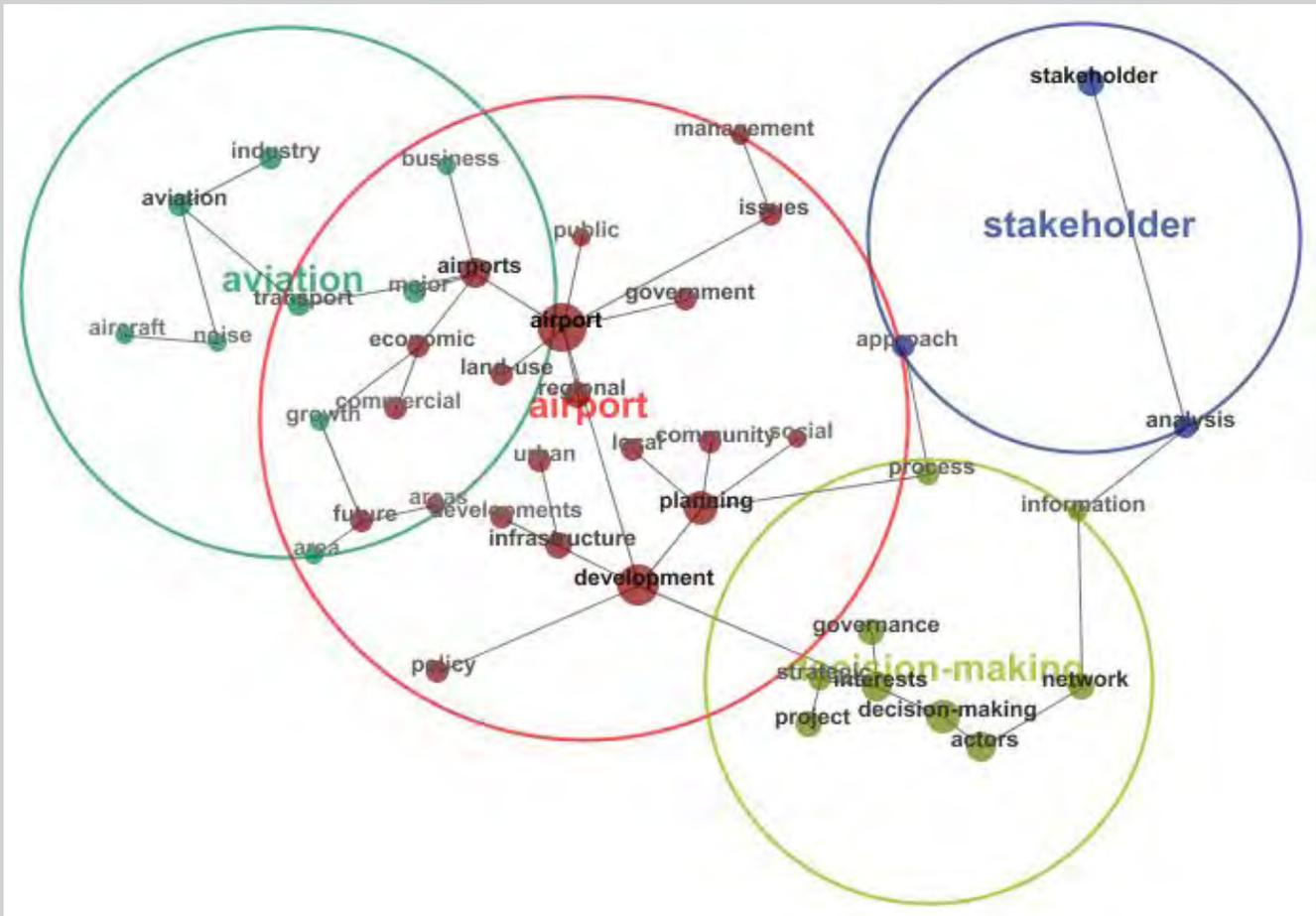


The Revised Airport Metropolis Interface Model

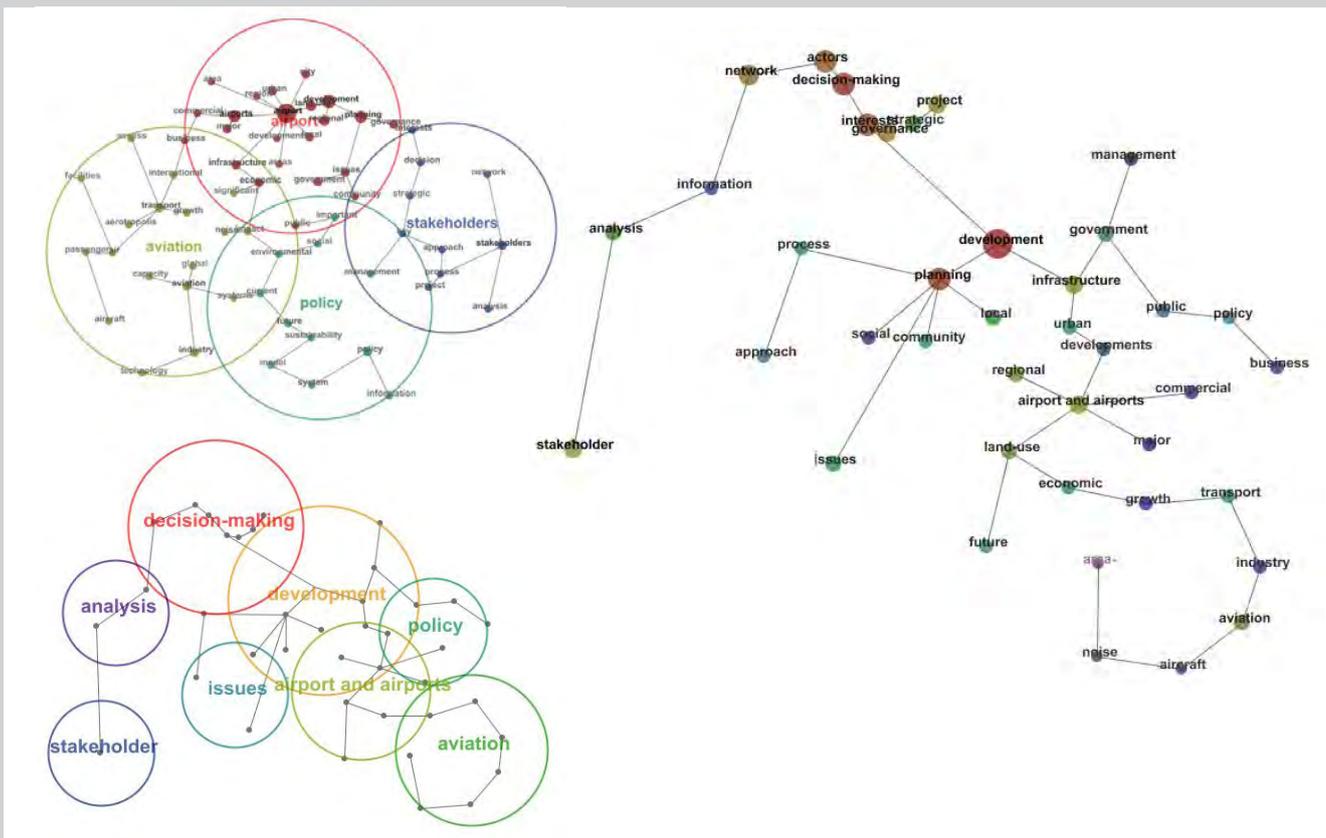
As a result of the project findings the original model (seen in Figure 3 earlier in the report) was revised.

In the revised model governance no longer appears as a separate interface but is shown as underpinning all of the themes — economic development, land use, infrastructure and spatial analysis. The major theme of stakeholders also emerged throughout the course of the project, closely linked to decision-making.

Figure 5. Leximancer major themes



Figures 6-8. Leximancer major themes with and without these components



These themes have been used to structure the final report findings as outlined in Table 3:

Table 3. Final Report Structure

Key theme	Keywords	Report topic
Aviation	Aviation, industry, aircraft, noise, transport, major, airports, business, economic, commercial, growth, future, areas, land use	National Aviation Policy White Paper Response
Airport	Airport, government public, land use, regional, issues, management, airports, business, major, transport, economic, commercial, growth, development, infrastructure, developments, areas, future, area, policy, planning, local, community, social, approach	Spatial Analysis Land Use Planning Support System
Stakeholders	Stakeholders, analysis, approach	Stakeholder Engagement
Decision-making	Decision-making, interests, actors, project, governance, strategic, network, information, process	Governance

Overall the significant common themes running through the Airport Metropolis research encompass those interface areas originally identified in the Airport Metropolis Interface Model with the general themes of Aviation and Airport and the additional ‘Stakeholders’ theme. Governance concepts were strongly identified in ‘Decision-making’ which presented as a major theme and in particular, underpinned all other

interface areas. Aviation issues strongly linked with those topics addressed in the National Aviation Policy White Paper Response, while land use, development, growth, economic, infrastructure and other similar concepts surrounded the key themes of planning and development within the overall Airport theme. A number of these themes were also common to the Aviation concept.

It is clear from the thematic analysis that all of the major themes are linked or overlap, supporting the overall concept of the Airport Metropolis Interface Model. The following findings section reports on the major common themes of aviation, through the National Aviation Policy White Paper Response; Airport, through Spatial Analysis, Land Use and the Planning Support System; Stakeholders, in Stakeholder Engagement; and Decision-Making, in Governance.



Key Theme: Aviation

There is a need for better coordination with **research and education** groups to provide a long term view and train the **highly skilled professionals** who will run the industry into the **21st century.**



The National Aviation Policy White Paper Response

Towards a National Aviation Policy Statement: Response Paper—a submission in response to the Australian Government’s National Aviation Policy White Paper to the Department of Infrastructure, Transport, Regional Development and Local Government—was a key output for the Airport Metropolis Project. Coordinated by QUT, the response was informed by three major research areas, the Airport Metropolis Project, Airports of the Future and the Smart Skies Project, and a fourth research consortium focusing on Rural, Remote and Regional Airports.

The AMP specifically informed ‘Australian Aviation Industry’ and ‘Aviation Infrastructure’ sections. The submission was a major piece of work contributing to the ongoing debate surrounding airports and their impact on surrounding regions. The responses were based on a culmination of reviewing academic research and significant consultation with key project stakeholders, namely the key stakeholder workshops carried out in Adelaide, Brisbane and Canberra.

A number of issues were identified and responded to in relation to the airport metropolis research focus:

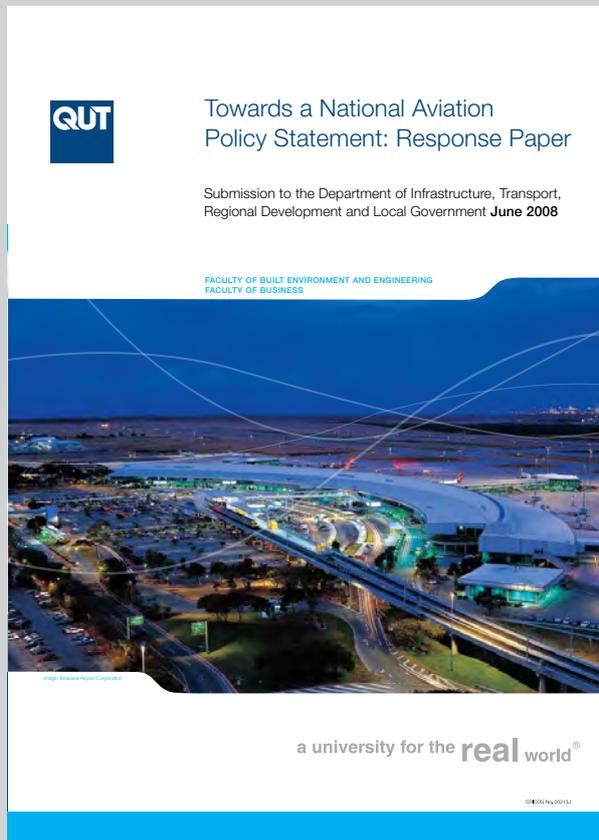
- Expanded debate and collective solutions
- Focused industry—integrated policy, planning and regulator processes
- Integrated infrastructure – compatible land use
- Safety, security and sustainability

The following key recommendations were put forward as part of the response:

- Planning could be better coordinated between airports and the surrounding metropolitan area. Use of any Airport Area Plan could coordinate interests on and around the airport as a metropolitan/regional strategy.
- Parallel community forums should be established to enable informal and formal engagement in planning and development.
- Before existing regulations and guidelines such as the Airport Development Consultation Guidelines are given greater force through incorporation in the *Airports Act 1996* (the Act), detailed consultation with major airports and other stakeholders is needed.

- An Airport Infrastructure Plan (as a supplementary document to the Airport Area Plan) could be established to balance and coordinate the costs and development of infrastructure.
- There is a need for better coordination with research and education groups to provide a long term view and train the highly skilled professionals who will run the industry into the 21st century. Research potential should be clustered within a dedicated research facility such as a Centre for Excellence to pave the way for greater synergistic effort and turbo-charge collaborative outcomes in the field; a national co-funded ARC Centre for Excellence in Aviation is a crucial next step for achieving a national approach that is informed, cohesive and future-oriented.

A summary of the response to specific issues related to the project research stream is outlined in Tables 4 and 5.



QUT’s Response:
Towards a National Aviation Policy Statement: Response Paper.

The submission was a major piece of work contributing to the ongoing debate surrounding airports and their impact on surrounding regions. A full copy of the report can be found at www.infrastructure.gov.au

Table 4. Summary of responses to The Australian Aviation Industry issues

Topic	Response/Recommendation
What should be the basis of government and industry policy towards air services to regional and remote communities?	<p>Airport stakeholders identified seven basic areas of policy significance:</p> <ul style="list-style-type: none"> • The economic and social contribution of RRR airports. • The role played by RRR airports in the broader regional transport network. • Best practice management systems for RRR airports. • Innovative approaches to infrastructure provision for RRR airports. • The funding and viability of RRR airports. • Approaches to the provision and funding of security at RRR airports. <p>Based on these issues, government and industry policy for regional and general aviation should be based on the sustainable provision of on-going community health and connectivity. Government policy at a commonwealth, state, and local level needs to be harmonised so that regional and remote communities benefit from better, coordinated decision-making.</p> <p>The training and retention of staff at RRR airports.* Airport owner/operators, carriers, and the aviation industry need to unite with commonwealth and state governments to develop consistent policy guidelines and service standards to address each of these areas for airports of various scale.</p> <p>* Baker et al., 2008</p>
Are security and safety measures adopted for major capital city trunk routes appropriate for regional and remote services? If not, what alternative measures should be adopted?	<p>Consultation with members of the Australian Airports Association revealed the following concerns:</p> <ul style="list-style-type: none"> • regional and remote airports are alarmed about the prospect of having to pay for screening equipment and expansion of terminal facilities and staffing; • uncertainty of regional aviation makes the risk of capital infrastructure provision high; and • it is unclear why large turbo-propeller aircraft do not attract screening while similar sized regional jets do. <p>There needs to be consideration of the full range of financial possibilities—including payment options and cost sharing models—when evaluating and implementing security measures for regional airports.</p>
How has micro-economic reform impacted on general aviation businesses and what strategies need to be put in place to ensure that access to airport infrastructure does not impede industry viability and growth? Do the needs of general aviation operators warrant any changes to airport regulatory and planning arrangements?	<p>The aviation industry involves a set of complex interactions between industry, communities and government. This needs to be better understood before any further reforms are made to regulatory arrangements.</p>
What role should all levels of government have in protecting secondary airport infrastructure and providing for new infrastructure?	<p>Secondary airport infrastructure needs to be addressed at a tripartite level:</p> <ul style="list-style-type: none"> • the Commonwealth government must have a national policy to coordinate and protect secondary airport infrastructure and development (similar to a national roads and port infrastructure strategy); • state governments must coordinate infrastructure needs as part of a multi-modal transportation strategy; • airports owned by local councils need to be supported by local government and state government; planning schemes need to pay due diligence to airport uses, surrounding land, and future development; and • Both federal and state governments have important roles to fulfil in the integration of secondary airport infrastructure, particularly at a regional level.
Additional Issues Raised	<p>Of particular note are the:</p> <ul style="list-style-type: none"> • reduction of services due to the pilot and related skills shortage • burden and risk of upgrading airports to accommodate larger aircraft which are becoming more attractive to carriers • impact of low cost carriers entering the market via secondary airports • need for rationalisation of close-proximity airports • shortage of training services and facilities (associated with the ageing of the GA fleet) • privatisation and otherwise change in ownership of certain airports.

Table 5. Summary of responses to the Australian Infrastructure issues

Topic	Response/Recommendation
<p>Are the planning and development mechanisms under the Airports Act working effectively?</p>	<p>One issue with respect to planning and development is the perception of a lack of transparency and coordination with surrounding authorities and communities. These issues are evident with the land use conflict that has occurred around capital city airports over the last decade. It is recommended that local and state planning policies comprehensively consider the impact of regional land use planning on airport aeronautical operations.</p>
<p>How can we improve consultation with state and local authorities and with the community?</p>	<p>Three strategic mechanisms can be used to improve relationships with state government, local authorities and regional communities:</p> <ul style="list-style-type: none"> • The use of tribunals such as an ‘Airport Community Council’ or an ‘Airport and Regional Development Tribunal’. The Tribunal could make recommendations to the federal minister and state and local planning authorities regarding development within the airport region/catchment. • Greater coordination and communication between airports and local communities, in particular integrated airport and regional planning may be informed by: <ul style="list-style-type: none"> • state government strategic targets • demographic projections • airport corporation strategic goals • local government planning schemes, community benefits and social capital. • The Airport Area Plan could consider all airport and state and local land use activities under the ANEF contours and safety zones as well as a defined airport area of influence. Airport city type development must be fostered by the Act to ensure airports can continue to grow and strengthen diverse revenue streams that could be re-invested into aviation related airport development. Local planning must be consistent with Airport Area Plans (which may include activities outside airport property in the airport’s area of influence). <p>Prior consultation with major airports is recommended.</p>
<p>Could the regulatory regime better facilitate genuine long-term co-operation between airport operator companies and state and local governments on land use planning?</p>	<p>Master plans could better inform local planning schemes, state policies and communities. State and local governments must ensure that state policies and local planning schemes give due consideration to the development plans of the airport.</p>
<p>How can we better integrate investment on airport with the funding and construction of improved road and rail links to and from our airports?</p>	<p>Connecting infrastructures from state and municipal authorities have been poorly coordinated and funded. As such the following are recommended:</p> <ul style="list-style-type: none"> • There is a critical need for economic and social indicators (metrics) which can be used to calculate airport contributions to infrastructure investments. • New tools are needed to better gauge the true impact of infrastructure investment. • Impact studies for both the airport and the region, such as social cost benefit analyses, will inform a larger scale of infrastructure planning – that extends to the regional level to capture costs and benefits. • Establishment of an Airport Infrastructure Regional Plan (as a supplementary document to the Airport Area Plan) is one means of balancing and coordinating the costs and development of infrastructure, potentially leading to better services for the region and the airport.
<p>What mechanisms might be used to ensure an effective ongoing dialogue between airport operators and their local communities?</p>	<p>Effective ongoing dialogue between airport operators and their local communities is supported. Whatever mechanism is adopted must support rather than impede effective decision-making and progress. One approach could be the establishment of parallel communication forums that facilitate both informal and formal engagement. These would optimise the exchange of information and assist in the integration of stakeholders’ views.</p>

Topic	Response/Recommendation
<p>How can the regulatory regime better ensure non-aeronautical developments do not compromise the aeronautical requirements of airlines and airports?</p>	<p>In other regions, regulatory regimes are used to guide non-aeronautical development. However, a set of accountability related key performance indicators may provide a pathway that meets the needs of all participants and a level of transparency for the community.</p> <p>Further research into these alternatives would provide insights into what might be most appropriate in a substantially privatised airport environment in Australia.</p> <p>In the coordination and evaluation of airport and regional land use, the literature recognises the benefit of the following integrated strategies and key actions, in facilitating airports as development catalysts:</p> <ul style="list-style-type: none"> • Airports need to be addressed as part of the overall transport planning network, with complementary air, port, road and rail. • Developing a broad range of commercial activities needs to be seen as essential to the health of an airport as a business. • Areas around airports should be reserved for those activities which have a functional need to establish in that location. • There is a need to reach consensus on a strategic, integrated approach to airport and metropolitan development. • There is a need to develop communication, infrastructure and integration with wider regional interests. • Airport master plans need to evolve from isolated statements of on-airport development to integrated strategies that: <ul style="list-style-type: none"> • Address urban, city, regional and national planning policies • Address the implications of each other's strategic planning • Provide the rationale for land use controls • Involve the community in their development. • City planning needs to provide unique and innovative opportunities to develop strategy to facilitate, rather than control, development. • Cities need proactive policies for establishing frameworks for urban development around airports. • Cities need to become more aware of management policies for airports to ensure opportunities and benefits for regional development can be realised. <p>Further, there is a need to progress a better definition and determination of what constitutes aeronautical and non-aeronautical development. In addition there is a need to ensure aeronautical requirements are protected by mandated standards (ICAO etc) and adequately monitored.</p>

* MIC 1999; DoT 2002; Wells and Young 2004



Topic	Response/Recommendation
<p>How should the potential commercial impact for off airport competition be taken into account in planning on-airport non-aeronautical development?</p>	<p>Airport Area Plan consideration must be given to all airport and regional activity centres and the integration of commercial ventures within the scope of the plan. Both the airport and the metropolis should be developed together in response to community demand.</p>

<p>How can the mechanisms for guiding development around airports be improved to ensure potential issues from aircraft noise are fully addressed in planning? How can we better ensure off-airport developments subject to state and local government planning regimes, such as tall buildings, do not compromise the safety and effective use of aviation infrastructure?</p>	<p>A joint plan needs to be formulated which incorporates safety zones, noise contours and land use planning zones into the Airport Area Plan. The Airport Area Plan would need to have statutory enforcement to protect safety zones and avoid inappropriate development in noisy areas. The use of a national web-based map with safety, noise and zoning information would facilitate dissemination of this information to councils, developers and the public. A framework could be designed specifically for airport development using:</p> <ul style="list-style-type: none"> sustainability assessment indicators and benchmarking that considers the regional setting of the airport metrics for the evaluation of airport locational aspects with regard to regional development as well as broader social, political and cultural considerations. <p>Internationally a variety of tools are used which may assist:</p> <ul style="list-style-type: none"> The zoning of compatible uses through land designation in town planning documents, which recognise airport regions as being suitable for particular land uses. Building codes relating to establishing noise performance requirements for the interior noise levels of both new and existing structures on and near airports. Disclosure of airport location, potential noise impacts and aircraft traffic patterns by real estate agents and developers. Allow the airport to purchase 'avigation' easements or development rights to property prior to general sale or from a property owner. <p>A regulatory response could alleviate this situation; however, consultation with key stakeholders should pre-empt such a response.</p>
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<p>Additional issues</p>	<p>Integrated Approach to Airport Infrastructure Asset Management:</p> <ul style="list-style-type: none"> • An integrated approach to asset management is required that will assist in prioritising expenditure on asset management on an annual and a rolling three to five year basis. <p>Use of GIS and GPS in Airport Infrastructure Management:</p> <ul style="list-style-type: none"> • Currently condition assessments of runway, taxiway and apron areas are done physically and recorded. Advanced research is recommended in the use of Geographical Information System (GIS) and Global Positioning System (GPS) technologies for collection of pavement condition data and other airport facilities. A GIS-based system would simplify the collection and storage of data for pavement condition, the runway and taxiway lighting, vegetation, and aircraft parking apron operating systems (in digital format). GPS devices would enable routine airfield distress surveys to be undertaken more efficiently and with an enhanced and reliable location efficiency capability. One of the major advantages is that such condition assessment operations can be done without disrupting runway operations.
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Primary research material:
 Queensland University of Technology. 2008. *Towards a National Aviation Policy Statement: Response Paper*. Submission to the Department of Infrastructure, Transport, Regional Development and Local Government June 2008.

Key Theme: Airport

“A new approach is required, bringing together airport planning, urban and regional planning, and business site planning in a synergistic manner so that future aerotropolis development will be economically efficient, aesthetically pleasing, and socially and environmentally sustainable.”

(www.aerotropolis.com)



Spatial Analysis

Despite the importance of aviation in the globalised world, the role of airports in shaping metropolitan form and the rising attention given to the ‘aerotropolis’ model, airports have largely been neglected in scholarly planning literature. In particular, the role of airports as both ‘users and producers of spatial developments within their region’ and the consequences for planning policy are under researched.³³

To address this knowledge gap the research team explored the literature on airport planning (past and present), reviewing various conceptual models with regard to the goal of the ‘sustainable airport’. The approach was informed holistically by the four fundamental interfaces underpinning the AMP (infrastructure, economic development, governance and land use); hence this research component was given the shorthand description of ‘spatial analysis’.

The key research questions included:

- How has airport development been addressed critically in the planning and urban studies literature?
- How can the airport-city relationship best be represented in spatial planning models?
- How, why and to what reception have airports turned to commercially oriented property development?
- How can the notion of an ‘aerotropolis’ be defined. What are the various approaches and business models employed? And how well does it capture airport-centric growth trends for 21st century and the planning issues arising?

- How can the positionalities of airport operators, regulators and the community in relation to airport development best be captured and represented?
- What policy settings are most effective for apprehending the holistic complexity of the airport region?
- How effective are existing and proposed Australian protocols for the guidance and regulation of airport and airport-centred development?
- What lessons are presented from international development for Australian conditions?

Overall this research found that an airport-centred perspective can compound the planning challenges faced. As such there is a greater need for convergence between airport and city planning with aviation needing to be built more explicitly into the urban planning process³⁴ and airport strategic planning needs to consider a supra-local perspective. Ultimately, airports seemingly cannot ‘go it alone’. As identified in the White paper response outlined in the previous section, there is a need for all parties to embrace collaborative planning.³⁵

Overall the analysis highlights the importance of planning models for airports and the implications for airport operators, local, state and national governments. The findings will inform future policy suggestions for new airport regions’ spatial planning governance arrangements and mechanisms that increase the broader public benefits.

Research methodology overview

To investigate this research component the AMP undertook an extensive scholarly, policy, industry and popular literature desk-top review. The approach was informed holistically by the four fundamental interfaces underpinning the AMP: infrastructure, economic development, governance and land use. As sustainability is a significant preoccupation for the planning profession the review used the three pillars of sustainable development—economic, environmental and social sustainability—to unpack the following forms of airport-centred urban development:

- Airfront
- Decoplex
- Airport city
- Airport corridor
- Aerotropolis
- Airea

In addition to the three pillars a fourth pillar—governance—was added to highlight the importance of implementation strategies to achieve sustainability objectives. A description of the pillars used are provided in Table 6.

33 Knippenberger, U. 2010. Conference Report: From Airport City to Airport Region? The 1st International Colloquium on Airports and Spatial Development, Karlsruhe, 2009. *Town Planning Review* 81:209-15

34 Hicks, C. 2007. “Urban Planning and Airport Issues: Integrating Aviation into the Urban Planning Process.” Paper presented to the Singapore Airport Cities Conference, September.

35 Healey, P. 1997. *Collaborative Planning: Shaping Places in Fragmented Societies*. London: Macmillan Press

Figure 9. Major shifts in research foci from 1920 – current (adapted from Freestone and Baker, 2011)

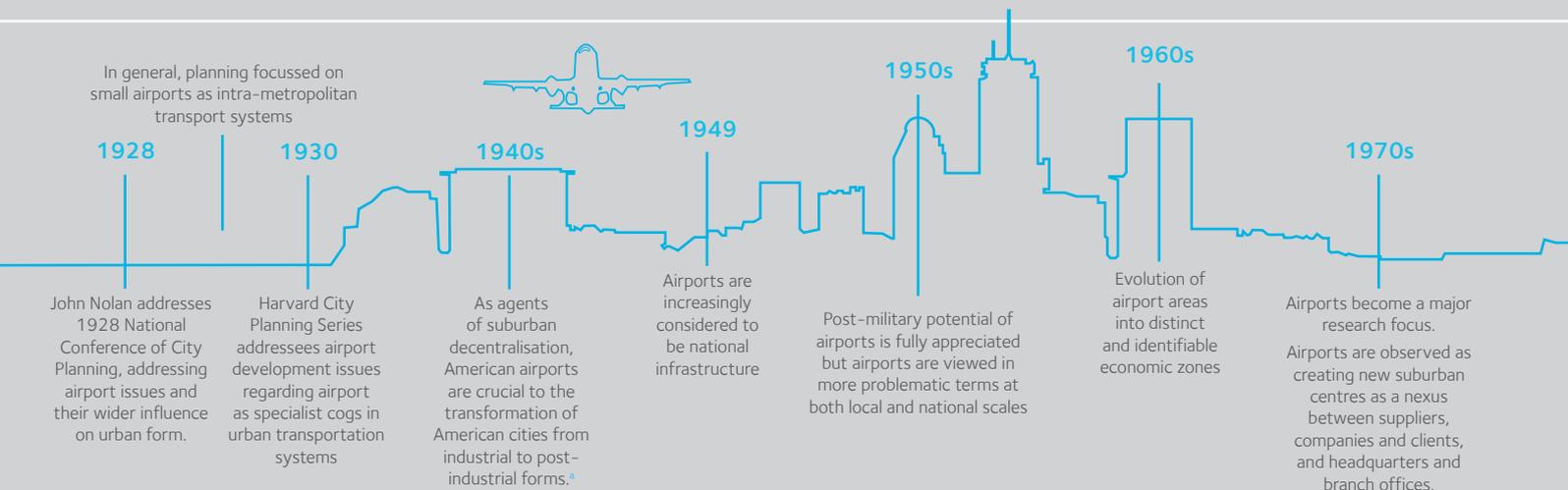


Table 6. Pillars used for the spatial planning research analysis

Pillar	Description
Economic	Prospects for enduring employment generation
Environmental	Specifically the spatial implications of extensive airport-led development
Social	Linked to the redistributive implications of airport centric development
Governance	How better planning frameworks have been addressed

Research findings

The airport in planning and urban studies literature

The growing awareness of the need for regional conceptualisation can be tracked through the literature, from substantial technical documentation dealing with rudimentary guidelines to visionary treatments of airport issues and their wider influence. Planning literature has charted this growing awareness citing material from as far back as the 1920s through to present day. As can be seen from Figure 9, the importance and understanding airports and their impacts have evolved overtime within the planning literature; however there remains limited systemic treatment of airports in a metropolitan context with reference to the broader urban and planning constructs.

The airport-city relationship: models of urban form and the new airport region

The vision of an airport at the heart of the city goes back to at least Le Corbusier in the 1920s, whose ideal city featured an aerodrome sitting atop a multi-nodal grand central station flanked by vertiginous skyscrapers. Latter day visions are characteristically more spatially expansive—moving beyond small-scale airport busparks and fly-in residential and leisure communities to the fully integrated mixed-use concept of the ‘decoplex’.

However it is Kasarda’s ‘aerotropolis’ model which is the best known model to capture the nexus between planning, sustainability and airport led development. Kasarda argues that airports are shaping urban space in the twenty-first century much the same as highways did in the twentieth century, railroads in the nineteenth century and seaports in the eighteenth century. He has been prominent in maintaining the significance of airports as engines for local and regional economic development in their attraction of directly aviation-linked activity and more indirectly aviation-oriented land uses both within airport boundaries and along transport corridors.³⁶

Indeed, a review of the literature points to the land use mix of airport and near-airport land becoming increasingly diversified with more large-scale mixed-use complexes evolving toward suburban downtowns.³⁷ The boundary between airport and surrounding territory is increasingly blurred in a seamless urban landscape of hotels, retail malls, leisure facilities, offices, business parks, warehouse and logistic complexes, factories, and service industries. On the airport platform proper, non-aviation commercial revenues (notably, retailing, and car parking) on average now account for half of all airport income worldwide.³⁸

The rise of non-aeronautical uses is a defining element of the new airport³⁹ leading to one caricature of them as ‘a runway with a shopping mall beside it’.⁴⁰ These trends are challenging conventional wisdom about the very nature of airports.⁴¹ The transformation of airports from transportation nodes into urban centres has been driven by a number of factors:

- airport operators’ need to create additional revenue streams for profit-seeking and counter-cyclical business reasons
- industry’s pursuit of affordable and accessible urban land
- the globalisation of supply chain management and rise of ‘just-in-time’ manufacturing and delivery
- the increasing role of e-commerce and logistics
- the increasing role of airports as meeting places in corporate interactions
- the emergence of airports as gateways if not destinations in their own right for passengers and tourists.⁴²

36 Kasarda, J. D. 2000. ‘Aerotropolis: Airport-Driven Development’. In *ULI on the Future: Cities in the 21st Century*, 32-41. Washington, DC: Urban Land Institute; Kasarda, J. D. 2004. ‘Aerotropolis: The Future Form’. In *Just-In-Time Real Estate: How Trends in Logistics are Driving Industrial Development*, 92-104. Washington, DC: Urban Land Institute; and Kasarda, J. D. 2006. ‘The Rise of the Aerotropolis.’ *The Next American City* 10:35-37.

37 Dempsey, P. S., A.R. Goetz, and J.S. Szyliowicz. 1997. *Denver International Airport: Lessons learned*. New York: McGraw-Hill.

38 Graham, A. 2009. “How Important are Commercial Revenues to Today’s Airports?” *Journal of Air Transport Management* 15:106-11.

39 Reiss, B. 2007. “Maximizing Non-Aviation Revenue for Airports: Developing Airport Cities to Optimize Real Estate and Capitalize on Land Development Opportunities.” *Journal of Airport Management* 1:284-93.

40 Graham, B., and C. Guyer. 2000. “The Role of Regional Airports and Air Services in the United Kingdom.” *Journal of Transport Geography* 8:249-62.

41 Morrison, W. G. 2009. “Real Estate, Factory Outlets and Bricks: A Note on Non Aeronautical Activities at Commercial Airports.” *Journal of Air Transport Management* 15:112-5

42 LeTourneur, Christopher. 2002. “The Bricks and Mortar of Global Commerce.” *Airport World* 6:36-40; Schaafsma, Maurits. 2008. “Accessing The Airport as a City.” In *The Image and the Region: Making Mega-City Regions Visible!*, edited by Alain Thierstein and Agnes Forster, 69-79. Baden: Lars Muller

a Karsner, D. 1997. “Aviation and Airports: the Impact on the Economic and geographic Structure of American Cities, 1940s-1980s”, *Journal of Urban History*, 23: 406-36

b Short, J.R. & Kim, Y.-H. K. 1999, *Globalization and the City*, New York: Longman

c Adey, P., Budd, L., & Hubbard, P. 2007. “Flying Lessons: Exploring the Social and cultural Geographies of Global Air travel.” *Progress in Human Geography*, 31: 773-91.

The process has been stimulated by airport corporatisation, globalisation and privatisation (to varying degrees internationally with the US displaying the lowest level of privatisation).⁴³ In particular, the macro-trend affecting the nature of airports in their urban context has been the progressive loosening of their historic ties to the state—airports have shifted from being branches of government to dynamic and commercially-oriented business.⁴⁴ However, this has unfolded in a variety of ways with seven different types of ownership/governance structures identified worldwide.⁴⁵

The nature of the trends is uneven, impacted by the scale and mix of airport activity in its metropolitan context, leading to considerable diversity in the nature and scale of airport zones: there is no one size and type fits all cases. However, in spite of the development of an airport city and the broader aerotropolis region being hailed as a long run process,⁴⁶ several preliminary typologies of airport city-regions have been suggested (Table 7)

The new airport region

The nature of the emerging airport region has been captured in various ways in more specialist aviation discourse. Various terms have been coined to describe the evolution toward airport-centred mixed-use business hubs including:

- Avioport
- Aeroville
- Aeropolis
- Aviapolis.

The research team identified six distinct models of planned airport-linked urban development (summarised in Table 8).

As can be seen from Table 8 Airport-centred development can occur across a spectrum of scales from the immediate fringe through to the metropolitan region. The six models—airfront, decoplex, airport city, airport corridor, aerotropolis, and airea—pick up this progressively larger and more complex territorial impact and each denotes a different geography as described in Table 9.

These models are united by their privileging of aviation as central to inter-urban transportation, endorsement of mixed-use and non-aviation development, and signposting the importance of planning in providing an effective orchestration of regional resource allocation and infrastructure provision. With the exception of the airea, all are normative models, differing in terms of their scale, notional patterns of governance, level of conceptual development, and degree of logistical detail. The central question from a planning standpoint when evaluating the efficacy of their vision is their treatment of sustainability.

43 Graham, A. 2008. *Managing Airports: An International Perspective*, 2nd ed. London: Butterworth, Heinemann/Elsevier.

44 Doganis, Rigas. 1992. *The Airport Business*. London: Routledge.

45 Gillen, David. 2011. "The Evolution of Airport Ownership and Governance." *Journal of Air Transport Management* 17:3-13.

46 Kasarda, J. D. 2001. "From Airport City to Aerotropolis." *Airport World* 6:42-45.

Table 7. Typologies of airport city regions and current examples (source Freestone & Baker 2011)

A: Evolution towards integrated airport-led area development (Dietrich 2007)	
Rudimentary	London Heathrow, Louisville
Planned	Berlin, Guangzhou
Under construction	Seoul, Shanghai
Rudimentary/planned	Los Angeles, Denver, Chicago, Washington, Frankfurt, Madrid
Planned/under construction	Detroit, Zaragoza, Dubai, Beijing, Kuala Lumpur
Completed/under construction	Dallas-Fort Worth, Amsterdam, Hong Kong, Bangkok, Singapore
B: Staged model of evolution and adaptation (LeTourneur 2002)	
First wave – adapted	Europe: London Heathrow, London Gatwick, Amsterdam, Copenhagen, Frankfurt
Second wave – planned	Asia and Australia: Hong Kong, Osaka, Singapore, Sydney, Melbourne
Third Wave – adapted and planned	North America: Los Angeles, Chicago, Denver, New York JFK, San Francisco, Vancouver
Fourth Wave – planned	North America-Regional: Portland, Phoenix, Salt Lake City, Detroit, Pittsburgh, Orlando, Calgary
C: Development characteristics (Schaafsma et al. 2008)	
Airport and passenger services (hotels and car rental)	All airports
Airline companies and aircraft maintenance	All airports
Concentrations of airport-related economic activities	Most airports
Concentrations of economic activities developed as economic clusters and innovation poles	Memphis, Dallas-Fort Worth, Amsterdam
Hubs within internationalized regional economies	Dubai, Hong Kong, Singapore, Macau
Airport destinations	Dubai 2020, Seoul 2020

Table 8. Models of Airport-Driven Urban Development (source: Freestone and Baker 2011)

	Definition	Location	Lead Actors	Key Author	Exemplar
Airfront	Airport-related commercial zone	Airport fringe	Local community; airports private–public partnerships	Blanton (2004)	Metropolitan airports
Decoplex	New airport community in regional setting	Regional setting	Master developer	Conway (1993)	Large-scale fly in setting communities
Airport city	Planned mixed-use development of Airport site	Airport land	Airport owner–lessee	Güller and Güller (2003)	Schiphol
Airport corridor	Coordinated provision of infrastructure and commercial development	Airport–CBD axis	Private developers; public infrastructure authorities	Schaafsma, Amkreutz, and Güller (2008)	Zurich
Aerotropolis	Time-sensitive metropolitan scatter of airport-oriented uses	Airport-centred metro	Private market	Kasarda (2000a)	Dallas–Fort Worth
Airea	Discrete spatial clusters of airport-related development	Metropolitan subregion	Private market	Schlaak (2010)	Denver

Table 9. Six models of airport-centred development (adapted from Freestone and Baker 2011)

Model	Characteristics
Airfront	The characteristic land use mix of these airport fringe zones include car rental facilities, hotels and meeting facilities, freight and cargo services, manufacturing, and warehousing; all requiring or dependent upon frequent air connections and sometimes down at heel. The airfront model is associated with the American Planning Association's Airports in the Region project with these districts conceived in the same way as other special districts requiring more coordinated planning to assist both economic development revitalisation and noise mitigation. ^a
Decoplex	Standing for development–ecology complex, the decoplex denotes a fully integrated mixed-use airport of an intermediate urban scale featuring a jetport alongside planned industrial sites, offices, hotels, and waste treatment facilities with all core units having direct runway taxiways.
Airport city	Defined as 'the more or less dense cluster of operational, airport-related activities, plus other commercial and business concerns, on and around the airport platform', ^b airport cities have four major development directions: ^c <ul style="list-style-type: none"> • shopping malls concentrated on the terminals • commercial offices • air cargo facilities • tourism, leisure, and health facilities. <p>These are given different weights depending on market opportunities. Like the other models, the airport city generalises from existing trends, notably the marketing concept for Amsterdam's Schiphol Airport. Additional revenue from an expanded retail offering was seen as complementing income from airport taxes and parking fees. The concept has subsequently been extended by the Schiphol Group as a corporate vision for other airports in which it has either a management or ownership stake such as Brisbane.^d</p>
Airport corridor	Links the airport and central city as a band of integrated road/rail infrastructure and property development. This zone is often 'the city's backyard, a governmental vacuum of small municipalities and weak regional authorities, out of reach of the city or metropolitan authorities and neglected by the urban planners because it is neither city nor airport'. The corridor concept seeks to transform this space into an integrated economic zone. The strength and vitality of the corridor is driven by factors including airport size and geographic monopoly, landside transportation connectivity, land availability, leadership from airport or city or in coalition, the makeup of the regional economy, institutional arrangements, and development vision. The corridors most clearly defined are in city regions with close proximity between major airport and CBD (Sydney), made-to-measure governance structures (Paris and Zurich) and massive public investment in infrastructure (Kuala Lumpur, Singapore, and Hong Kong).
Aerotropolis	This form emerged as an outgrowth and integration of Kasarda's work from the early 1990s on airline networks and employment growth, industrial location, logistics, and economic development. The aerotropolis consists of a core 'airport city' at the epicentre of a wider metropolis and interconnected by dedicated motorways ('aerolanes') and high-speed rail links ('aerotrails') with outlying aviation-oriented business precincts such as e-commerce fulfilment centres, business and logistic parks, retail complexes, hotels, and free trade zones. The aerotropolis label has been applied flexibly to a diversity of environments, planned and unplanned.
Airea	A variation on the aerotropolis, but framed more from a metropolitan rather than an airport perspective and more flexible in spatial form, scale and complexity than the other models. In this spatial model, the airport's sphere of influence is disaggregated into various 'fragmented islands of development' often with complex relationships between each other and the airport.

^a Blanton, Wt. 2004. 'On the Airfront.' Planning 70:34–36; Wong, D. 2006. "Airfront Districts: Economic Noise Mitigation." Accessed Nov 2010. <http://www.aviation-noise.org/events/2006Conf/Presentations/Wong.pdf>.

^b Güller, M., and Güller, M. 2003. From Airport to Airport City. Barcelona: Editorial Gustavo Gill.

^c Schaafsma, M., Amkreutz, j. and Güller, M. 2008. Airport and City. Airport Corridors: Drivers of Economic Development. Amsterdam: Schiphol Real Estate

^d Timbrell, G., Foth, M. and Hearn, G. 2006. 'Towards Knowledge Management for Explorers: The Case of the Brisbane Airport Corporation.' International Journal of Knowledge, Culture and Change Management 6:97–104

^e Schaafsma, M. 2008. "Accessing The Airport as a City." In The Image and the Region: Making Mega-City Regions Visible!, edited by Alain Thierstein and Agnes Forster, 69–79. Baden: Lars Muller

The goal of the sustainable airport

As previously noted, the research approach used the three pillars of sustainable development (economic, environmental and social sustainability) in addition to a fourth pillar (governance) to unpack the various forms of airport-centred urban development. The findings from these analyses are now addressed.

The economic interface

The dominant discourse in the aviation industry is growth. In particular, growth underpins the aerotropolis concept. One challenge facing airport-centred developments is the economic dimension. The positive interrelationship between high-quality transport infrastructure, inter-city connectivity, economic growth and competitiveness has been documented for airports big and small—from major hub airports⁴⁷ to small regional facilities.⁴⁸

All six planning models depict airports as economic gateways capturing and translating economic growth into on- and off-airport jobs. They assert that airport regions tend to be characterised by strong development pressures and investment activity compared to the rest of the metropolitan region.⁴⁹ However, as Kasarda⁵⁰ acknowledges, the presence of an airport alone does not make for successful airport-led development. Critical factors include:

- the nature and scale of airport activity (hubbing potential, passenger-cargo split, air carrier support, etc.);
- goodness of fit within the overall pattern of metropolitan development;
- the extent of government support and incentives;
- regional ground transportation accessibility;
- the cost of land; and
- regional policy responses to real estate speculation.⁵¹

The 'build and growth will come' optimism evident in numerous economic development prospectuses must be tempered by the *real politik* of the aviation and logistics industries as captured by an industry insider's comment that 'airlines go to markets, not airports'.⁵²

Other development constraints can include:

- land tenure restrictions;
- inter-jurisdictional issues relating to land use and servicing;
- getting the balance right between aviation and non-aviation uses; and
- concerns of adjacent communities.⁵³

There have been relatively few studies of the actual mechanics of the airport gravitational pull. While highlighting the notion of competitive clusters of economic activity, the implicit assumption in airport-led development is the growth pole notion of economic growth trickling down and spreading out, most literally embodied in the decoplex construct.

There is no sense of an optimal scale of development for airport cities and corridors, yet conventional urban economic theory cautions about the negative impacts of unbridled agglomeration. In particular, some regional economies have been found to be too dependent on air traffic, causing vulnerability in periods of downturn. One study found that although international firms gravitate towards airport corridors, the disadvantages can outweigh advantages for local firms—in essence airport proximity can have a repelling impact.⁵⁴

In addition, the trend of increasing freight traffic and its quicker recovery rate compared with passenger traffic post-economic down turn have been duly linked to good prospects for airport area development. The corporate search for greater and faster supply chain economies has been tapped as an area development strategy. An outcome of these developments and the related growth of the logistics sector has been the 'global transpark' concept. These are more

than traditional air cargo facilities; they are conceived as assemblages of time-sensitive economic activities based around transport hubs with direct intermodal loading and unloading capabilities, advanced telecommunication services, and business-friendly government taxes and customs processing. Apart from environmental capacity limitations, new air freight-led airport developments face other constraints. Cargo (as opposed to passenger growth) is actually a poor predictor of employment growth and hence economic development, with warehouse and distribution facilities increasingly automated and offering lower paying jobs.⁵⁵

In conclusion, while the economic benefits of airport-driven development are certainly there—especially for path-dependent long-established airport areas—their sustainability is challenged by cyclical downturn, dramatic exogenous shocks affecting negatively on air traffic volumes, and the degree of overall regional resilience.

The environmental interface findings

The environmental impacts of aviation are of major concern to communities, governments at every level, and the industry itself.⁵⁶ Environmental critiques of airports largely target operational dimensions such as air pollution, physical and psychological health, contaminated run-off and land consumption. In addition, the peak oil issue regarding irreversibly dwindling supplies and the costly technological search for fossil fuel alternatives are also of concern;⁵⁷ however climate change is now the main arena for debate.⁵⁸

Climate change presents many and increasing uncertainties for airport development and operations through the direct impact of extreme events, irreversible trends like sea-level rise (affecting coastal airports) and the regulatory environment for aviation.⁵⁹ General consensus is that the aviation industry is responsible for 3–5% of the worldwide total global anthropogenic carbon emissions; however it is the

47 Colin Buchanan and Partners. 2009. *Economic Impacts of Hub Airports*. London: British Chambers of Commerce

48 Button, K., Soogwan Doh, and Junyang Yuan. 2010. "The Role of Small Airports in Economic Development." *Journal of Airport Management* 4:125–36

49 Schlaack, J. 2010. 'Defining the Airea: Evaluating Urban Output and Forms of Interaction Between Airport and Region.' In *Airports in Cities and Regions: Research and Practise*, edited by U. Knippenberger and A. Wall, 113–26. Karlsruhe: KIT Scientific Publishing

50 Kasarda, J. 2000. 'Planning the 'Aerotropolis.' *Airport World* 5:52–53

51 Dempsey, P. S., Goetz, A. R., and Szyliowicz, J. S. 1997. *Denver International Airport: Lessons learned*. New York: McGraw-Hill; Green, R. K. 2007. "Airports and Economic Development." *Real Estate Economics* 35:91–112; Moore-Wilton, M. 2007. "Aerotropolis: Airport Cities." Paper to the Capitals Alliance Conference, Canberra, January 2007. Accessed February 2009. http://www.aerotropolis.com/files/2007_01_Aerotropolis.pdf; Sadler, M. 2007. "Charting the Future." *Hub, Magazine of the Memphis Logistics Council* Winter:8–18.

52 Quoted in Erie, S. P. 2004. *Globalising LA: Trade, Infrastructure, and Regional Development*. Palo Alto: Stanford University Press

53 LeTourneur, C. 2002. "The Bricks and Mortar of Global Commerce." *Airport World* 6:36–40.

54 Hoare, A.G. 1973. "The Detrimental Economic Effects of a Major Airport: The Consequences of Heathrow Upon Factory and Office Firms." *Tijdschrift voor Economische en Social Geograafie* 64:339–51

55 Green, R. K. 2007. "Airports and Economic Development." *Real Estate Economics* 35:91–112

56 ICAO. 2007. *Environmental Report*. Montreal: International Civil Aviation Organisation

57 Newman, P. 2007. "Beyond Peak Oil: Will Our Cities Collapse?" *Journal of Urban Technology* 14:15–30

58 Gössling, S., and Upham, P. eds. 2009. *Climate Change and Aviation: Issues, Challenges and Solutions*. London: Earthscan

59 Thomas, C., Hooper, P. and Raper, D. 2010. 'Air Transport in an Environmentally Constrained World.' *Journal of Airport Management* 5:4–6



projections which are most troubling—one source predicts an increase in CO² aviation emissions of up to 300% by 2050 if ameliorative action is not taken.⁶⁰ These predictions tend to overshadow managerial initiatives in transitioning to a low carbon future.

Environmental concern about the continuing growth of air travel and the airports which make that possible is spilling over into airport-related development. The aerotropolis model as the most ambitious vision is curiously silent about the environmental ramifications of aviation and airport development, especially given the objections that new and expanding airports have encountered since the 1970s.

At the most extreme level, diametrically opposed positions have been staked out in relation to environmental concerns:

- **environmentalist position:** advocating for the tightening of government policy and international regulations to constrain demand for air travel.
- **pro-growth stance:** highlighting the economic dis-benefit of restricting airport capacity.

The environmental capacity of airports is constrained far more than their operational and management capacity when a cumulative raft of relevant issues is factored into their operations, such as

air quality, risks of accidents, biodiversity, community opposition to growth and, latterly, climate change.⁶¹ The growth of the global freight market with the rise of just-in-time processing and distribution has been accompanied by growing environmental problems near urban airports because of night time operations and the use of older less eco-efficient aircraft.⁶² For some airports community activism such as classic NIMBY ('not in my back yard') campaigns have resulted in limitations on airport activity; 66% of European airports have environmental constraints.⁶³

It appears that the greater the scale of aircraft operations, the more inherently unsustainable the situation becomes.⁶⁴ With more audible political and community discussion about the limits to growth and the need for demand travel, there are serious implications for the attendant growth and prosperity of development dependent on unconstrained air travel. The models deal unevenly with sustainable urban form:

- the aerea model notionally promotes polycentric development
- the corridor model suggests linear compaction of development and infrastructure
- the aerotropolis model more tacitly endorses an extensive pattern of land use development along lines most evident in American cities.

The central issue is the confusion between the aerotropolis as a positive interpretation of trends versus its normative aspirations toward a better form of development.⁶⁵

- 60 Upham, P., C. Gillingwater, T. D., and Raper, D. 2003. "Environmental Capacity and Airport Operations: Current Issues and Future Prospects." *Journal of Air Transport Management* 9:145-51; Macintosh, A., and Downie, C. 2007. "A Flight Risk? Aviation and Climate Change in Australia." Discussion Paper No. 94. Canberra: The Australia Institute."
- 61 Upham, P., Thomas, C., Gillingwater, D., and Raper, D. 2003. "Environmental Capacity and Airport Operations: Current Issues and Future Prospects." *Journal of Air Transport Management* 9:145-51.
- 62 Gillingwater, D., Humphreys, I., and Watson, R. 2003. "Air Freight and Global Supply Chains: The Environmental Dimension." In *Towards Sustainable Aviation*, edited by P. Upham, J. Maughan, D. Raper, and C. Thomas, 149-61. London: Earthscan."
- 63 Hooper, P. 2007. "Sustainable Perspective on the Implications for Airports of the Future." Paper presented to the Aviation Business Airport Development Conference, Sydney, August.
- 64 Upham, P. 2001. "A Comparison of Sustainability Theory with UK and European Airports Policy and Practice." *Journal of Environmental Management* 63:237-48
- 65 Blau, J. R., La Gory, M., and Pipkin, J. 1983. *Professionals and Urban Form*. Albany: State University Press of New York

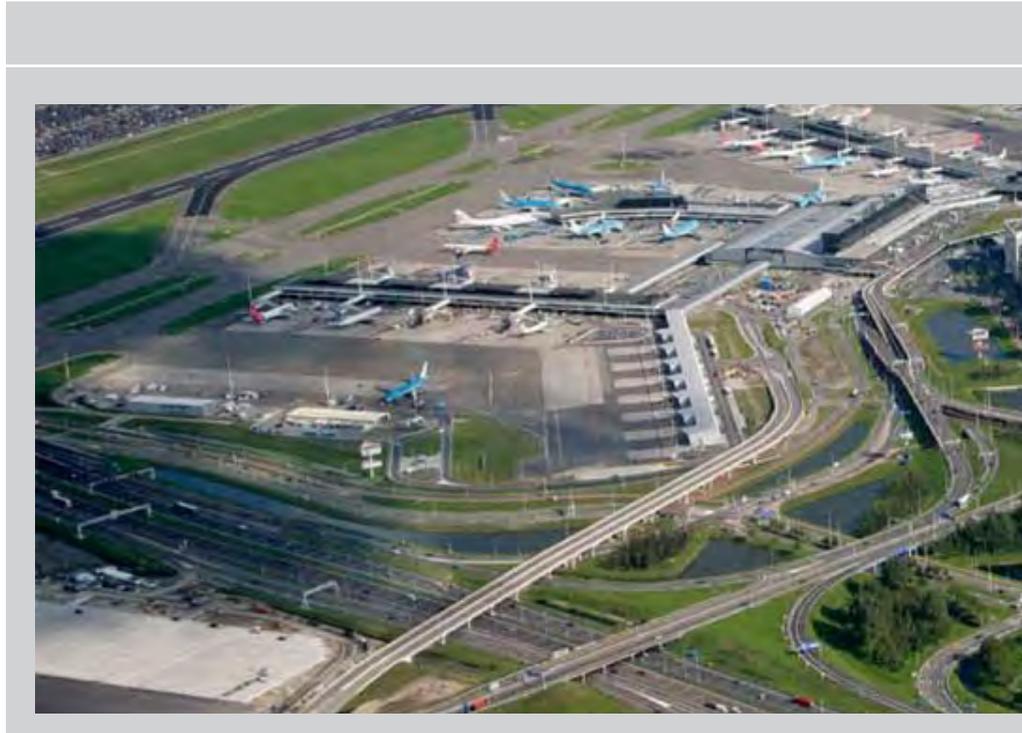
Social sustainability findings

As previously noted, growth is a prevailing discourse in the aviation industry; the ruling assumption is 'growth forever,' the goal is 'competitive advantage' and the discourse largely revolves around expansion, setbacks to growth, profits, and global free market forces.⁶⁶ While the role of airports in urban regeneration has long been recognised,⁶⁷ a dominant 'development island' mentality means that relatively few airport master plans reach out in this direction. However with the advent of corporate social responsibility this is changing.⁶⁸

Looking more broadly, the airfront, airport corridor, and airera models have the greatest potential to incorporate socially progressive goals such as community renewal, business regeneration and affordable housing since they are more clearly paradigms retrofitted to existing neighbourhoods. The decoplex harbours its benefits within the confines of a master planned community. The aerotropolis as the most aggressive model conceives the airport as an upmarket economic engine with the mark of success being high rents comparable to, if not in excess of, central city ones attracting primarily higher income users,⁶⁹ particularly through 'elite corridors' of grade A office space, housing, hotels, entertainment, and educational facilities oriented to high-income groups.⁷⁰

The social cleavages become developing countries. A vision of the Suvarnabhumi Airport aerotropolis in Bangkok is intended to capture the dynamism of planned airport-centric development but alternatively reads as dystopic: outer rings of development from the new airport will extend deep into the countryside where 'giant clusters of apartment towers and bungalows will take shape; the former will house Thais working the assembly lines and cargo hubs in the inner rings, the latter the expatriate armies imported by the various multinationals expected to set up shop around the airport'.⁷¹ In other planned settings, the working poor supporting both the airport operations and the business elite are excluded altogether, such as in South Korea's New Songdo City that is part of the wider Incheon Airport aerotropolis.⁷² Low-taxing and duty-waiving free trade zones calibrated to reduce costs and promote operational efficiency in airport cities can be exploitative spaces for cheap labour.⁷³

Social-spatial divisions are also promoted through what is termed⁷⁴ 'bypass corridors' further underscoring a sense of economic elitism. The high-speed airport-CBD rail link has emerged as a *sine qua non* for any serious contender for global city status and de rigueur for airport cities, corridors and aerotropoli. This transport infrastructure enables business travellers and top-end



tourists to be isolated to minimise the risks of interaction with non-globalised interlopers living in the intervening suburbs.⁷⁵ Some researchers⁷⁶ contend that such special purpose, high-speed, fixed route access solutions are expensive 'special services to a privileged clientele' that are neither cost-effective nor sufficiently networked for most airport area workers and many passengers.

Governance findings: towards new planning frameworks

The governance of airport regions is of growing international concern in providing the key to genuinely sustainable development.⁷⁷ In particular the trends in privatisation, commercialisation and globalisation bring new complexities and conflicts. With airport privatisation comes the transfer of airport management—and in many cases ownership—to the

private sector by a variety of methods. Airport commercialisation means the transformation of a public utility to a commercial enterprise, adopting of more businesslike management practises, while airport globalisation denotes the emergence of global airport companies who operate an increasing number of airports around the world such as BAA, Schiphol and Macquarie Airports. As discussed later in the Land Use section of this report, these trends have resulted in rapid unplanned as much as planned development of both on- and off-airport land. All this inevitably raises the issues of contested airport area development and increased aviation activity.⁷⁸ Airport regions are often the centre of conflicting interest from a range of stakeholders—airport operators, investors and developers, local authorities, infrastructure providers and regional and national agencies.⁷⁹

66 May, Murray, and Stuart B. Hill. 2002. "Unpacking Aviation Travel Futures: An Application of Causal Layered Analysis." *Journal of Futures Studies* 7:41-65

67 Robertson, J.A. W. 1995. "Airports and Economic Regeneration." *Journal of Air Transport Management* 2:81-88

68 Schaafsma, M. 2010. "From Airport City to Airport Corridor: Airport and City, Sustainability and Economy." In *Airports in Cities and Regions: Research and Practise*, edited by Ute Knippenberger and Alex Wall, 173-9. Karlsruhe: KIT Scientific Publishing

69 Van Wijk, Michel. 2007. *Airports as Cityports in the City-Region: Spatial-Economic and Institutional Positions and Institutional Learning in Randstad-Schiphol, Frankfurt Rhein-Main, Yokyo Haneda and Narita*. Netherlands Geographical Studies 353, Utrecht

70 Hack, G. 2000. "Infrastructure and Regional Form." In *Global City Regions: Their Emerging Forms*, edited by R. Simmonds and G. Hack, 183-92. London: Spon Press

71 Lindsay, Greg. 2006. "Rise of the Aerotropolis." *Fast Company* July/August:76-85

72 Campbell, S. 2005. "Metropolis from Scratch: South Korea's New Songdo City." *The Next American City* 8:9-11

73 Graham, S., and Marvin, S. 2001. *Splintering Urbanism: Networked Infrastructures, Technological Mobilities and the Urban Condition*. London: Routledge

74 Ibid.

75 Ibid.

76 de Neufville (2006)

77 Güller, M., and Güller, M. 2003. *From Airport to Airport City*. Barcelona: Editorial Gustavo Gill.; and Va Van Wijk, M. 2008. "Development of Airport Regions: Varieties of Institutions in Schiphol and Frankfurt." *Airlines* 40:1-5

78 Thomas, C., Hooper, P. and Raper, D. 2010. *Air Transport in an Environmentally Constrained World*. *Journal of Airport Management* 5:4-6

79 Güller, M., and Güller, op cit.



Amsterdam, Schiphol:
a pioneer of the airport city model of development.

The Airport Metropolis TU-deelrapport Fase 2 Report provides an overview of Schiphol and its global context. In addition to being the fifth busiest passenger airport in Europe it is in itself a major employment centre, employing some 62,000 people daily on Schiphol grounds.

All of the spatial planning models reviewed were predictably weak in respect to handling these conflicts and addressing implementation. In all cases model implementation seriously underplays the inter-sectoral complexities involved in implementing coordinative planning in dynamic urban regions marked by different public and private networks of action and influence.⁸⁰ Airports as highly specialised transportation facilities often regulated by national or independent authorities have long been a 'black hole' in metropolitan planning strategies. The lack of genuine consultation and coordination concerning development plans, land use planning, and infrastructure provision over a protracted period underpins many of the conflicts encountered today. Almost everywhere, regional governance arrangements are imperfectly equipped to handle land use development challenges in wider airport regions fragmented into multiple authorities and conflicting private and public interests. Calls for a broader conceptualization of planning at the airport-city interface are increasingly heard.⁸¹ The public-private land development partnerships pioneered in the Schiphol Airport area emerge frequently as one model for spatial governance in which 'airport-relatedness' is a criterion in coordinated land use decision-making.⁸²

However, there are some notable approaches such as the innovative approach taken for the new Berlin-Brandenburg International Airport (set to open in 2012): the two German states have collaborated in a joint planning exercise and established an official 'dialogue forum' comprising municipalities and other key stakeholders.⁸³

The problem arising with such experiments is the transferability and adaptability of the lessons to quite different institutional contexts.

Acknowledging the problem of 'glocal' tensions some research⁸⁴ has begun to explore a more relational and actor-oriented planning in which strategic visions are derived through roundtable discussion and debate between key actors leading to concrete projects through consensus. The process underlines the importance of more informal channels and forums for communication, conflict resolution and negotiation outside of statutory frameworks.

In Australia, the issue of privatisation lends a special flavour to public debate.⁸⁵ Privatised airports have sought to exploit their land assets for commercial development. These trends are sanctioned by the trajectory of government regulatory policies; however, through government inquiries and occasional public protests, a strongly stated view has emerged within the community that transport should remain primarily a public responsibility and that utilisation of public land for business enterprises not directly connected to core airport activity reflects only narrow private quests for profits.⁸⁶ So here, as in other planning jurisdictions, the wider commercial development of the airport and environs captured in different ways by the models outlined earlier remains a contested reality.

- 80 Alexander, Ernest. 1998. "Planning and Implementation: Coordinative Planning in Practice." *International Planning Studies* 3:303-20; and Salet, W., and Thornley, A. 2007. "Institutional Influences on the Integration of Multilevel Governance and Spatial Policy in European City Regions." *Journal of Planning Education and Research* 27:188-98
- 81 Güller, M., and Güller, op cit. Jarvis 2007
- 82 Van Wijk, M. 2008. "Development of Airport Regions: Varieties of Institutions in Schiphol and Frankfurt." *Airlines* 40:1-5
- 83 Sperling, S. 2010. "A Dialogue Forum: Development of the Area around Berlin-Brandenburg International Airport." In *Airports in Cities and Regions: Research and Practise*, edited by Ute Knippenberger and Alex Wall, 181-6. Karlsruhe: KIT Scientific Publishing
- 84 de Jong, B. 2008. "Glocal Complexity and Airport Planning: Towards a More Relational Planning Approach." In *Blue Skies or Storm Clouds? Essays on Public Policy and Air Transport*, edited by De Jong, Bart, Bram Kaashoek, and Willem-Jan Zondag, 65-71. Amsterdam: ScienceGuide informed by the work of Healey, P. 2007. *Urban Complexity and Spatial Strategies: Towards a Relational Planning for Our Times*. London: Routledge
- 85 Freestone, R, Williams, P. and Bowden, A. 2006. "Fly Buy Cities: Some Planning Aspects of Airport Privatisation in Australia." *Urban Policy and Research* 24:491-508.
- 86 Freestone, R, and Baker, D. Land Use Planning Around Australian Airports." *Journal of Air Transport Management* 16:264-71; and May, M., and Hill, S. B. 2002. "Unpacking Aviation Travel Futures: An Application of Causal Layered Analysis." *Journal of Futures Studies* 7:41-65

Conclusion

Airport-driven development raises a host of planning and related issues as highlighted in this research. The review has captured the implications of each scenario, finding that spatial models respond in different ways (summarised in Table 10), with various strengths and weaknesses becoming evident.

Overall an airport-centred perspective compounds the planning challenges faced—central to the task is the need to balance local liveability and sustainability, national economic interest and international dynamics.⁸⁷ As a result there is a greater need for convergence between airport and city planning. In particular, aviation

needs to be built more explicitly into the urban planning process.⁸⁸ A common theme running through the planning literature is that airports ‘cannot go it alone’—a better merging of different planning cultures is needed. This need for all parties to embrace collaborative planning⁸⁹ was recognised in the Australian Government’s National Aviation Policy White Paper as noted earlier in the report.

In addition to collaborative planning there is a need for airport strategic planning and development decision-making to consider the local regional perspective. Something frequently missing is a coherent vision of metropolitan and regional development within which aviation interests are realistically accommodated.⁹⁰

More detailed issues of land use planning, governance and the complexities around engaging multiple—and often competing—stakeholders are discussed further in the relative sections of this report.

- 87 Healey, P. 2010. *Making Better Places: The Planning Project in the Twenty-First Century*. London: Palgrave Macmillan.
- 88 Hicks, C. 2007. “Urban Planning and Airport Issues: Integrating Aviation into the Urban Planning Process.” Paper presented to the Singapore Airport Cities Conference, September.
- 89 Healey, P. 1997. *Collaborative Planning: Shaping Places in Fragmented Societies*. London: Macmillan Press
- 90 Freestone, R, and Baker, D. Land Use Planning Around Australian Airports.” *Journal of Air Transport Management* 16:264-71

Table 10. Comparison of Airport Area Planning Models on Sustainability Dimensions

	Economic	Environmental	Social	Governance
Airfront	Business district model	Mitigation and amelioration	Benefits from improvement districting	Special planning district
Decoplex	Regional industrial-leisure complex	Ideal of resource self-containment	Community stakeholders	Master planned community
Airport city	Mixed use centres with non-aeronautical development	Higher density compact development	Airport orientation	Airport authority
Airport corridor	Mutual airport-city development strategies	Mix of densities suited to location	Potential welfare strategies	Public-private coordination
Aerotropolis	Building competitive advantage into urban form	Low density spread city	Business orientation	Mixed jurisdictional for planned versus unplanned
Airea	Multiplicity of economic development and marketing nodes	Polycentric urban form	Business orientation	Regional planning

Source: Freestone & Baker 2011



Primary research material

Freestone, R. and D. Baker 2011. Spatial Planning Models of Airport-Driven Urban Development. *Journal of Planning Literature*, 63(3), 263-279.

Freestone, R. 2009. Planning, Sustainability and Airport-led Urban Development. *International Planning Studies*, 14(2), 161-176

Land Use

As previously touched on in the Spatial Analysis section, the privatisation of airports combined with factors such as the economic pressures of fuel price volatility has led to privately operated airports seeking diversified revenue streams, ultimately embracing the 'Airport City' concept. This in turn has led to, particularly in the Australian context, more and more non-aeronautical land use development within airport boundaries. In seeking to maximise return on investments and ensure their businesses are less susceptible to market downturns, airport operators in Australia are increasingly choosing retail and commercial ventures which in turn can impact on the character and progress of city-planned retail and commercial centre. This rapid increase of non-aeronautical landside development has resulted in conflict between local municipal and airport planners who are limited in their ability to engage in mutual and cooperative land use planning as a result of divergent legislative frameworks.

As a result of this trend there is a need to understand the issues surrounding integrative airport and regional planning and the extent and category of on-airport land use to allow both Australian and international airport and municipal planners to improve decision-making when proposing developments both within and beyond the airport boundary.

Research aim

To address this knowledge gap the land use research program focussed on identifying stakeholders' views and differences in airport and regional land use, and quantifying and comparing land areas for landside developments using a common nomenclature.

Key findings

The land use research identified three significant issues contributing to the fragmentation of airport and regional land use planning—current legislative and policy frameworks, competing stakeholder priorities and interests, and inadequate coordination and disjointed decision-making. Research also provided evidence of the current adhoc and incompatible airport and regional development currently taking place in Australia. Identifying a lack of common nomenclature relating to land use classification, the research team successfully developed a national land use classification for on-airport development which will assist comparative analyses and understanding across a number of airport-types of where and how the airport and region fits into the dialogue surrounding land use compatibility.

It is envisaged that in the Australian context, this research will establish a national reference for decision-making when proposing development both within the Airport Master Plans and beyond airport boundaries in local town and regional plans.

Research methodology overview

The land use component of the project is informed by the work of Nicholas Stevens who has recently submitted his PhD. His research consisted of managing stakeholder workshops and in-depth interviews in case studies of three major Australian airports—Adelaide, Brisbane and Canberra. The Land Use Forums run in each of the three locations were aimed at identifying stakeholders' views and differences regarding airport and regional land use. The outcomes were then used to inform future land planning research efforts. Document analysis of all Airport Master Plans produced by the 22 privatised airports governed by the *Airports Act 1996* (the Act) and in-depth stakeholder interviews were used to identify emergent, higher-level issues regarding the uncertainty and opportunities surrounding airport and regional land use planning. An international comparison of current land uses of 75 airports from North America, Europe and Asia was also undertaken.

A history of land use



Land use context:

airport operators in Australia are increasingly choosing retail and commercial ventures which in turn can impact on the character and progress of city-planned retail and commercial centre.

As a result this rapid increase of non-aeronautical landside development has often caused in conflict between airport and regional planners.

planning in the Australian context

In order to understand the issues surrounding land use planning within Australia it is necessary to understand its history.

Land use planning became a significant issue with the advent of airport privatisation in Australia. Between 1997 and 2002 the Australian government leased all Federal Airports Corporation-administered airports to private corporations and syndicates under the provisions of the then new Act. Airport operators effectively entered into 99 year leases (50 year lease with the option of a further 49 year lease).

The syndicates included a range of national and international business interests, the latter of which included Schiphol group, British Airports Authority, Deutsche Asset management and Hastings Fund. Government sales teams actively marketed the investment potential and opportunity for revenue from property development, car parking and commercial initiatives⁹¹ and operators ultimately purchased a wide range of development rights with little restrictions on land uses and types of development.

From a government policy perspective the privatisation of the 22 Australian airports was hailed as a success, netting the federal government billions of dollars in revenue. However, while a success in terms of alleviating financial strain, municipalities largely expected airports to remain as 'city airports' predominantly as air transport hubs. This contrasted with the reality where privatised airports, seeking to diversify their revenue and reduce the risk of market downturns, rapidly turned to non-aeronautical developments within the airport boundaries in order to maximise profit. While in 1996 most of the 22 privatised airports were virtually green fields (with the exception of airport facilities) the landscape is now very different.

Challenges and conflicts facing land use planning in Australia

The research shows that many of Australia's major airports are embracing the 'airport city' concept as strategic intent. Since privatisation the rate of non-aeronautical development has been swift, presenting a range of challenges and issues for both airport and region.

While much landside non-aeronautical

development overseas focuses on enhancing the function of the airport (thereby not competing directly with the region) this is not the case in Australia. Australian airports appear to favour landside non-aeronautical developments which draw on the regional catchment for new consumers. This has created a climate of conflict with local municipal authorities who believe that increased retail and commercial developments within airport boundaries will take away from city-planned retail and commercial centres, impacting on the region's viability. This concern is evidenced in the submissions received in response to the National Aviation Policy Green and White Paper as well as the costly legal disputes experienced by Brisbane and Canberra airports in relation to planned developments.

Much of the conflict and lack of integrative planning stems from the fact that airport and regional stakeholders are challenged by divergent legislative frameworks which limit mutual and cooperative land use planning. Under the Act, local and state government control of on-airport development is limited to 'consultation'. The Australian airport planning approvals process involves an Airport Master Plan and major development plans (MDPs). The master plan is a strategic policy document setting out the airport's agenda for current and future airport management and development and deals with broader indicative intentions rather than detail individual projects. The master plan must relate to a period of 20 years and be updated every five years.⁹² Section 71 of the Act lists matters that must be included in a draft master plan for an airport, including the airport lessee company's assessment of future needs of civil aviation and other users of the airport for services and facilities. Under s79, before submitting a draft master plan to the Minister, the airport must undertake a formal 90-day public consultation process. Details of the public consultation undertaken, submissions received and details of consultation undertaken by the airport lessee prior to the formal public consultation period must be included in the draft master plan lodged with the Minister.⁹³ Approval of a master plan does not represent approval to build any specific major development referred to in the master plan. Major development applications must be separately approved. Under s89 a separate MDP is required for each development that is defined as 'major'. This is an extensive definition, and includes development such as constructing a new runway or extending an existing one; constructing a new building wholly or principally for use as a passenger terminal

where the building's gross floor area is greater than 500m²; constructing a new building not used wholly or principally as a passenger terminal, whose construction cost exceeds \$20 million; and development of a kind that is likely to have a significant environmental or ecological impact.⁹⁴

Conversely, there are no mechanisms for airport operators to have input into off-airport land (regional) development; airports are frequently concerned by land use planning for consolidated and Greenfield residential development under flight paths and proposed high-rise airspace interference. Ultimately neither airport nor regional stakeholders are able to influence, endorse or veto land use planning decisions of the other. The result is that planning occurs in isolation with actual and potential land use conflicts and lost opportunities for collaborative and value adding urban development. In response to this, two Australian states (Queensland and Western Australia) have developed aviation state planning policies to help local governments in planning and developing near airports, while some airports and regions have developed informal consultative processes such as memorandums of understanding, monthly meetings or reference groups. However, despite these initiatives the processes are primarily 'consultative' as opposed to 'collaborative'.

In addition to the complexities of on- and off-airport land planning as a result of disparate legislative frameworks, while the Act intends for airports to utilise similar land use planning vernacular, few do so leading to a lack of common nomenclature relating to on-airport land use.

Government responses

As covered in the Aviation section of this report, land use issues were covered under 'airport infrastructure' in the federal governments National Aviation Policy Review. Following the release of the Green Paper, a discussion paper (*Safeguards for airports and the communities around them*) was released with the aim of developing a national technical rule book for off-airport development to assist in protecting airspaces and the community from operational and catastrophic aviation impacts. The proposed framework will not, however, provide spatial land use planning guidance to identify potential conflicts or opportunities for cooperative, integrative development. In addition to the National

91 Freestone et al. op cit.

92 Ibid.

93 Ibid.

94 Hooper et al., 2000

Aviation Review, the federal government has initiated two additional reporting requirements and guidelines for airports,⁹⁵ one of which concerns vehicle and traffic impacts. In January 2011 a further draft guide was released, titled *Significant impact on the local or regional community guide*, intended to provide information to both the public and industry stakeholders about whether a proposed on-airport development 'triggers the significant impact on the local or regional community clause'⁹⁶ of the Act 1996. However, other than these responses and whilst the White Paper forwarded commitments regarding communicative mechanisms for airport and regional dialogue, there is little in the way of mechanisms for genuine planning assistance or the provision to either airports or regions to have significant influence in planning processes.

Land use planning research findings

Case study sites

The Land Use Forums brought together over 120 industry and government representatives from aviation service providers, freight management and infrastructure corporations, tourism board and council representatives, chambers of business and commerce, members of the emergency services, engineering and airport master plan consultants, energy and telecommunications infrastructure providers and both private and public transportation infrastructure providers.

The three case study sites were chosen due to the fact that they:

- exhibit significant variance in their airport and regional regimes
- acknowledge regional land use planning conflict
- have capacity for further on-airport non-aviation land use development
- all share common airport and regional land use planning opportunities.

Current airport–regional land use planning issues

Using the airport metropolis interfaces—governance, infrastructure, economic development and an additional interface 'environment'—provided a robust structure to assist in interpreting airport and regional land use planning conflict and opportunity. This analysis uncovered eight key issues pertinent to industry and government stakeholders across all three sites. Table 11 outlines the key airport and regional land use planning themes for each interface domain.

Table 11. Airport and regional land use



CASE SITES FROM A PLANNING PERSPECTIVE

Brisbane, Queensland

Brisbane Airport is Australia's third-largest airport in terms of passenger movements, where 18.9 million passengers passed through in 2009–10.⁹⁷ Brisbane Airport Corporation (BAC) administers and manages a 2400ha airport site 12 km to the north east of the Brisbane central business district. Brisbane City Council (BCC) is the sole local government administration which adjoins the airport site and is the local government area most directly impacted by the airports operation. The Queensland state government also plays an important role in regional land use planning and administration through the provision of aviation orientated state planning policy and the establishment of the Urban Land Development Agency (ULDA). ULDA has oversight and approvals responsibility of key 'state significant' urban development projects, several of which are located in the Brisbane airport urban catchment. The Queensland context presents three tiers of government all with land use approvals power operating within the same urban framework.

Adelaide, South Australia

Adelaide Airport is Australia's fifth-largest airport in terms of total passenger movements, where 7.02 million passengers passed through in 2009–10.⁹⁸ The airport site is 785ha and located approximately six kilometres west of the Adelaide central business district, and is administered and managed by Adelaide Airport Limited (AAL). Four local government areas (LGAs) surround the airport and are directly affected by the operation of the airport. Within this context, the City of West Torrens entirely surrounds Adelaide airport, while the cities of Holdfast Bay, Adelaide and Charles Sturt are adjacent to and may be considered to be within the area of influence of the airport. The South Australian state government also plays an important role in planning for greater Adelaide through *The 30-Year Plan for Greater Adelaide*. This document provides a guide for local government planning and development decision-making, thereby requiring local government development plans to be consistent with the Plan's principles, policies and targets.

Canberra, Australian Capital Territory

Canberra Airport had a total of 3.26 million passenger movements in 2009–10.⁹⁹ The airport site is 436ha and located 6km from the Canberra central business district and is administered and managed by Capital Airport Group (CAG). The administrative context for the Australian Capital Territory (ACT) is unique in that there is no 'state' government or lower house 'local' government—it is a federally administered territory government. Many of the planning approvals for the ACT are managed by the ACT Planning and Land Authority. In addition, the National Capital Authority has planning and approval powers in 'those areas of continuing interest in the strategic planning, promotion, development and enhancement of Canberra as the National Capital'.¹⁰⁰ The airport is adjacent to the state of New South Wales (NSW) and two local government areas (LGAs) within NSW, Queanbeyan and Palerang. In consideration of the airports Australia Noise Exposure Forecasts (ANEF) contours, these LGAs are impacted by the operation of Canberra Airport.

95 Queensland Government. (2009) Queensland Department of Infrastructure and Planning. South East Queensland Regional Plan 2009–2031 (SEQRP) July.

96 Australian Government. (2011) Significant Impact on the Local or Regional Community Guide – Discussion Draft. Department of Infrastructure and Transport, Canberra, Commonwealth of Australia. January.

97 DITRD LG 2011b

98 DITRD LG 2011

99 Ibid.

100 National Capital Authority (2010) Business Plan 2010 – 2014. Australian Government, Canberra.

planning themes

Interface	Key theme	Description
Land Use & Governance	Legislation limits consultation	In this theme stakeholders recognize that integrated airport and regional decision making relies on consultative processes established in good faith. The need for both formal and informal communication mechanisms across airport businesses and all tiers of government was seen as necessary to achieving higher levels of coordination. State, territory and local government stakeholders raised issues pertaining to the initial privatization process, particularly in relation to the lack of perceived transparency and partiality, and the ongoing federally administered on-airport planning approvals process.
	Divergent planning processes and priority	Stakeholders acknowledge that processes for compatible and integrated airport–region land use planning are multifaceted and complex. Regional stakeholders conceded that on-airport planning and development arrangements under the Act will have important latent and explicit impacts for urban and regional development. Conversely all airport lessees appreciate that on-airport planning is in the national interest and believe the approval processes must continue to be a federal responsibility, vigorously opposing any regional interference or further federal oversight when it comes to landside development. They are also gravely concerned about the impacts of local and regional planning on airport operations. However, while this theme highlighted differing stakeholder opinions there were some encouraging findings, with general agreement regarding the move towards more cooperative relationships and improved mechanisms developing on both sides.
Land Use & Environment	Inter-jurisdictional fragmentation in decision-making	This issue was recognised by all as contributing to the piecemeal decision-making on environmental issues. Stakeholders agree that the disjuncture relating to requirements and considerations for environmental reporting mean that airport–region environmental management will never be seamless. Government stakeholders, however, regard state government administered regional planning frameworks to be a solution, providing jurisdictional directives and regulation to aid integrative environmental management.
	Independent scope of environmental parameters	The disjuncture on the requirements and considerations for environmental reporting across jurisdictions is a continuing source of frustration for all stakeholders; not only are many stakeholders seeking direction on who is responsible for what, they are also unclear on ‘what’ requires detailed consideration. The impacts of many environmental externalities are not able to be contained to a particular site or situation. Significant environmental concerns include storm water runoff, flood mitigation, and noise. Stakeholders from both the airport and region agree that a clearer direction and awareness of reciprocal and interface biophysical environmental impacts is needed in all strategic planning documentation. The anticipated cooperative understanding of environmental impacts was also extended to include further consideration of social environmental parameters and forecasting across all stakeholder strategic documents. In all of the case study regions, research participants acknowledged that collective and agreed understanding of demographic trends and socio-economic parameters are needed.
	Inadequate mechanisms for improved land use planning	There are few mechanisms to help mitigate negative environmental impacts and promote cooperative and integrated airport and regional land use planning. The issue of aircraft noise was a foremost concern for stakeholders. Airport stakeholders in particular were universally concerned about the use of Australia Noise Exposure Forecasts (ANEF) contours as a regional planning tool. They also agree urban and regional stakeholders need to continue to consider airport and regional land use planning as a three dimensional exercise with the detailed inclusion of Obstacle Limitation Surface (OLS) and Procedures for Air Navigation Services – Aircraft Operations (PANS-OPS) in all strategic land use planning documents. Across the case studies key points of environmental difference relate largely to the locational context of the airport and region. Each site has distinct climatic conditions, geography, flora, fauna and regional demographics. These differences are further apparent when considering the detail of the environmental parameters included in off-airport regional environmental strategic planning and the legislatively required Airport Environment Strategies.

Interface	Key theme	Description
Land Use & Economic Development	Limited acknowledgment of reciprocal economic impacts.	<p>All stakeholders agree that airports are significant drivers of local, regional and national economic development by means of their aviation function. However airport stakeholders believe that while governments and business recognize this, the broader community does not. In addition, aviation-based airport economic development is seen as unique and as such is entitled to particular planning and development concessions. However the expectation from urban and regional stakeholders is that on-airport commercial development is not in economic conflict with local and regional retail and commercial services. The economic impact of an airport is most often acknowledged as bestowing regional advantage, yet some impacts are recognized by regional stakeholders as diversionary and consumptive of regional benefit, for example on-airport retail centres drawing custom from regional areas. All stakeholders recognize airports need to diversify their revenue streams and that mutually beneficial and cooperatively developed airport and regional economic development is necessary. However confidence issues and competing priorities and interests make cooperative economic planning difficult to achieve.</p> <p>In addition there is no consistent consideration of the airport in regional strategic policy documents. In more than a decade since privatization, urban and regional planners and policy makers continue to struggle with the changing role of airports and the means by which they may be acknowledged, incorporated and included with the broader urban framework. While accepted as an aviation hub there is caution in acknowledging the commercial and retail role of airports for fear of legitimizing an on-airport function which they have argued so strongly against. However, despite urban and regional inconsistency in the designation of the airports, regional stakeholders agree that mutual policy recognition has gone some way in assisting airport and regional integration. They appreciate that airport master planning is increasingly acknowledging and incorporating off-airport infrastructure and elements of regional planning.</p>
	Disputed impacts on transport infrastructures	Disputed impact relates largely to accounting for the use of a range of infrastructures in consideration of actual and proposed on- and off-airport land use. Regional stakeholders have often been critical of airports developing as multi-use commercial and retail centres, believing such developments are contributing to regional road congestion. As such there is pressure for airports to (further) financially contribute to the planning and development of off-airport roadway infrastructure. Conversely airport stakeholders have a different view: they believe they have contributed enormously to on-airport infrastructure which is of substantial benefit to the region.
Land Use & Infrastructure	Inadequate coordination of infrastructure delivery	How airport and regional transport infrastructure is forecast, managed and financed is central to much of the airport and regional planning debate. All stakeholders agree these connections are critical in ensuring the efficient use of the airport as a regional aviation hub and economic generator. While they recognize the importance of integrated infrastructure planning, the links between airport and regional land use approvals and the impact on infrastructure demand is not comprehensively sequenced or modelled in any of the case studies. Stakeholders consider the negotiation and establishment of infrastructure agreements regarding coordination and contribution equity to be important. They agree that it should be clear who is responsible for providing and funding utilities and transport infrastructures. It is recognized that initiation, implementation and integration of this infrastructure needs to be facilitated through appropriate cooperative arrangements, long term planning strategies, effective communication and committed agreements. Case study stakeholders are beginning to initiate and negotiate ad hoc planning and agreements for a range of infrastructures through context driven arrangements beyond any statutory responsibility. These arrangements have included in lieu infrastructure contributions, memorandums of understanding, management contracts and construction finance.

Summary

The Land Use Forums were established and facilitated specifically to explore the interface relationship with airport and regional land use policy. They provided rich insight into current issues and opportunities. Overall, the forums uncovered three key findings:

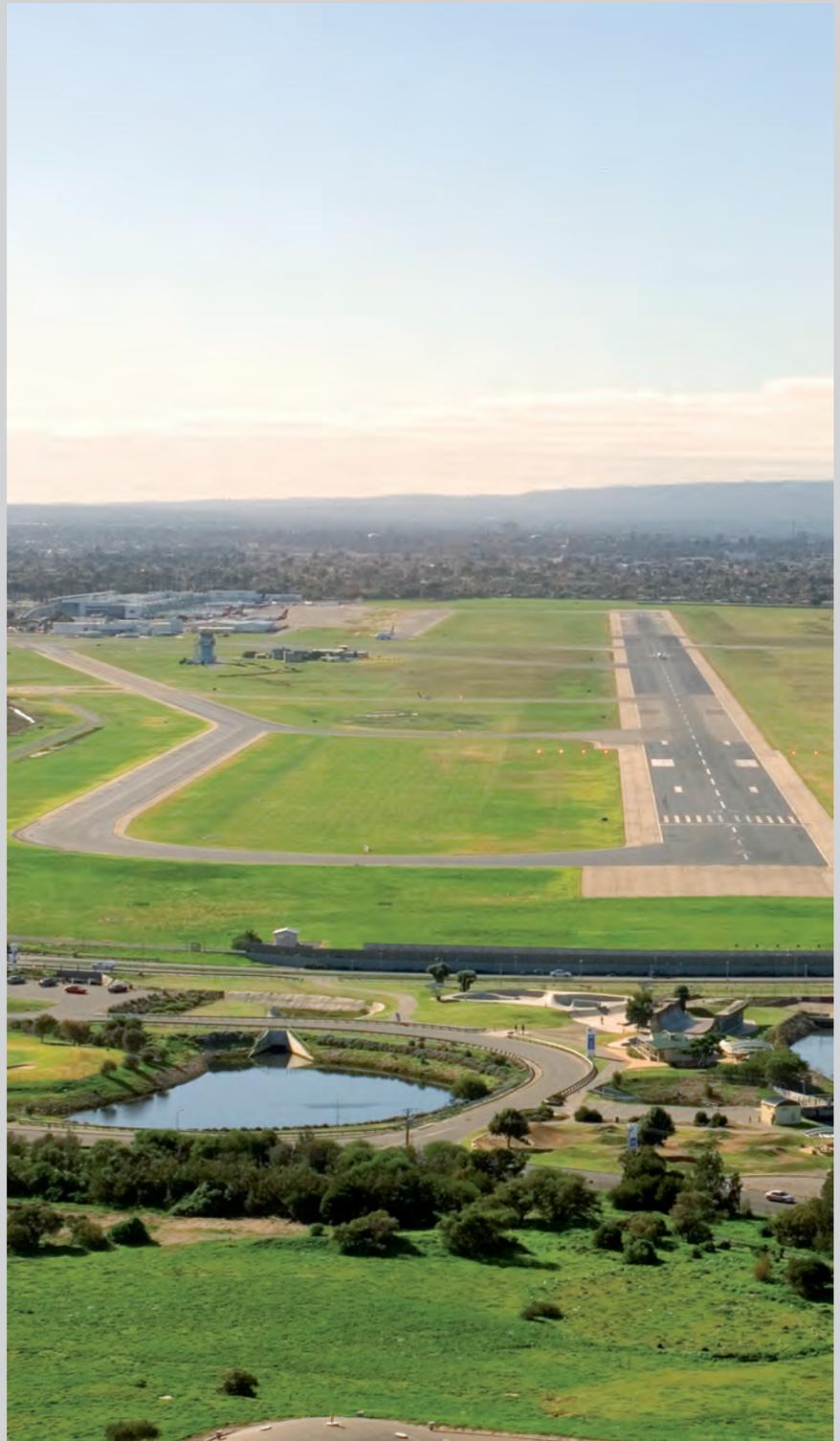
- There are three principle concerns contributing to the fragmentation of the airport and regional land use planning:
 - current legislative and policy frameworks;
 - the competing priorities and interests of stakeholders; and
 - inadequate coordination and disjointed decision-making.
- Stakeholders across the three cases experienced a level of consistency in the problems they face.
- Cooperative and integrated airport and regional planning needs to be negotiated at a local and regional level.

In terms of the specific themes within each interface domain the following findings are highlighted:

- **Land use and governance**—governance issues are fundamental to the consideration of airport and regional land use planning (this issue is reported on in its own right later in this report).
- **Land use and environment**—it is clear that airport land use development requires a trade-off between expansion and potential negative impacts for surrounding areas.
- **Land use and economic development**—stakeholders must recognise, support and understand the importance of airports and the unique development and economic opportunities they provide. They acknowledge that airports are significant drivers of economic development and that there is benefit to cooperative land use and economic development planning within a 10–15 km radius of the airport metropolis.
- **Land use and infrastructure**—there is a recognition that the initiation, implementation and integration of infrastructure needs to be facilitated through cooperative arrangements, long-term planning strategies, effective communication and committed agreements. In addition there is a clear need for a governance structure as identified in relation to the land use–governance interface.

Overall the findings support the notion that better management of reciprocal impacts can be achieved if they are supported by effective policy frameworks.¹⁰¹ They acknowledge a general discord in the coordination and decision making in current airport and regional land use planning. These findings offers a basis for further research into these fragmentary themes.

¹⁰¹ Blanton, W. (2004) *On the Airfront*. Planning 70(5) pp. 34–36; Department of Transport (DoT). (2002) *State of California. Division of Aeronautics. California Airport Land Use Planning Handbook*. January. (accessed 27/06/2009) <http://www.dot.ca.gov/hq/planning/aeronaut/htmlfile/landuse.php>; and Graham, A. (2003) *Managing Airports*. 2nd ed. Oxford: Elsevier.



Current airport land uses

In addition to identifying the principal concerns of stakeholders, the project's land use research component aimed to assist airport and local municipal planners both nationally and internationally to understand the extent and category of on-airport land use, the land use team undertook a review of all Airport Master Plans from the 22 privatised airports.

This analysis shows two key issues:

- there is currently a disjunction between airside operations of many airports and developments being proposed and established within their boundaries; and
- despite the efforts and intentions of the *Airports Act 1996*, there is no common nomenclature across airports and municipalities in relation to land use categorisation.

In response to this the research team developed a common set of zoning categories in order to compare and contrast current on-airport land uses (Table 12). As a result these categories can be used as a common national land use classification to enhance the comparability and understanding of where and how airports and regions fit into the dialogue surrounding land use compatibility.

Table 12. Zoning Categories—Australian airport comparison

Zoning Category	Description
Residential	Predominant use is housing.
Commercial	Retail, business, community, leisure, entertainment, recreation, hotels, conference facilities, shopping centres, (i.e., will mostly be non-aeronautical)
Industrial	Warehouses, freight, manufacturing, service oriented businesses, (can be either aeronautical or non-aeronautical)
Commercial and Industrial	Mix use commercial and industrial.
Open Space and Conservation	Open areas, nature based recreation areas, protected areas.
RAAF Base	Military airbase of the Royal Australian Air Force (RAAF). The Australian Department of Defence has planning and control of this area.
Airport Airside (including terminal and aviation support)	Aviation operational areas, terminal and aviation support areas.

These zoning categories were adapted for the international comparison of 75 airports across Asia, Northern America and Europe as can be seen in Table 13.

Table 13. Zoning Categories—International airport comparison

Land use category	Description
Residential	This category incorporates different scales of residential types, such as high density multiple dwelling, medium and low density single unit, and mixed residential where various residential uses occur and the individual uses cannot be separated at mapping scale.
Commercial Services	Areas that contain structures predominantly used for the sale of products and services are classified as Commercial and Services. This category incorporates CBD, commercial strip development (commercial activity developed along major highway and access roads to cities and towns), isolated commercial establishments, isolated commercial office buildings (scattered commercial development), shopping centres, resorts, hotels, motels and related facilities, educational institutions, health institutions, correctional institutions, government centres, military installations, other institutional, and mixed commercials and services (this includes a mix of various commercial uses and services exist and no one category predominates).
Industrial	This category encompasses a great variety of structure types and land uses. Light and heavy industry are comprised of land uses where manufacturing, assembly or processing of products takes place. Power generation and sewage plants are included here because of their similarity to heavy industry.
Transitional land	Areas where construction activity or change in land use is occurring.
Open Space and Recreational Land	Areas of natural or man-made green spaces or areas used for recreational purposes. These include parks, forests, sporting arenas, natural reserves.
Agricultural	All areas used primarily for the production of food and fibre and some of the structures associated with this production. This category incorporates cropland and pastureland, orchards, vineyards, nurseries, and horticultural areas.
Water	Areas incorporating streams, canals, natural lakes, artificial lakes, reservoirs, bays, estuaries and all other tidal waters.
Airport	Areas owned or under control of airport.

When looking specifically at Australian airports' land use it can be seen that Australian airports opt for retail and commercial (e.g. industrial parks) as a source of alternate revenue stream—resulting in high levels of local/regional conflict and dissatisfaction with airport operations.

The findings from the Australian review found that on average 50% of airport land is used for airside activities, 8% for defence uses, 13% for open spaces and 29% for landside development activities (Figure 10).

These results confirm that in Australia, many airports are turning to retail and commercial/industrial park type developments to diversify their income streams. Indeed, all 22 airports studied zoned their land assets with capitalisation of landside developments in mind, supporting the notion that major Australian airports are embracing the 'airport city' concept as strategic intent.

However, there appears to be no relation between the amount of land being zoned for landside development and an airport's size (in terms of both property area and passenger and freight movement). While this finding was disappointing, it was not entirely unexpected—the urban environment has many complex variable and factors which govern the space in which development can and will occur.

An international comparison

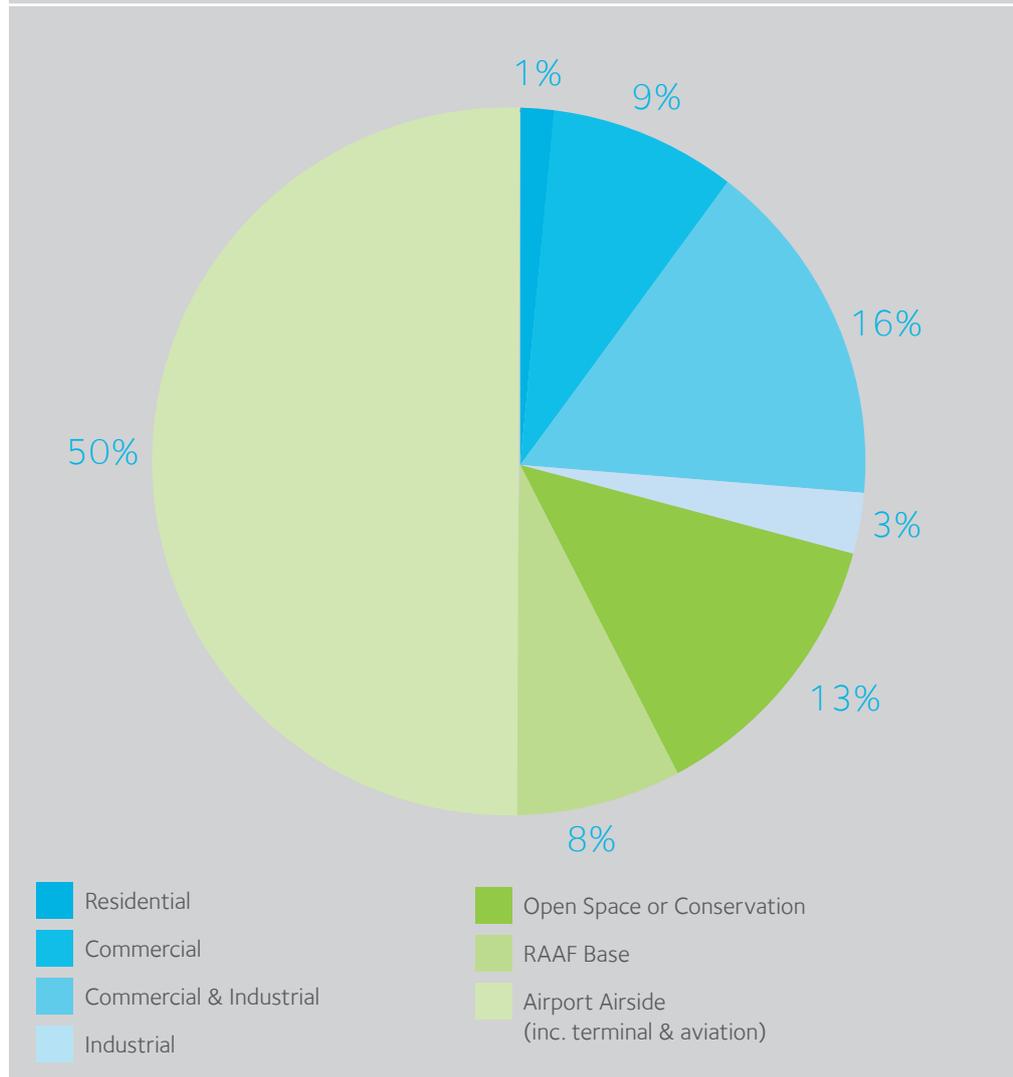
In comparison the international study of 75 airports found:

- Residential accounted for 31%
- Agricultural for 22%
- Open Space for 13%
- Water for 15%
- Industrial for 7%
- Airport for 7%
- Commercial for 4%
- Transport for 1%

The trends across the international study group (Figures 11 - 13) found the following key findings:

- North American airports have twice as much residential land around airports (45%) compared to Europe and Asia, and over twice as much commercial (6%) and industrial (12%) land uses compared to Europe and Asia
- Asian airports are dominated by water (25%), agriculture (23%) residential (24%) land
- European airports have high agricultural land (37%) and open space (17%) as surrounding uses and have low commercial (2%) and industrial uses (4%).

Figure 10. Australian zoning percentages



Conclusion

Overall, land use around airports appears to be contextual, with governance and development patterns in particular being unique to each area.

While internationally there does not appear to be a dominant trend of land development around airport-type and commercial and industrial land uses are relatively low, within Australia major airports can be seen to be embracing the notion of the airport city concept, focussing primarily on retail and commercial land use developments.

This, combined with Australia's strong privatisation framework, has led to complex and often conflicting airport region land use planning. With the development of a common national land use classification, airport and local municipal planners will now be able to better understand where their airport and region fit into the dialogue surrounding land use compatibility.

As the researchers found in the stakeholder workshops, airport-region stakeholders clearly recognise the benefits of cooperative land use planning and, external to any legislative requirements, are making progress toward more integrative planning processes. This need has also been recognised in the 2010 National Aviation Policy White Paper which advocates for enhanced commitment to transparent documentation, consultation and accountability.

However, greater governance structures and a common nomenclature alone are not enough—airport and regional stakeholders need also better comparative land use planning tools from which they will be able to make more informed decisions. The project team sought to resolve this significant shortfall by developing the Planning Support System (PSS) as discussed in the next section of the report.

Figure 11. North American airport trends

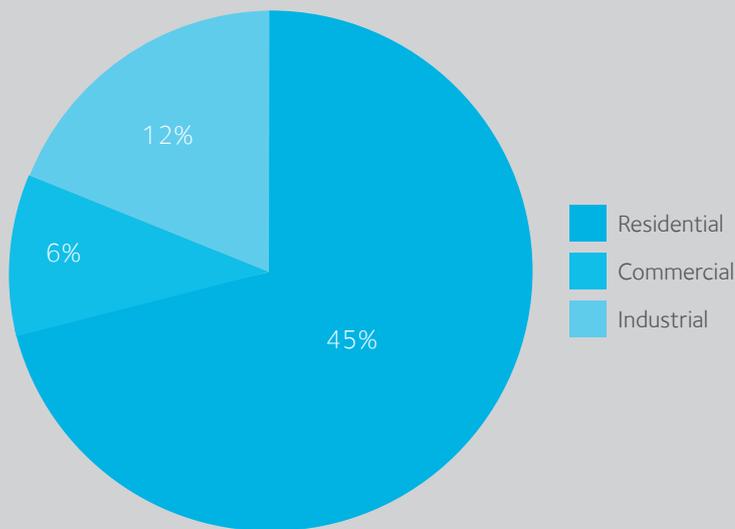


Figure 12. Asian airport trends

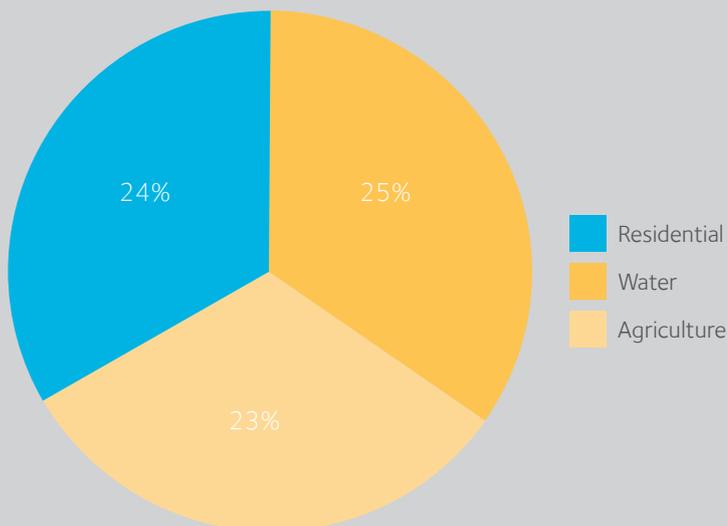
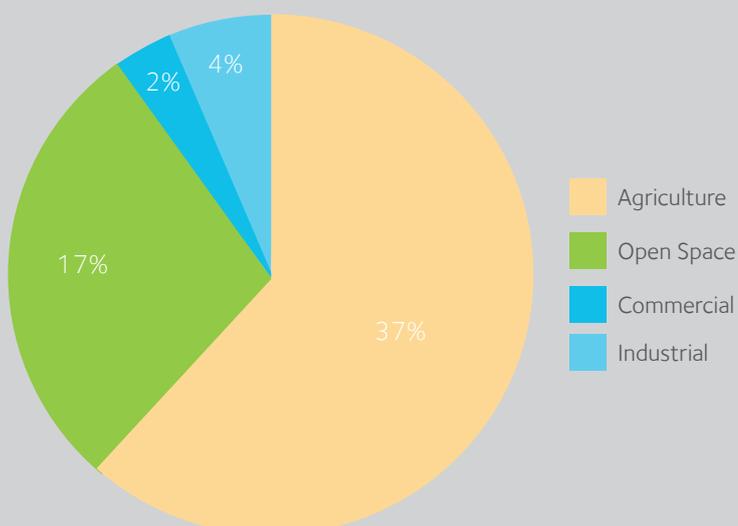


Figure 13. European airport trends



Primary research material

Baker, D. 2008. *Land Uses Around 75 International Airports: Trends and Challenges*. Presented at Aviation Business Airport Development 2008 Conference. Sydney, Australia, June 4-5.

Stevens, N. and D. Baker (In Press) Land use conflict across the airport fence: competing urban policy, planning and priority in Australia. *Urban Policy and Research*. In Press Nov 2011

Stevens, N. and Walker, A. 2010. Land use trends in and around Australian airports since privatisation. Presented at the 14th Air Transport Research Society World Conference, Porto, Portugal, July 6-9.

Walker, A.R., Stevens, N. 2008. *Airport City Developments in Australia*. TRAIL Congress Conference 2008, 15-16 Oct, Rotterdam.

Airport Metropolis Research Themes: Overview and Highlights

Highlights:

- An airport centred perspective can compound planning challenges.
- There is an increasing need for convergence between airport and city planning.
- Airports cannot 'go it alone'.
- Planning models and their implications for airport operations, local, state and national government are important considerations.

Spatial Analysis

Spatial analysis develops the theoretical concept of the airport metropolis and its changing role in the urban pattern.

Highlights:

- There are three significant contributors to the fragmentation of airport and regional land use planning: current legislation and policy frameworks, competing stakeholder priorities and interests, and inadequate coordination and disjointed decision-making.
- There is a lack of common nomenclature relating to land use classification.
- Land use appears to be contextual with development patterns unique to each area.

Land Use

Land use addresses the need to understand the issues surrounding integrative airport–region planning and the extent and category of on-airport land use in Australia.

Highlights:

- There is a need for integrative support to state decision-making.
- The PSS theme aims to bridge disparate planning with its a and cont planning.
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Planning

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Highlights:

There is a need for an innovative planning tool to bridge the gap between airport and local and regional decision-making. This tool has the potential to bridge the gap between different planning regimes and the ability to compare and contrast different spatial policies and impacts. The prototype has proven effective in modelling interactions and integrating them into one platform, providing invaluable insights for stakeholders.

Highlights:

- Standard stakeholder categories do not suit complex airport stakeholder arenas.
- Stakeholders differ on various levels and need contingent approaches.
- The Airport Metropolis Project's stakeholder analysis approach is better suited to unpack the dynamic complexity of the airport stakeholder arena.
- The Stakeholder Engagement Tool is being successfully used by project partners.

Highlights:

- Network governance is a key component of airport–region planning.
- Airport–region decision-making currently adopts a hybrid model of informal, horizontal governance in the form of networks alongside the formal hierarchical market modes of governance.
- Despite airport–region tensions a number of pathways exist to move planners to more integrative mechanisms.

Support System

The system has evolved over the last project to focus on spatial scenario building to assist decision-making.

Stakeholder Engagement

Stakeholder Engagement focuses on the mechanisms used to identify key stakeholders and the development of strategic management tools.

Governance

This theme focused on understanding how to achieve greater collaborative planning approaches and to better understand current governance practices and impacts surrounding airport–region planning.

The Planning Support System

The consequences of the changing urban form present significant challenges for the integration of airport and regional planning for airport and city planners alike. Strategic airport planning in particular faces three main challenges:

- inefficient problem-solving process for airport planning problems;
- inadequate consideration of the uncertain future; and
- a lack of stakeholder involvement.

As airport–regional interactions become more complex, and a broader understanding of trends, problems, challenges and sustainable policy solutions becomes increasingly important for public and industry policy-makers. Modelling these interactions and integrating them into one system has the potential to support stakeholders grappling with the challenges of new airport city type developments—particularly where stakeholders have conflicting interests. However, while tools exist for regional planning and for airport operational planning there is no one tool that addresses both landside and regional planning simultaneously. Recognising this shortfall, a key aim of the project was to develop a Planning Support System (PSS) framework to support all stakeholders in the planning and development of an airport city, incorporating land use, infrastructure, governance and economics models into the framework to simulate the relationships between an airport city and its surrounding urban interface.

The main research problems resulting in the need for an integrated PSS were:

- What PSS functionality should be provided to facilitate meaningful discussion and negotiation about an airport region's development?
- How do we integrate the various airport sub-system components to model the complete airport complex system?
- How do we represent the importance of respective sustainability indicators and the relationships between them to create an intuitive intelligent PSS interface?

The benefits of this research cannot be underestimated. Providing stakeholders with a tool that can integrate—often conflicting—interests into one common goal for the airport–region is significant. Not only will it aid with the implementation of the Planning Coordination Forums called for in the National Aviation Policy White Paper (White Paper) by facilitating the

communication of spatial planning policies and their impacts and benefits, it will ultimately lead to better decision-making. In addition the recent amendment to the Act (under the Master Plan Amendments Guidelines) requires that airport planning consider off-site impacts in a Ground Transport Plan. The PSS will provide an ideal opportunity to model a variety of off-site impacts and examine opportunities to mediate impacts in different scenarios.

While the tool is still undergoing work, the research team has successfully used the Brisbane Airport Region as a case study to pilot initial prototypes.

The need for greater airport regional planning integration—a background

As noted earlier in this report, with the rise of the airport city, airports can no longer be considered in isolation to their surroundings; likewise, as a result of increasing urban encroachment of airport boundaries, regions can no longer plan in isolation to the airport. While airports are embracing the airport city model—seen in the rise of non-aeronautical development on airport land—the regions within which they operate have not. The issue is further compounded by the impacts of privatisation and its associated governance networks, with airports operating under different planning regimes to the local and state areas surrounding them, ultimately acting to limit the opportunity for cooperative planning resulting in divergent strategic visions.

This disconnect has been recognised in the recent White Paper which notes the lack of compatibility between airport development and community planning. Consequently the White Paper has called for 'improved planning at Australia's airports to facilitate better integration and coordination with off-airport planning', in particular calling for the introduction of Planning Coordination Forums. As a result the need for an

integrative planning tool to support airport and local and state decision-makers has never been greater. A PSS has the ability to bridge the gap between federal, state and local planning regimes with its ability to compare and contrast different spatial planning policies and impacts. In doing so it presents an opportunity to bring together the increasing number of stakeholders in the airport planning domain, using commonly understood terms and agreed metrics.

What is the PSS?

The PSS goes beyond simple geographical information systems (GIS) functionality and is well suited to collaborative planning. Defined as 'any geographical information and spatial modelling system that has been developed to support public or private planning processes (or part thereof) at any defined spatial context,¹⁰² the PSS essentially acts as the missing link between planners and a GIS.

The PSS supports collaborative planning by integrating the sometimes conflicting stakeholder interests with one common goal for the airport and surrounding region. It achieves this by allowing the integration and modelling of a range of issues, trends, challenges and sustainable policy solutions into one system. Using a common language and agreed metrics it has the ability to express technical modelling outcomes in terms familiar to planners.¹⁰³

In addition in the process of employing an agreed set of metrics the PSS has the added benefit of ensuring differing stakeholder positions are communicated to the broader planning group with less emotion and in factual terms.

¹⁰² Geertman, S. & Stillwell, J. (2003) *Planning Support Systems in Practice*, Berlin, Springer.

¹⁰³ Brommelstroet, M. T. & Bertolini, L. (2008) *Developing land use and transport PSS: Meaningful information through a dialogue between modelers and planners*. *Transport Policy*, 15, 251–259

“The informal benefits have been very good as a principal in planning, given us the ability as a technical developer of transport models to be able to look at what others are doing and have discussion with them and see if that’s the direction we may take. This process has built up the ability to build good models; it has assisted in that coming together.”

(DEPARTMENT OF TRANSPORT AND MAIN ROADS, DAVID WELSBY)

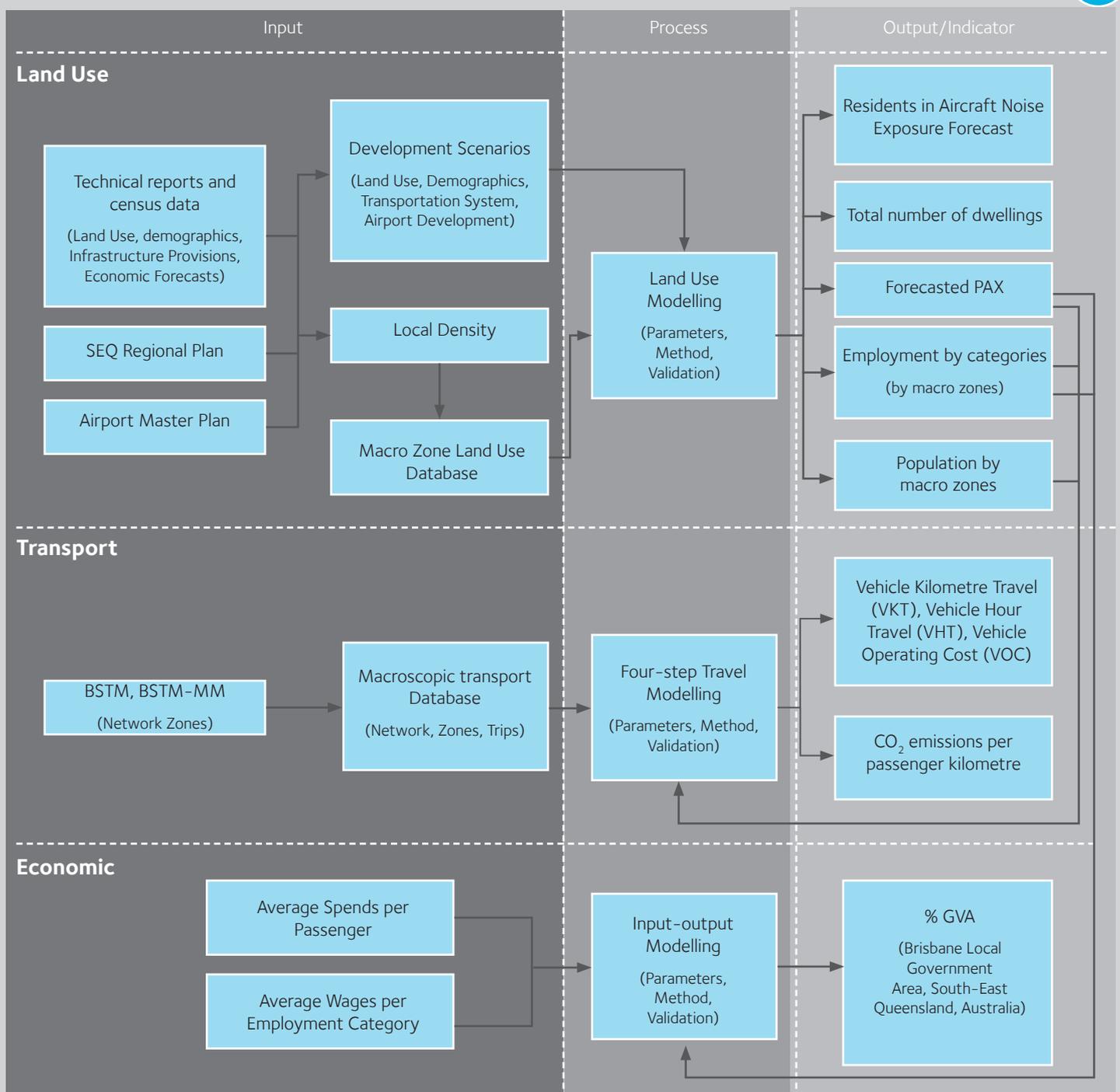
Building the PSS prototype

The prototype PSS has the following functionality:

- scenario planning that allows the user to create and analyse alternative land use plans for the case study region (Brisbane Airport) that compares them side-to-side;
- land use, transport and economic modelling that will allow dynamic analysis of plans (i.e. on-the-fly changes to a plan will automatically cause recalculations of impacts); and
- a standard set of sustainability indicators that are clearly understandable to stakeholders, decision-makers and the public.

A number of methods and materials were employed to develop the prototype PSS: a comprehensive case study review, primary data collection, modelling, scenario development, sustainability indicator development, policy inclusion and piloting. Figure 14, provides an overview of the various features of the PSS. The case study region, data sets, modelling, indicators, scenarios and policies are all discussed in detail below.

Figure 14. The Planning Support System



Brisbane Airport Case Study

Brisbane Airport and the surrounding region was chosen as the PSS prototype case study. Brisbane Airport is Australia's third busiest airport behind Sydney and Melbourne airports. Passenger numbers at Brisbane Airport in 2008 were 19,011,760 making it a relatively small airport when compared to Atlanta International Airport which had 90,039,280 passengers in the same year.¹⁰⁴ However, the property size of approximately 2,700 hectares, of which 1,000 hectares is suitable for land use development, makes it one of the largest in area of any of its national and international contemporaries. Brisbane Airport is privately owned by Brisbane Airport Corporation (BAC) which has clearly articulated its intention to develop airport land and transform Brisbane Airport into an airport city.¹⁰⁵ Like other privatised Australian airports, planning of Brisbane Airport falls under federal control through the *Airports Act 1996* (the Act).

Brisbane Airport is part of the larger 8,000 hectare Australia TradeCoast (ATC) precinct which is developing as an economic and employment centre of major regional and national significance. The site is currently home to 7,500 businesses (including Brisbane Airport and the Port of Brisbane) and it is anticipated that by 2026 the area could provide up to 103,939 jobs and qualify as the largest employment centre outside of Brisbane's Central Business District (CBD).¹⁰⁶ While not all of the ATC will develop into aviation related industries, its size and proximity to the airport will allow the Brisbane airport city to develop outside the airport's property boundary. Such development would be necessary if the airport is to develop into a true airport city.^{107,108} Key airport and regional planners in the Brisbane case study have formed a Planning Coordination Forum, one of the first such committees in Australia. It currently comprises representatives from BAC, Brisbane City Council (BCC) (the only municipality adjacent to Brisbane Airport) and the Queensland State Government. It was established before the White Paper was published and its aim and structure closely align to the Planning Coordination Forums advocated for in the White Paper.

104 Centre for Asia Pacific Aviation (2009) Centre for Asia Pacific Aviation – News, Analysis, Research and Information for the Aviation Industry, <http://www.centreforaviation.com/> accessed on 16 Dec 2009

105 Brisbane Airport Corporation (2009) Master Plan 2009 Brisbane Airport. Brisbane

106 Queensland Government (2008) Australia TradeCoast Transport Study. Report No 1: Statement of Current and Future Trends. Brisbane, Queensland Transport

107 Conway, M. (1993) Airport Cities 21, Atlanta, Conway Data

108 Kasarda, J. D. (2006) The Rise of the Aerotropolis. *The Next American City*, 10, 35 - 37

Systems

There are a number of PSS tools available in the market place today. Since airports and urban planners both use GIS, it made sense for the research team to use this same tool to bring the parties together. After reviewing a range of off-the-shelf alternatives the team considered the following:

- the ability for the system to provide comprehensive impact assessment tools;
- the type of planning problems and the context it would be used in—ultimately determining that a desk-top tool would suffice (in comparison to a web-based tool); and
- the need for the GIS-based system to support customisation through a programming software development kit.

After consideration CommunityViz was chosen as the most suitable alternative. The PSS uses a standard GIS interface that allows different data sources to be layered together in a 2-dimensional mapping interface. In addition, a third dimension of 'time' can also be displayed on the basic mapping interface or as a chart indicator. The interface (Figure 15) runs within ArcMap and requires the CommunityViz

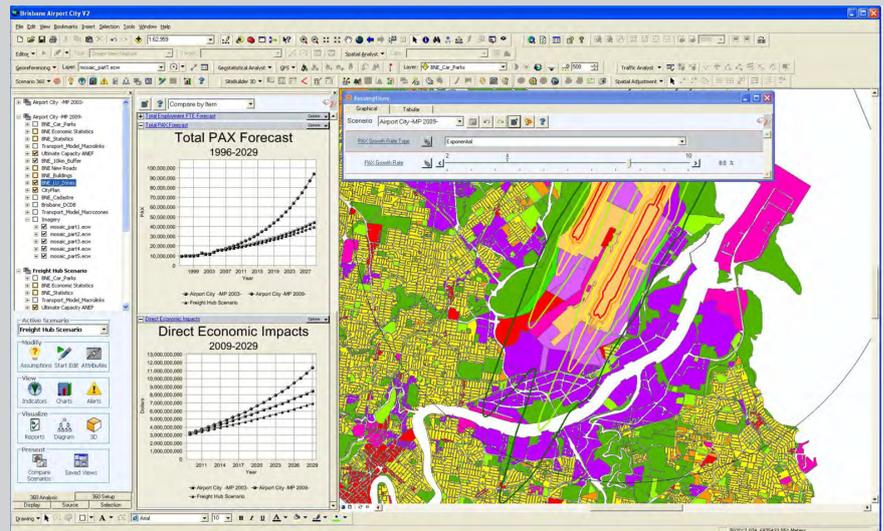
extension. While most of the functionality is controlled by CommunityViz toolbars some additional customised toolbars have been implemented.

Data sets

Due to the nature of the stakeholders involved in the Brisbane case study, a rich set of diverse GIS datasets were available including:

- property parcel information,
- both airport and local government land use information,
- major planned infrastructure projects,
- employment area information,
- population forecasts,
- airline growth forecasts,
- demographic information (i.e., Census data from 1996 to 2006),
- transportation zones and network,
- transport travel study information,
- aircraft noise contours and flight path densities,
- noise complaint information,
- economic activity areas and statistics, and
- aerial photography.

Figure 15. PSS Interface



Planning Support System

The PSS has a user-friendly interface to assist airport and regional planners.

The PSS uses a standard GIS interface that allows different data sources to be layered together in a 2-dimensional mapping interface. In addition, a third dimension of 'time' can also be displayed on the basic mapping interface or as a chart indicator. The interface runs within ArcMap and requires the CommunityViz extension. While most of the functionality is controlled by CommunityViz toolbars some additional customised toolbars have been implemented.

However, while the above data was accessible the project did experience data access problems in relation to the transport data as a result of the use of the transport modelling software used (EMME3). While the PSS project is capable of translating to EMME3, the data must first be in VisSim format (a visual language used for modeling and simulating nonlinear dynamic systems). The project team initially encountered problems during this process as a result of licensing issues.

Modelling

Various methods were used to develop the models. These included utilising TransCad's software development kit to create TransCad models within the ArcGIS interface. In addition, ArcGIS's model builder and CommunityViz's dynamic attributes were used to create models and existing CommunityViz tools were also used. The models were enhanced through considering the spatial relationships between datasets. While they need further calibration and testing they serve as a good starting point for the prototype PSS. Some of the models rely on a set of initial assumptions calculated from historical values and validated with expert knowledge. The assumptions are dynamic and can be changed interactively within the PSS. Table 14 outlines the main models implemented in the prototype PSS.

Sustainability indicators

The majority of the sustainability indicators were selected from the SEQ regional plan¹⁰⁹ with a few extras added during the stakeholder workshops as outlined in Table 15.

Table 15. Sustainability Indicators

Economic Impact	Environmental Impact
Regional economic growth	Greenhouse gas emissions
Employment levels	
PAX	
Social Impact	Integrated Transportation
Total number of dwellings	Road congestion
Number of dwellings (within ANEF)	Access to PT
	Mode share
	Freight movements
	Number of cars

Scenario development

Scenarios are essentially alternative futures which are likely to occur in the study area. Four scenarios were developed made up of a series of external factors outside of stakeholders' control; they provide important inputs and assumptions to the models within the PSS. The external factors were identified through stakeholder workshops where the resulting factors were rated in terms of uncertainty and impact on system models. Following this, factors were then clustered to produce the four scenarios outlined in Table 16 (over).

A series of development scenarios were defined considering two main trade-offs: the land use type of the airport precinct; and the set of regional/urban policy options regarding infrastructure provision and land use patterns. On one hand, the Brisbane Airport precinct land use pattern is an indicator expressing how the changes in the immediate surroundings of the airport precinct could be implemented. The first two land use patterns could be defined within the context of the chronological changes between Brisbane Airport's master

plans: the Brisbane Airport Master Plan 2009 and Brisbane Airport Master Plan 2003.

The set of regional/urban policy options regarding infrastructure provision and land use patterns represent possible variations in courses of actions. The regional/urban policy options may include several developmental strategies such as Business-As-Usual, Compact Development, Dispersed Development, Multi-Centred/Hybrid Development, and Transit-Oriented Development. For each one of these strategies, a series of indicators such as population, employment, travel modes, vehicle operational cost and infrastructure provision could be identified as key parameters of the regional/urban policy options. Ideally, these strategies and their respective indicators would be set and well defined as part of regional/urban planning efforts. For each strategy and indicator, the annual breakdown of changes would be required as a critical element for the analysis.

¹⁰⁹ Queensland Government (2009) South East Queensland Regional Plan 2009-2031. Brisbane, Queensland Department of Infrastructure and Planning

Table 14. Sub-models of the Planning Support System

Model	Description	Tools
Development suitability model	A weighted multi-criteria analysis framework was implemented to produce a polygon feature class that indicates where certain types of development should occur given constraints as inputs	Combined ArcGIS model builder and CommunityViz dynamic attribute functions
Allocation Model	Based on the different urban forms derived from different scenarios and suitability analysis, the residential population and employment growth are allocated at the different polygon feature level	Combined ArcGIS model builder and CommunityViz dynamic attribute functions
Building build-out model	The existing CommunityViz Build-Out tool is used to visualise the amount and location of building develop given the different stakeholder policies. The floor space ratios used are obtained from a number of existing survey report.	Built-in CommunityViz function
Transportation model	The transportation model is a simplified version of the Brisbane Strategic Transport Multi-modal Model (BSTM-MM) at the Brisbane City Council area. The output of the building build-out model (i.e., residential population and employment figures) is the input of this transportation model	Emme3 software development kit
Economic model	An Input-output Model that can input employment figures (generated from building build-out model) to get %GVA changes of Australia, Queensland (QLD), South East Queensland (SEQ) and Brisbane City Council (BCC) area as an output	Developed in Excel spreadsheet environment

In order to capture the effects of congestion due to the potential impact of airport land use/transport options on the wider transport networks and *vice versa*, we analysed time of day traffic flow rather than average day traffic flow. The transport options in particular include multi-modal options as part of overall scenario analyses, which facilitate stakeholders to assess integrated transportation and environmental sustainability in terms of changes in vehicle kilometre travel, vehicle hour travel, vehicle operating cost, and CO₂ emissions per passenger kilometre.

The translation process or more specifically the quantification of the parameters for the different scenarios was backed up by extensive literature reviews and opinions from experts and stakeholders. As a part of the literature review numerous technical reports related to population employment projections, expected travel mode shifts, and future infrastructure provision of the BCC area were considered. Most of the parameters are dynamic and can be changed interactively within the prototype system. These scenarios are descriptions of future worlds and will be utilised to evaluate the robustness the decision makers' airport and regional planning policies. The significance of this research is its ability to analytically establish a set of scenarios based on information supplied from all key stakeholders.

Forecasting Dwelling Densities and Employment Densities for Different Scenarios

The data that are used for the current version of the plans (City shape plan, BSTM-MM) by the Brisbane City Council and Department of Main Roads and Transport is considered as Business as Usual Scenario.

Policies

The policies incorporated into the PSS—land use zoning, transportation infrastructure and mode share options—mainly illustrated various investment options that BAC (as the main stakeholder) could make as it develops Brisbane Airport into an airport city. In addition, the 2003 and 2009 Airport Master Plans were compared against each other.

Table 16. PSS Scenarios for the Brisbane case study

Scenario 1: Compact Development	<p>The four locations and their respective assumed dwelling densities are:</p> <ul style="list-style-type: none"> • 10–20 storey development in Fortitude Valley, Spring Hill and West End at 300+ dwellings per hectare • 10–20 storey development in the Bowen Hills–Dutton Park–Milton triangle around the CBD at 300+ dwellings per hectare • Inner City Suburbs (Herston, Highgate Hill, Kangaroo Point, Kelvin Grove, New Farm, Newstead, Paddington, Red Hill, South Brisbane, Spring Hill, Woolloongabba) at a net residential density of 80+ dwellings per hectare <p>For the two '10–20 storey' development areas, the total dwelling potential of all the identified polygons within each of the locations is calculated by assuming that 50% of their whole area would yield 300+ dwellings per hectare. For the two '80+ dwellings per hectare' development areas, the total dwelling potential of all the identified polygons within each of the locations is calculated by assuming their whole area would yield 80+ dwellings per hectare.</p> <p>20% of the predicted future employment growth of Brisbane CBD is relocated to the above mentioned areas equally.</p>
Scenario 2: Dispersed Development	<p>For the selected LR polygons, the additional dwelling potential of all the identified polygons combined is calculated by assuming 20% of all houses on holdings of 600 m² or more within the LR area classification will be converted to dual occupancy. Additional broad hectare Land at Oxley Wedge (Willawong and Pallara–Heathwood–Larapinta) identifies the additional broad hectare land assumed to develop to a net residential density (in accordance with the Draft SEQ Regional Plan) of 30+ dwellings per hectare.</p> <p>The employment densities would be same for Business as usual Scenario.</p>
Scenario 3: Multi-Centred/ Hybrid Development	<p>Each of the Carindale, Chermside, Upper Mount Gravatt and Indooroopilly centres has two spatially distinct areas which were assumed to develop at the densities of 140+ and 40+ dwellings per hectare, respectively. The 40+ dwellings per hectare applied to polygons whose centroids are more than 400-metre distant from the respective PT access points.</p> <p>The total dwelling potential of all the identified polygons within each of the eight distinct location/density types is calculated by assuming that whole area (calculated as the sum of the 'Calc_Area' field) could yield the respective dwellings per hectare, i.e. either 140+ or 40+ as appropriate.</p> <p>20% of the predicted future employment growth of Brisbane CBD is relocated to the above mentioned areas equally.</p>
Scenario 4: Transit-Oriented Development	<p>The total dwelling potential of all the <i>identified polygons</i> (based on suitability analysis) combined is calculated by assuming their whole area could yield based on the Transit oriented guideline developed by Department of Local Government and Planning.⁸</p>

“The **ultimate goal** of any PSS is to make it easier for all stakeholders to **reach consensus** on planning decisions. From the results of the Brisbane case study, the prototype PSS achieved that goal. The prototype PSS undoubtedly has the potential to assist the new Planning Coordination Forums in Australia and **facilitate a broader understanding of trends, problems, challenges** and sustainable policy solutions across stakeholders.”



Sample of Prototype outputs

Out of many possible outputs (over 300 different combinations) that can be generated from the PSS, it is best to look at total network performance for different scenarios. As an example of the PSS operation, our focus here is on Vehicle Kilometres Travel (VKT) and Vehicle Hours Travel (VHT).

At a glance, we can see that all the scenarios will have changes from the Base Case scenario, but with different levels of significance. Within this context, of most interest are reductions in VKT and VHT in the AM and PM peak for the Compact Development (BNE2009MP), Transit-Oriented Development (BNE2009MP) and Multi-Centred Development Scenarios as compared to Base Case Scenarios. The

model predicts a most significant fall in the Compact Development (BNE2009MP) Scenario for VKT of daytime off peak (-2.47%) and much greater fall in VHT off PM peak (-10.32%) out of other scenarios as compared to Base Case scenario. However, in the case of Dispersed Development (BNE2009) Scenario, the model predicts a rise of both the VKT and VHT for different time frames of a day as compared to the Base Case Scenario.

If we compare Table 17 and Table 19, we can easily detect that all the scenarios of the Table 17 follow the BNE 2009 Master Plan, and in case of Table 19, all the scenarios follow the BNE 2003 Master Plan for the authorised area of Brisbane Airport Corporation.

In comparing the different scenarios outlined in Tables 17 and 19, we can see that there will be a significant increase in

the total VKT for each scenario in Table 19 as compared to Table 17. These results are reasonably intuitive. This is the same in comparing Tables 18 and 20, where VHT is higher for each scenario in Table 20 as compared to Table 18. This is due to the fact of different land use patterns of the airport area as proposed in BNE 2003 Master Plan (BNE2003MP) and BNE 2009 Master Plan (BNE2009MP) for the projected year of 2031. Due to different land use development, BNE2003MP produces more employment opportunities as compared to BNE2009MP. However, because of this, more trips are generated towards airport zones in the case of BNE2003MP. The modelling suggests that there is a significant impact of land use development within the airport area on the surrounding networks in terms of traffic flow.

Table 17. Comparison of total Vehicle Kilometres Travel (VKT) in million km (BSTM-MM Zone) between the base case and the other scenarios- 2031-BNE2009MP

	Compact Development BNE2009MP	Transit-Oriented Development BNE2009MP	Dispersed Development BNE2009MP	Multi-Centred Development BNE2009MP	Business As Usual Development BNE2009MP (Base Case)
AM	12.45 (-1.97%)	12.63 (-0.55%)	12.75 (0.39%)	12.66 (-0.31%)	12.7
DOP	33.46 (-2.47%)	34.19 (-0.35%)	34.33 (0.05%)	34.28 (-0.08%)	34.31
PM	13.61 (-2.43%)	13.88 (-0.50%)	13.98 (0.21%)	13.9 (-0.36%)	13.95
NOP	20.87 (-2.20%)	21.28 (-0.28%)	21.39 (0.23%)	21.32 (-0.09%)	21.34
24Hr	80.39 (-2.32%)	81.98 (-0.39%)	82.45 (0.18%)	82.16 (-0.17%)	82.3

Table 18. Comparison of total Vehicle Hours Travel (VHT) in thousand hours (BSTM-MM Zone) between the base case and the other scenarios- 2031-BNE2009MP

	Compact Development BNE2009MP	Transit-Oriented Development BNE2009MP	Dispersed Development BNE2009MP	Multi-Centred Development BNE2009MP	Business As Usual Development BNE2009MP (Base Case)
AM	382.24 (-6.13%)	399.51 (-1.89%)	415.74 (2.09%)	402.68 (-1.11%)	407.23
DOP	688.06 (-3.19%)	706.93 (-0.54%)	711.95 (0.17%)	709.89 (-0.12%)	710.76
PM	499.45 (-10.32%)	537.17 (-3.54%)	563.77 (1.233%)	541.74 (-2.72%)	556.9
NOP	351.3 (-2.52%)	358.07 (-0.65%)	360.55 (0.04%)	359.14 (-0.35%)	360.4
24Hr	1921.05 (-5.61%)	2001.68 (-1.65%)	2052.01 (0.82%)	2013.45 (-1.07%)	2035.29

AM= AM peak period (7.00-9.00), DOP= Day time off-peak (9.00-16.00), PM= PM peak period (16.00-18.00), NOP= Night time off-peak (18.00-7.00)

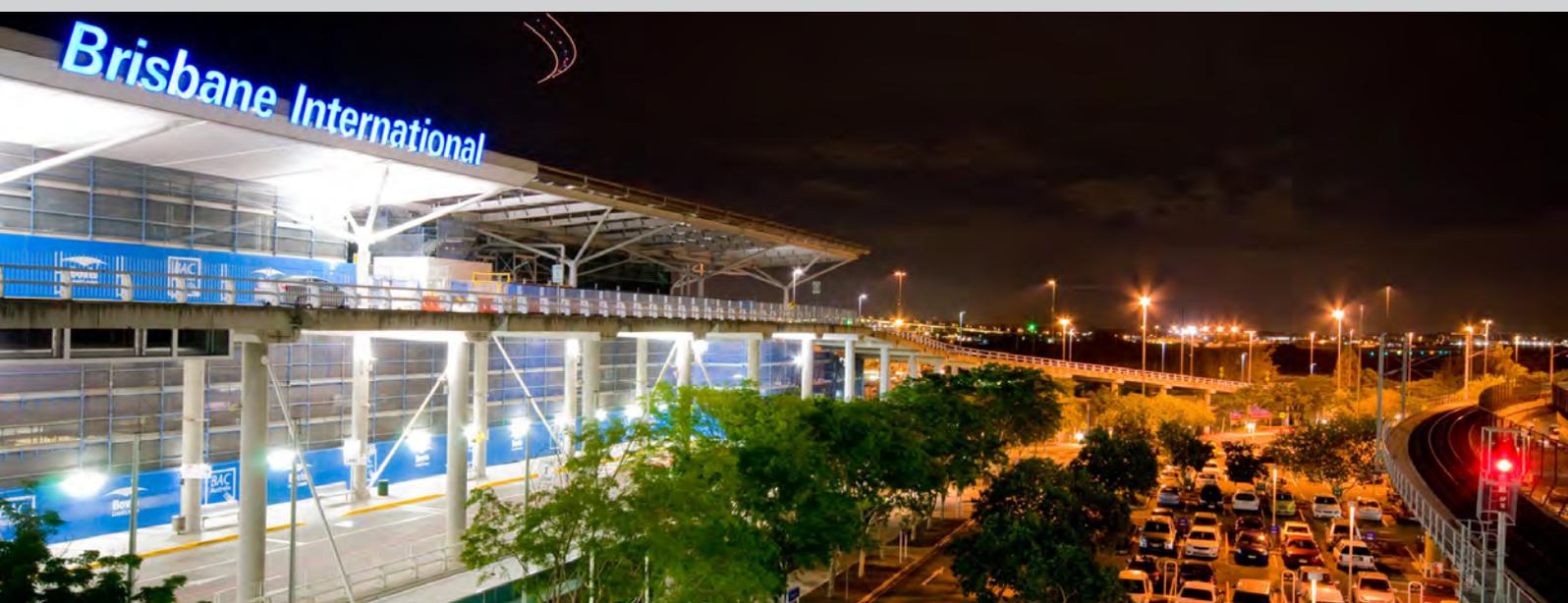
Table 19. Comparison of total Vehicle Kilometres Travel (VKT) in million km (BSTM-MM Zone) between the base case and the other scenarios- 2031-BNE2003MP

	Compact Development BNE2003MP	Transit-Oriented Development BNE2003MP	Dispersed Development BNE2003MP	Multi-Centred Development BNE2003MP	Business As Usual Development BNE2003MP (Base Case)
AM	12.52 (-1.88%)	12.7 (-2.70%)	12.82 (0.47%)	12.73 (-0.23%)	12.76
DOP	33.79 (-2.39%)	34.51 (-0.32%)	34.65 (0.09%)	34.59 (-0.08%)	34.62
PM	13.72 (-2.41%)	13.99 (-0.49%)	14.09 (0.21%)	14.01 (-0.35%)	14.06
NOP	21.07 (-2.18%)	21.47 (-0.32%)	21.58 (0.18%)	21.5 (-0.18%)	21.54
24Hr	81.1 (-2.26%)	82.7 (-0.33%)	83.14 (0.19%)	82.83 (-0.18%)	82.98

Table 20. Comparison of total Vehicle Hours Travel (VHT) in thousand hours (BSTM-MM Zone) between the base case and the other scenarios- 2031-BNE2003MP

	Compact Development BNE2003MP	Transit-Oriented Development BNE2003MP	Dispersed Development BNE2003MP	Multi-Centred Development BNE2003MP	Business As Usual Development BNE2003MP (Base Case)
AM	406.83 (-6.72%)	424.34 (-2.70%)	441.16 (1.15%)	427.09 (-2.07%)	436.14
DOP	720.89 (-3.33%)	739.46 (-0.84%)	746.12 (0.04%)	744.85 (-0.12%)	745.76
PM	537.26 (-7.98%)	575.36 (-1.46%)	602.54 (3.19%)	579.34 (-0.78%)	583.9
NOP	358.14 (-2.16%)	364.73 (-0.36%)	367.07 (0.27%)	365.7 (-0.10%)	366.08
24Hr	2023.12 (-5.10%)	2103.89 (-1.31%)	2156.89 (1.17%)	2116.98 (-0.69%)	2131.88

AM= AM peak period (7.00-9.00), DOP= Day time off-peak (9.00-16.00), PM= PM peak period (16.00-18.00), NOP= Night time off-peak (18.00-7.00)



Visual Outputs

The PSS has the capacity to generate a variety of visual outputs for the modelled airport region. Visual outputs of the PSS can be presented in map formats to demonstrate scenario impacts in a wide area. Figure 16 provides:

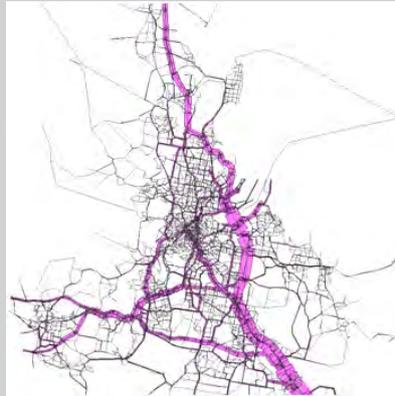
- a simple comparison of medium and heavy commercial vehicle volumes in 2031 for the Transit Oriented Development Scenario;
- a volume capacity ratio in 2031 for the Dispersed Development Scenario;
- an international passenger attraction in 2031 for the Compact Development Scenario.

Prototype outcomes

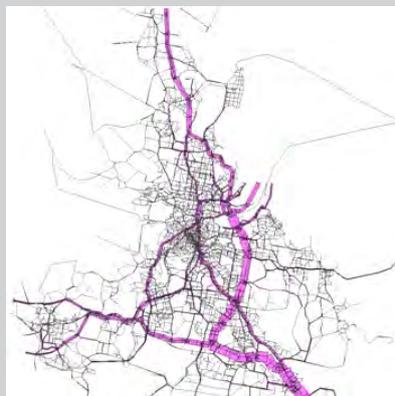
The resultant PSS prototype was successfully demonstrated to the majority of the Brisbane Case Study stakeholders using the Research Advisory Committee (RAC) Meetings as a forum. Initial feedback was positive. The main benefits have been identified as being:

- the potential for the PSS to provide support for Airport Coordination Forums;
- likely impacts of airport developments of the surrounding environment and communities can be visualised and quantified in the PSS;
- the PSS has an improved understanding of the relationship between the transportation network and land use plan;
- the PSS will facilitate more effective engagement with communities through real-time evaluation of planning policies; and
- the PSS provides a transparent decision-making process.

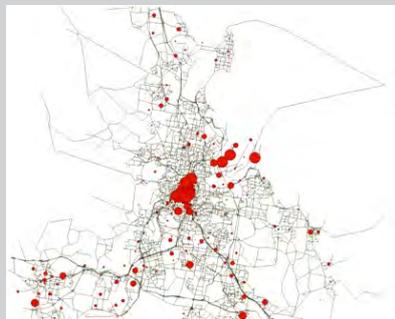
Figure 16. PSS Scenario Screen Shots



Medium Commercial Vehicle Volume (morning peak period) in 2031 for Transit-Oriented Development_BNE2009MP Scenario



Heavy Commercial Vehicle Volume (morning peak period) in 2031 for Transit-Oriented Development_BNE2009MP Scenario



International Passenger Attraction (morning peak period) in 2031 for Compact Development_BNE2009MP Scenario



Volume Capacity Ratio (morning peak period) in 2031 for Dispersed Development_BNE2009MP Scenario

Project learnings and next steps

The PSS component of the project was not without its problems. Far from being a simple, straightforward development, the PSS involved complex undertakings with several software and data compatibility and access problems. Most notably, access to transport data access have impacted the project somewhat but were eventually resolved. In addition to data issues, key learnings included:

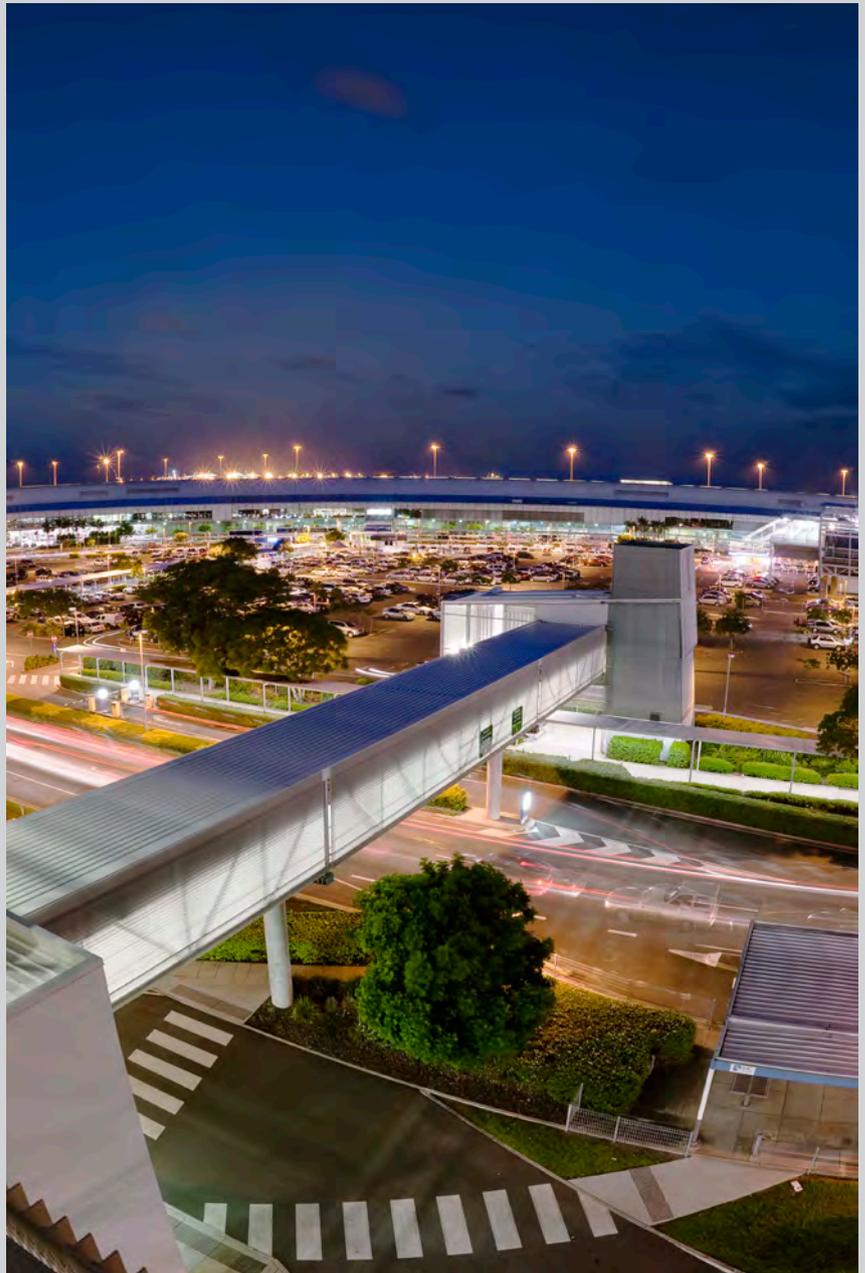
- pre-modelling assumptions need to be verified to reduce uncertainties (for example in relation to land use, economics, demographics and investments);
- it was extremely difficult to overcome traditional modelling paradigms;
- integration of the transport model required a customised set of interactions to facilitate running the scenario; and
- a well-established base is critical to modelling.

Once the transport data is integrated into the PSS the project team will run the scenarios and further consider the value of the PSS. The team received external interest in the PSS concept with a group from Queensland Treasury having viewed the program and the data in order to consider the concept for budget estimation application.

Conclusion

The ultimate goal of any PSS is to make it easier for all stakeholders to reach consensus on planning decisions. From the results of the Brisbane case study, the prototype PSS achieved that goal. The prototype PSS undoubtedly has the potential to assist the new Planning Coordination Forums in Australia and facilitate a broader understanding of trends, problems, challenges and sustainable policy solutions across stakeholders. The PSS prototype has proven that modelling these interactions and integrating them into one system can provide invaluable support for stakeholders grappling with the challenges of new airport city type developments. The current PSS provides a good foundation for further work in this area.

In addition to the PSS tool which assists in integrating competing and conflicting stakeholder interests into one common goal, understanding each stakeholder in the airport stakeholder arena was identified as being a crucial component of successful airport–region planning as discussed in the next section of this report.



Primary research material

Walker, A. and Baker, D. 2010. *A Planning Support System for Airport City Development*. ATRS Conference, Porto, Portugal, 6–9 July, 2010, Paper #14.

Walker A. and Mahmood, N. 2011. *A Planning Support System for Airport City Development*. Presented at the *Redefining the Role of the Airport: An International Colloquium on the Airport Metropolis*, 9–11 February, Brisbane, Australia.

Dantas, A. 2011. *Airport Metropolis—PSS Transport Interface*. Presented at the *Redefining the Role of the Airport: An International Colloquium on the Airport Metropolis*, 9–11 February, Brisbane, Australia.



Key Theme: Stakeholders

“Stakeholder consultation now holds an **increasingly central** position in the planning and management of airports and in **managing the interfaces** with regional centres.”

Stakeholder Engagement

As previously noted, privatisation, commercialisation and globalisation trends have all impacted on the airport arena. For Australia, privatisation in particular fundamentally changed stakeholders' interaction with airports. Within the rules and legislation drawn up around the privatisation, new airport owners were given considerable independence with regard to airport management and owners expected to be able to utilise this independence.¹⁰¹ The rules and legislation effectively mean that while airport land remains under federal government control, airport operators can act independently of local and state governments who have little to no influence on developments on airport land. In particular, the *Airports Act 1996* (the Act) allows limited provisions for either airport or region to endorse, influence or veto land use planning decisions of the other. The impact of these privatisation arrangements, coupled with the impact of commercialisation, has seen privatised airports in Australia develop airport land as they perceive best for creating a profitable business—largely through the development of large-scale retail/commercial ventures—often impacting the regional area surrounding them. This, combined with the impacts of increasing urban encroachment, has resulted in several conflicts between airport and region stakeholders.

Research aims

As previously noted, airport stakeholders are increasingly challenged by the divergent legislative frameworks which limit mutual and cooperative land use planning. However, this environment is changing. Both airports and regions are recognising and acknowledging the importance of the other in achieving strategic goals: airports through their reliance on external infrastructure, and cities through their acknowledgement of the impact of airports on a region's economic development. In Australia two states, Queensland and Western Australia, have developed policies around decision-making in the vicinity of airports, recognising airports as fundamental to regional development and the need for cooperation. Stakeholder consultation—for Australian and international airports—now holds an increasingly central position in the planning and management of airports and in managing the interfaces with regional centres.

¹¹⁰ Freestone, R., Williams, P., & Bowden, A. (2006). *Fly Buy Cities: Some Planning Aspects of Airport Privatisation in Australia. Urban Policy and Research, 24*(4), 491–508.

However, to leverage stakeholder engagement, airports and their regional counterparts need efficient policies, processes and, most critically, the ability to identify and understand stakeholder needs. Currently, stakeholder management is not being fully utilised by key stakeholders due to several reasons, among which, a lack in uniformity and validity in literature on methods and key measurements, as well as a disconnect between stakeholder engagement and community engagement theories. To date no identified empirical research has tried to extensively test the whole stakeholder management process, from stakeholder identification, through stakeholder differentiation and classification, relations investigation and finally to stakeholder engagement strategies. The aim of the stakeholder research was to improve corporate stakeholder policies, and the quality of decision-making, ultimately assisting project implementation. The final output of the research is the online iPad Stakeholder Engagement Tool (covered later in the report).

Key findings

Using an integrated stakeholder analysis approach the project found that:

- standard stakeholder categorisation, where one stakeholder is perceived to be more important than another, does not suit fundamentally complex environments such as the airport environment;
- stakeholders differ on various levels and need contingent approaches—a 'one size fits all' approach is likely to be detrimental to the overall stakeholder arena in an airport–region context
- an integrated stakeholder analysis approach as used by the researchers is better suited to unpack the dynamic complexity of the airport stakeholder arena than a single-dimensional approach.

Research methodology overview

The stakeholder research component was informed by the work of PhD student Robbert Kivits in developing his thesis, *Integrated stakeholder analysis: A methodology applied to Australian capital airports*, currently in the final stages of submission. This research employed a mixed method approach. This included

three exploratory case studies of major Australian airports—Adelaide, Brisbane and Canberra—each of which is well recognised as having crowded policy domains and complex stakeholder networks. Case study research involved documentary analysis and semi-structured interviews which employed a snowball sampling method to gather key informants. After thematic analysis of the qualitative data using NVivo, Leximancer was then used to cross-check the findings. In order to develop the stakeholder framework which formed part of the overall Stakeholder Engagement Tool, policy discourse analysis employed the Q Methodology approach while social network analysis (SNA) techniques were used to measure the strength of stakeholder network ties.

The increasing importance of stakeholders

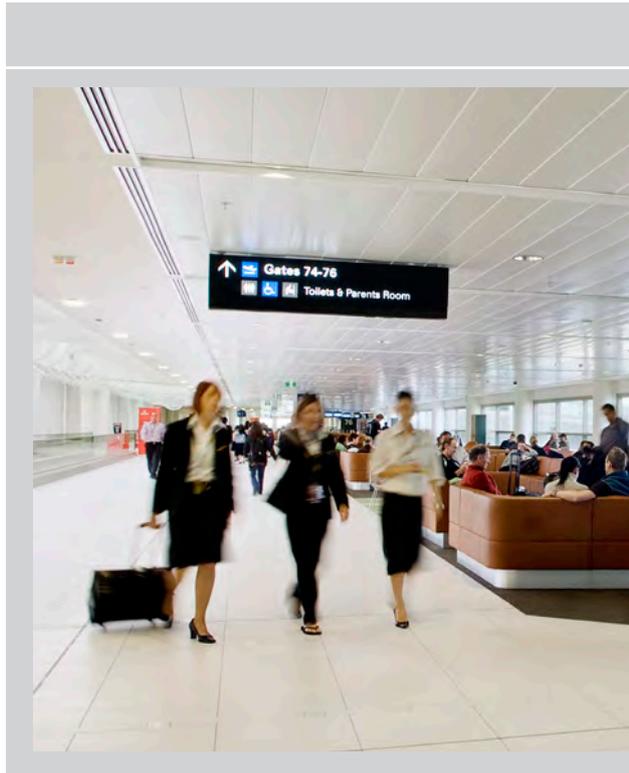
Some privatised airports increasingly see their most important stakeholders as private equity investors and superannuants in funds that have injected sufficient amounts into airports, and can therefore assume that 'distanced' airport shareholders are more likely to prioritise economic-based objectives than those of alternative stakeholders such as local communities. However, regardless of the reasons—economic or otherwise—stakeholders are becoming more visible to airport managers. There is an emerging realisation of the importance of sustaining a safe, profitable, environmentally sensitive and equitable airport business, understood as an evolving urban hub in its own right. This is a clear example of an adaption to a dynamic market economy faced with growing socially and environmentally driven political constraints. This environment is, in turn, forcing managers to factor in externality-drive market failures, making the environmental and social impacts of corporate activities more apparent, more costly and much more important.

The importance of stakeholders is illustrated in the responses to the 1998 Brisbane Airport Corporation's (BAC's) Master Plan: of the 4,183 submissions, 3,605 were letters with only 578 being more formal submissions. The level of public stakeholder response reflected the controversial western parallel runway proposal, the endorsement of which became the subject of a senate inquiry. This same response pattern was seen in the 2003 BAC Master Plan which had 452 submissions in total, of which 421 were letters and 31 more formal submissions.

Government response to stakeholder concerns

The Australian Government's National Aviation Policy Green and White Papers signalled the government's response to stakeholder concerns. In the Green Paper, the government structured and listed all the issues and challenges as perceived by stakeholders that responded to the initial Issues Paper. The Green Paper focused on amending the Act and was ostensibly concerned with restricting the development carte blanche given to airports a decade earlier. Within the Green Paper, a substantial section addressed the integration of planning between the airport and local and state government in addition to stakeholder consultation. The subsequent White Paper, released in 2009, sets out initiatives to ensure better planning and integrated development on and around airports, and to lessen the adverse effects of aviation activity on the environment and communities (see the Aviation section of this report). A large section of the White Paper addresses the interaction between the airport and its surrounding stakeholders including local governments. During the past decade there have been no legislative requirements for airports to actively or extensively engage with their stakeholders, instead remaining solely accountable directly to the federal government. The independence and expansion of airports and related airport master planning has since engendered debate among several airport stakeholders—airport owners, local communities, government and industry stakeholders—largely due to the airport domain increasingly intersecting with industrial and urban spaces.

The initial refusal of the Canberra Airport Master Plan in 2008 (submitted in accordance with the Act which requires a Master Plan to be submitted every two years) just after the release of the Issues Paper was the first indication that the government intends to enforce the findings of the White Paper. Prior to the Green Paper release, the Minister for Infrastructure, Transport, Regional Development and Local Government refused approval for Canberra's new Master Plan on several grounds—one being that matters raised during public consultation had not been adequately addressed.¹¹¹ This indicated that stakeholder engagement might become far more important in the future compared to current practices. Canberra's new Master Plan was finally approved after significantly altering the chapter on engagement, setting an example for all privatised airports to follow.



Airports are increasingly complex stakeholder environments

Airports are experiencing increasingly complex stakeholder environments—the Brisbane Airport case study alone involved 22 stakeholder groupings.

Complex multi-stakeholder arenas require specialised stakeholder analysis to better understand the desires, opinions and influences of stakeholders.

Airport regions as complex stakeholder settings

Airport challenges around land use planning conflicts, challenged communication, infrastructure interaction and environmental concerns can be defined as complex multi-actor issues.¹¹² This grounded policy domain—the stakeholder arena of privatised airports in Australia—can be described as one of the most complex settings in which to operate an organisation. The dynamic aviation paradigm with its complex multi-stakeholder issues requires specialised stakeholder analysis to better understand the desires, opinions and influences of stakeholders.

When considering the considerable expansion in almost all airports in Australia and the highly contested and complex arena of this expansion, stakeholder engagement can be a first step to resolving airport–region interface issues.

In looking more broadly to stakeholder analysis there are considerable benefits in airports taking a robust approach to stakeholder analysis and engagement. As illustrated in stakeholder theory, incorporating stakeholders' opinions is valuable for improving decision-making processes and project implementation.¹¹³ Successful engagement with stakeholders ensures legitimisation of issues and facilitates closer alignment between organisations and society.

Creating and using a more dimensional understanding of stakeholders allows organisations to:

- identify positive and negative forces and customise engagement strategies accordingly;
- improve the understanding and higher predictability of responses;
- enhance problem solving; and
- efficiently implement projects (on time and within budget) as a result of reduced stakeholder conflict and delaying tactics, and early awareness of potential issues (as evidenced in the informal networks discussed in the Decision-making section of this report).

For airport management, who increasingly have to manage and engage with stakeholders, a robust understanding of stakeholders with a clear delineation of perspectives can lead to more robust plans and relationships.

¹¹¹ Albanese, A. (2008). *Minister Refuses to approve Canberra Airports Master Plan*. Department for Infrastructure, Transport, Regional Development and Local Government Retrieved from www.infrastructure.gov.au.

¹¹² Inamete, U. B. (1993). Key Elements in Managing Airports: The Policy Environment and Increasing Efficiency. *International Journal of Public Sector Management*, 6(5), 12–34; and van de Riet, O. A. W. T. (2003). *Policy Analysis in Multi-Actor Policy Settings: Navigating Between Negotiated Nonsense and Superfluous Knowledge* (1st ed.). Delft: Eburon Publishers.

¹¹³ Deelstra, Y., Nootboom, S. G., Kohlmann, H. R., van den Berg, J., & Innanen, S. (2003). Using Knowledge for Decision-making Purposes in the Context of Large Projects in The Netherlands. *Environmental Impact Assessment Review*, 23(5), 517–541.

Stakeholder analysis: A new approach to stakeholder engagement in the airport context

The complex nature of the airport stakeholder environment challenges existing methodologies. For airport management, stakeholder analysis is or should be the precursor to developing stakeholder engagement policies and strategies.

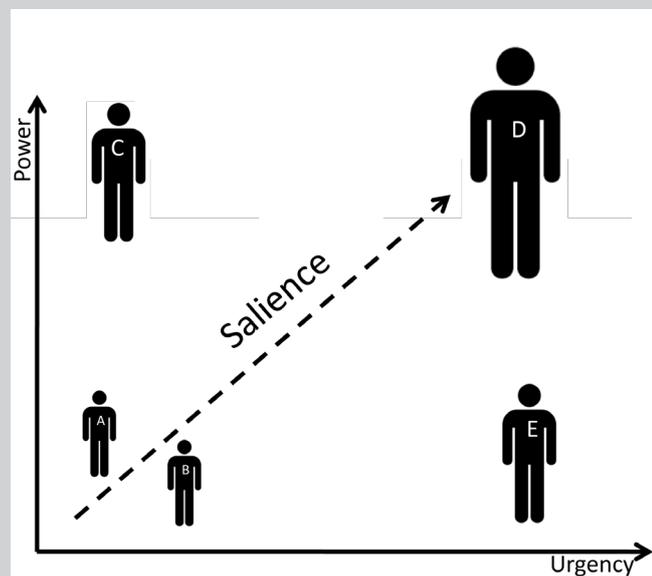
Traditional methodologies of stakeholder analysis involve the problem holder (e.g. the airport) identifying and then categorising stakeholders into traditional groups: communities, governments, non-government organisations (NGOs) and private industries. In most cases, stakeholders are analysed using 'salience' (i.e. power and urgency). In the context of airports, the changing nature and diverse range of stakeholders with different, and often competing and overlapping, interests and expectations requires a flexible, thorough and robust methodological framework for stakeholder analysis to assist in understanding the context.

The Airport Metropolis Project has successfully developed a new methodology to deal specifically with the complex and challenging stakeholder environment of airports. The tool combines three elements of analysis—stakeholder salience, frames of references and networks—to create a better understanding of the differences and dynamics of stakeholders. The three elements are described in detail below.

1. Salience – power and urgency

Traditionally stakeholder salience comprises two factors: power and urgency. Analysing a stakeholder's salience based on these two factors has the potential to clearly identify which stakeholders are more important relative to other stakeholders (as illustrated in Figure 17). By considering salience, an organisation can decide how to deal with each stakeholder. However, experience shows that this distinction alone is insufficient, particularly since salience is a dynamic concept and which change rapidly over time:¹¹⁴ matters which are not urgent today can become urgent tomorrow with little warning and individual actors can change abruptly. To address this problem the project added both stakeholder frames of references and stakeholder networks to produce a fully integrated stakeholder analysis method.

Figure 17. Classes of Stakeholder salience¹¹⁵



2. Stakeholders' frames of reference

Stakeholder frames of reference are the frames of reference from which stakeholders view the world.¹¹⁶ A person's internal frame of reference (policy frame) is unique, shaped by a person's experiences, education, culture and familial relationships.¹¹⁷ Though unique for each person, within a community, multiple groups (stakeholders) can share similar policy frames.¹¹⁸ This overlap (policy discourse) describes the way stakeholders look at a topic and how they will consequently behave and interact with other stakeholders on that same topic.¹¹⁹

Policy discourses are highly context specific and can help identify sub-groups or stakeholder groups within a community. Stakeholder groups that do not share policy discourses are also more likely to use different vocabularies and jargon.¹²⁰ This can result in stakeholders using the same language, but attaching different meanings to it, thereby resulting in confusion and miscommunication. Policy discourses also expose the underlying reasons for stakeholders' objectives, for example different stakeholders can have similar goals yet be driven by different motives. Understanding stakeholder frames of reference can therefore significantly enhance stakeholder engagement.¹²¹

114 Agle, B. R., Mitchell, R. K., & Sonnenfeld, J. A. (1999). Who Matters to CEOs? An Investigation of Stakeholder Attributes and Salience, Corporate Performance, and CEO Values. *Academy of Management Journal*, 42(5), 507-525; and Mattingly, J. E., & Greening, D. W. (2002). Public-interest Groups as Stakeholders: A 'Stakeholder Salience' Explanation of Activism. In J. Andriof, S. Waddock, B. Husted & S. S. Rahman (Eds.), *Unfolding Stakeholder Thinking: Theory, Responsibility and Engagement* (pp. 266-279). Sheffield, UK: Greenleaf Publishing.

115 *ibid.*

116 de Bruijn, H., & ten Heuvelhof, E. (2000). *Networks and Decision-making* (1st ed.). Utrecht: Lemma; Ryan, N. F., Head, B., Keast, R. L., & Brown, K. A. (2006). Engaging Indigenous Communities: Towards a Policy Framework for Indigenous Community Justice Programs. *Social Policy & Administration*, 40(3), 304-321; and van de Riet, O. A. W. T. (2003). *Policy Analysis in Multi-Actor Policy Settings: Navigating Between Negotiated Nonsense and Superfluous Knowledge* (1st ed.). Delft: Eburon Publishers.

117 Butts, C. T. (2008). A Relational Event Framework for Social Action. *Sociological Methodology*, 38(1), 155-200.

118 Barry, J., & Proops, J. (1999). Seeking Sustainability Discourses with Q methodology. *Ecological Economics*, 28(3), 337-345; and Gasper, D., & Apthorpe, R. (1996). Introduction: Discourse Analysis and Policy Discourse. *The European Journal of Development Research*, 8(1), 1 - 15.

119 Skelcher, C., Mathur, N., & Smith, M. (2005). The Public Governance of Collaborative Spaces: Discourse, Design and Democracy. *Public Administration*, 83(3), 573-596; and Kroesen, M., & Broer, C. (2009). Policy Discourse, People's Internal Frames, and Declared Aircraft Noise Annoyance: An Application of Q-Methodology. *Journal of the Acoustical Society of America*, 126(1), 195-207.

120 van Eeten, M. J. G. (2001). Recasting Intractable Policy Issues: The Wider Implications of the Netherlands Civil Aviation Controversy. *Journal of Policy Analysis and Management*, 20(3), 391-414.

121 Gasper *op cit.*; and McLaughlin, M. W. (2005). Listening and Learning from the Field: Tales of Policy Implementation and Situated Practice. In A. Lieberman (Ed.), *The Roots of Educational Change* (pp. 58-72): Springer, Netherlands.

In comparison to stakeholder salience, stakeholders' frames of reference are relatively static. Whereas fluctuations in stakeholder salience can occur suddenly and on a daily basis, changes in frames of reference tend to take place gradually over time,¹²² the implication of this being that stakeholders are unlikely to change their views overnight.

3. Stakeholder Networks

The final component to the stakeholder methodology is the complicated interrelatedness of stakeholders: stakeholder networks. The concept of stakeholder interrelationships was first brought to the fore with the recognition that all stakeholders surrounding a particular issue are intrinsically linked to each other through a social (stakeholder) network.¹²³ Social networks are more or less stable patterns of relationships between mutually dependent actors that form themselves around policy problems or clusters of resources, and are formed, maintained and changed by interaction.¹²⁴ Since each stakeholder claims to have a stake in a particular issue they are most likely to be connected to the principal problem owner. According to this rationale, most stakeholders are interconnected with the principal problem owner represented as the main node, further strengthening the notion that each stakeholder will be part of a stakeholder network (see Figure 18).

Networks collate a number of public, semi-public and private actors who, on the one hand, are dependent on one another's resources and capacities in order to get things done and, on the other, are operationally autonomous in the sense that

they are not commanded by superiors to act in a certain way.¹²⁵ The interdependent relations between network actors mean that they are horizontally, rather than vertically, related. However, the horizontal relations between actors do not imply that they are equal in terms of authority and resources.¹²⁶ There might be an asymmetric allocation of material and immaterial resources among network actors. However, since participation is voluntary and actors are mutually dependent on one another's resources no single actor can exert hierarchical control over others in the network.¹²⁷

Members of networks interact through communication and negotiations that combine elements of bargaining with elements of deliberation. In particular unanimous agreements are incredibly rare, especially within complex paradigms such as those centred around airports, where multiple factors influence stakeholders' intentions.

Networks contribute to the production of public purpose—an expression of visions, values, plans, policies and regulations that are valid for and directed towards the general public—within a certain policy area.¹²⁸ As a result, network actors engage in political negotiations about how to identify and solve emerging policy problems or exploit new opportunities.¹²⁹

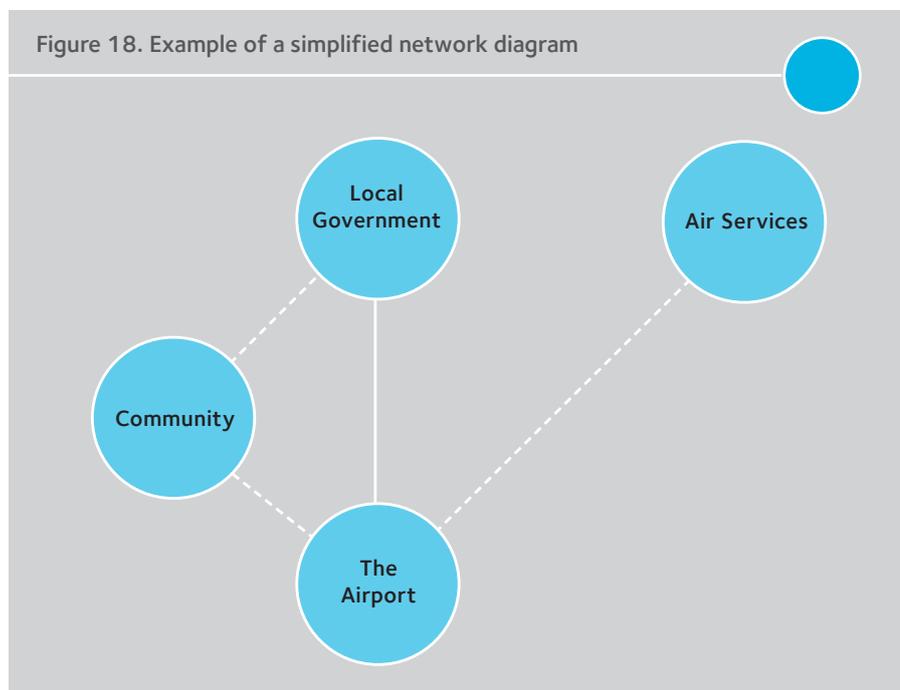
Examining the way in which social ties link stakeholders together can ultimately lead to more informed decisions regarding how to approach particular stakeholders in meaningful dialogue.¹³⁰

Social network analysis looks beyond attributes of individuals to examine:

- the relationships among stakeholders
- how stakeholders are positioned within a network
- how the relationships are structured into overall network patterns.

The five main variables used to define a social network are density, average path-distance, centralisation, strength and frequency (Table 21).¹³¹

Like stakeholder salience, stakeholder networks are also dynamic¹³² and largely rely on both personal and institutional relationships.¹³³ Relations on the personal level with an institution can change quickly when actors change positions or jobs. Moreover, entire stakeholder groups can leave a network, for example when they dissolve themselves or opt to sever network ties.



122 de Bruijn, H., & ten Heuvelhof, E. (2004). Process Arrangements for Variety, Retention, and Selection. *Knowledge, Technology, and Policy*, 16(4), 91-108; and Butts op cit.

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Table 21. Network measures and their definition

Measure	Description
Density	The measure of how much activity there is in the network, as compared to how much there could be. The higher the density ratio the more cohesive the network.
Average path distance	Average path distance is an indication of how quickly information can be spread and how easy it is to access resources, engage in planning and programming activity or make referrals.
Centrality	The extent to which an organisation is connected to other organisations (either directly or indirectly) within the network. It shows to what degree a network is shaped around single actors.
Strength	Relates to the intensity of a network relationship, including frequency or duration. Strong ties are ties where actors share an intense relationship with one another.
Frequency	Indicates how often network members interact with each other.

Summary

Each of the three components highlights a different aspect of the stakeholder. As such all three components need to be analysed and identified in order to gain a complete understanding of a stakeholder. The case study findings illustrate how analysing all three components provides a more holistic picture than if airports simply categorise and engage with stakeholders based on salience alone.

Case study findings

In order to study the complex nature of the airport stakeholder arena a case study approach was adopted, selecting three case study sites and an issues of interest. The three components—salience, frames of reference and networks—were then used to unpack the cases. The case study sites—Adelaide, Brisbane and Canberra airports—were chosen based on their complex stakeholder arenas. The issue of interest was selected by analysing the Australian Government Issues Paper and subsequent National Aviation Policy Green Paper which identified four main issues: aviation generated noise; airport noise; integration of on-airport and off-airport planning and non-aviation related developments on airport land; and airport access. Aviation noise was ultimately chosen as the issue of interest. For each of the case studies:

- salience was used to identify whether a stakeholder was interested or not (i.e. whether they were 'salient')
- frames of reference were used to shed light on the issue to identify a stakeholder's real reasons and motives for being interested in the issues
- stakeholder networks were drawn up to investigate how an issue impacted the network.



CASE STUDY BACKGROUNDS

Adelaide Airport

Adelaide Airport is the major gateway for South Australia, servicing international, domestic and regional flights. Currently operating under a Commonwealth mandated noise curfew, restricting airport use between 11pm and 6am, the airport has a total passenger throughput of some 7 million passengers per annum. Located 6km west of Adelaide's CBD, it is surrounded by residential, recreational and light industry developments. Despite being located within one local government area (City of Torrens) it directly impacts five others: City of Adelaide, City of Charles Sturt, City of Holdfast Bay, City of Marion and City of Unley. The airport is privately operated by Adelaide Airport Limited (AAL) and pursues revenue diversification through non-aviation on-airport developments such as its IKEA outlet.

Brisbane Airport

Brisbane International Airport is one of Australia's largest airports with respect to its land size. Situated approximately 8km from Brisbane's CBD, the airport is bordered by a diverse mix of land uses, including residential, commercial and industrial to the east, south and west, with a floodway and nature reserve to the north and Moreton Bay further to the north of that. Operated by Brisbane Airport Corporation (BAC) it has adopted an airport city development strategy as evidenced in the development of No 1 Airport Drive (Including a retail centre, hotel and office complex). It is the first airport to open an Experience Centre as part of its stakeholder engagement strategy. The airport serves as a passenger and freight airport with domestic and international terminals, a cargo terminal, two runways and a third in development. As the third-busiest airport in Australia it has strong projected growth figures over the next 25 years.

Canberra Airport

Situated approximately 6km east of Canberra's CBD and approximately 6km south-east of the New South Wales (NSW) state border. It is relatively unimpeded by residential development; however its flight path is located over the NSW city of Queanbeyan. Although called the Canberra International Airport, Canberra currently offers no international air services. Like Brisbane Airport, Canberra Airport Group Pty Ltd seeks to increase revenue through non-aeronautical development on airport land. The ACT Government's Canberra Spatial Plan identified the airport and surrounding areas as being an important centre for future industrial and related development. The airport's development has attracted negative community attention with the 'Curfew for Canberra' group advocating for night curfews in particular.

Stakeholder Salience findings

Research into each airport arena identified a large number of varied stakeholder groups potentially directly or indirectly affected by developments on airport land. For all three cases, each stakeholder has their own importance within the airport arena and each maintains its own values, interests and priorities regarding the airport. Investigations into stakeholder salience reveal that certain stakeholders are salient in more issues and therefore warrant more attention. While each airport has stakeholders unique to its arena such as local government bodies, there were a number of common stakeholders across all three airports (Table 22).

Table 22. Common stakeholders across the three case studies and their centrality (extent to which they are connected to other organisations within the network)

Stakeholders	Centrality		
	Adelaide	Brisbane	Canberra
AAL/BAC/CBR	High	High	High
AFP	Low	Low	Low
Airlines	Low	Medium	Medium
ASA	Low	Medium	Medium
CASA	Low	Low	Low
Community	Medium	High	High
DIT	High	Low	High
On-airport Tenants	Medium	Medium	Medium

Frames of reference findings

While there were a number of frames of reference for each airport, several of these were similar or overlapped between airports. Table 23 outlines the frames of references uncovered and the related airports.

Table 23. Frames of reference across the three case study regions

Frame	Description	Adelaide	Brisbane	Canberra
Aviation as an important economic contributor	In this frame the status quo for airport operations is considered satisfactory, it focuses on the notion that airports are important Australian infrastructure assets and should be maintained as such on account of their economic importance. This frame downplays the impact of airports on the environment as well as placing less importance on collaboration. For Canberra, airport relocation is simply not an option in this frame.	x	x	x
Collaboration as the way forward	This frame focuses on airport expansion being possible provided mitigating actions are taken to lessen the undesirable impacts of aviation. Collaboration with major stakeholders and in particular alignment between local, state and airport planning are important.	x	x	
Aviation connecting Australians	There is a strong focus on aviation as an important and socially desirable mode of transport. However, there is a belief that airports should mitigate their negative impacts. Collaboration is generally seen as the best way to achieve this.	x		
Back to centralised planning	In this frame there is a belief that forcing the sector to improve its social and environmental performance will hinder technological advancement and ongoing development. Collaboration is not viewed as the way forward—the sector itself is seen to be capable of solving these problems.	x		
Self-regulated airport planning	In this frame, aviation is considered an essential form of public transport and as such airports should be maintained and should expand through limited involvement from outside parties. Closer partnership in master planning is supported, however a federally appointed facilitating body is not.		x	
Aviation as a threat to environmental sustainability and health	Aviation in this frame is seen as a threat to the environment as well as to the local community through noise and emissions. In this frame airports should not expand unless the negative effects are mitigated for. In particular the economic impacts of airports are less important than human health.		x	
Aviation alternatives	This frame puts forward the notion that the negative effects of aviation pose limitations on airport expansion and that finding alternative transport modes together with greater stakeholder coordination is the way forward.			x
Aviation connecting Australians	The focus here is on the importance of aviation as a means to connect remote areas and link major cities. Aviation is an important and socially desirable mode of transport, meaning that airports should collaborate and integrate the planning of future expansions.			x
Airports as unfair economic competition	While airports are viewed as important economic drivers, non-aeronautical development is seen as unhealthy competition to the region. In particular this frame of reference considers that on-airport non-aeronautical developments should be subjected to the same rules and regulations as off-airport development.			x

Stakeholders adhere to at least one of these frames and in some cases several frames exist for the same stakeholder. By analysing both salience and frames of reference it clear that even though some stakeholders may have an interest in the same issue they do not necessarily look at it in the same way. From the airport's perspective it allows airports to clarify and highlight what the 'real' issues are for particular stakeholders and engage with them accordingly. For example, in Brisbane's case the community is the greatest supporter of collaboration, possibly as it has the most to gain from closer integration and collaboration around land use planning. This knowledge can help guide engagement strategies to maximise collaborative potential.

These frames of reference provide an in-depth explanation as to why stakeholders view certain issues as being important to them, why some issues are more important than others, and can help identify where differences exist and how these could be dealt with more efficiently. This knowledge in turn can help airports to not only understand stakeholders' positions but identify ways of interacting and discussing new possibilities with them.

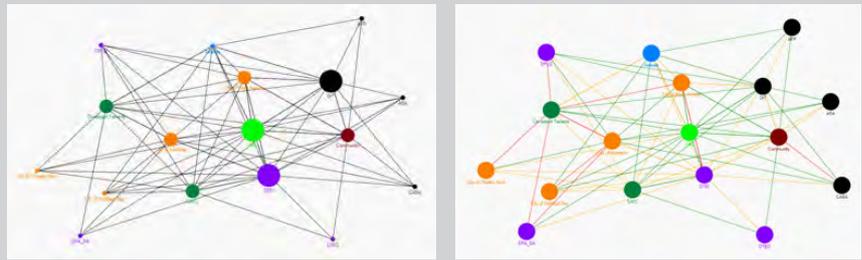
Stakeholder networks

In analysing networks the research considered the density, average path distance, centrality, strength and frequency of the relationships within each network.

Adelaide Stakeholder Network

Results of the basic network structure (Figure 19) largely support those found earlier in relation to salience and frames of reference. Overall, stakeholders do not appear to interact with one another extensively, nor do they appear to have the same interests at heart (measured through density). However, information (measured through average path distance), does appear to travel from stakeholder to stakeholder with relative ease, which in theory should help the network's ability and capacity to work together. In regards to centrality, there are three key players in the Adelaide stakeholder network. These players are critical to the stakeholder engagement process and collaborative undertakings between the three stakeholders will be vital to resolving issues. There are also a number of active players who are likely to proactively engage with other stakeholders to gather and share information. When considering the strength of relationships, it appears that Adelaide Airport's current engagement strategy is working well with AAL maintaining relatively strong links with the majority of stakeholders. However, it has a hierarchical rather than horizontal (as preferred in network governance¹³⁴) approach to information sharing.

Figure 19. Adelaide stakeholder network showing network centrality in node size and relationship strength in colour of the links

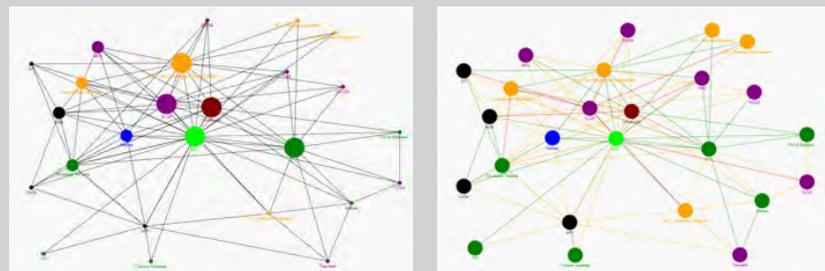


Brisbane Stakeholder Network

The overall network for the Brisbane stakeholder arena shows that stakeholders appear less committed to the network and are not extensively interacting with each other (Figure 20). Findings indicate stakeholders have different interests at heart, supporting the previous two components of analysis. Like Adelaide, information appears to flow relatively easily through stakeholders. There are five central stakeholders, one of whom is BAC, with a number of active stakeholders indicated by their medium-level of centrality. The majority are, however, less active in the

decision-making process having certain interests in specific issues. BAC has created relatively strong relations with the majority of stakeholders, highlighting the relative success of its current engagement strategy (although improvements could be made to the few weaker relationships). What the network does highlight, however, are the weak relations surrounding a state department, highlighted as one of the five major stakeholders. Anecdotal evidence from in-depth interviews supported this finding explained through the apparent weak involvement of the department in airport issues.

Figure 20. Brisbane stakeholder network, showing network centrality in node size relationship strength in colour of the links



“The project has helped Council understand how airports work, has strengthened the relationships, helped us understand airport issues and the organization ... there have been a number of intangible benefits [to the Airport Metropolis] in establishing relationships, discussing airports issues, and gaining knowledge about how other airports work has been a significant benefit. We're much better at seeing the big picture.”

Brisbane City Council, Mark Pattemore

134 Klijn, E.-H., Steijn, B., & Edelenbos, J. (2010). The Impact of Network Management on Outcomes in Governance Networks. *Public Administration*, 88(4), 1063-1082.

Canberra Stakeholder Network

The results for Canberra (Figure 21) are extremely similar to those found in Brisbane and Adelaide: stakeholders in the Canberra network do not appear to interact extensively or have the same interests at heart, information flows with relative ease and there are four central stakeholders with a number of other stakeholders active within the network. In addition like its counterparts, Canberra Airport has relatively strong relationships with the majority of stakeholders, with only a few being weak. This can largely be attributed to Canberra Airport's active stakeholder engagement program.

Analysing all three components

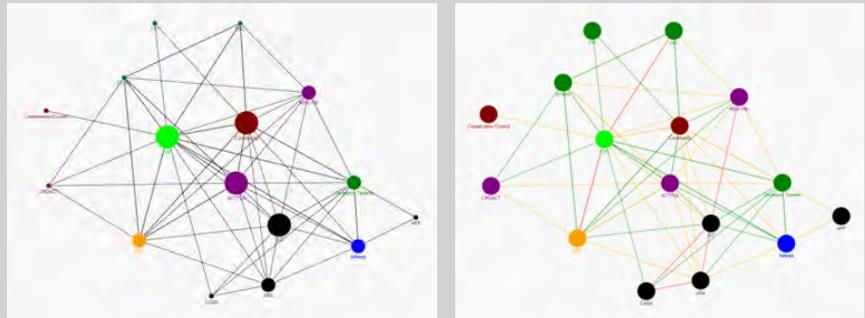
By analysing all three stakeholder components, airports have the opportunity to improve their stakeholder engagement programs by creating more efficient, individually specialised ways of engaging with its various stakeholder groups. Tables 24–26 outline the major findings from all three airports including the stakeholders, groupings, frames of reference, salience and centrality in terms of the stakeholder network. As can be seen, different levels of salience can be determined for each stakeholder depending on the issue at hand. An important finding for Canberra in particular in regards to salience is that almost all stakeholders in the airport stakeholder arena are perceived to be salient, or at least have potential power—only a few are bystanders

Research found that some frames of reference are predominant amongst a large number of stakeholders while some are only found in a few. This again supports the notion that different stakeholders have different underlying reasons for having an interest in an issue and should not be treated as a homogenous group but rather engagement needs to be tailored to suit the circumstance.

It is clear from the stakeholder network analysis that stakeholder relations in all three sites are complex and multifaceted. There is no one 'critical stakeholder'; instead stakeholders need to be considered separately based on the issue at hand.

Overall the findings indicate that different engagement strategies are likely to be necessary for the same stakeholder depending on the issue—in some instances it may be better to deal with multiple issues simultaneously whereas in other cases it would be best to deal with issues separately.

Figure 21. Canberra stakeholder network, showing network centrality in node size relationship strength in colour of the links



Conclusion

Complete stakeholder analysis leading to best practice stakeholder engagement presents opportunities for the aviation sector and its surrounding regions. In an age where airports—and regions—are facing increasing scrutiny and requirements for greater engagement with ever increasing stakeholders, a new methodology to help actors identify relevant stakeholders, gauge their level of impact and interest, and ultimately develop effective engagement strategies has the potential to significantly increase stakeholder satisfaction, reduce the cost of lengthy, drawn out negotiation battles and ultimately secure better outcomes for all parties.

The integrated stakeholder analysis used in this research was successful in unpacking the Adelaide, Brisbane and Canberra airport stakeholder arenas. While there are stakeholders unique to each airport, such as city councils, state government departments, industry and communities, there were several stakeholders common across all three: namely federal government departments and airlines. In each case the community can be regarded as the most complex stakeholder—attaching similar levels of urgency and importance to a variety of issues. One considerable difference was the power attached to the Canberra community.

This research clearly identified the complex nature of the airport stakeholder arena. In all three cases, traditional stakeholder identification categorisation would not have explained why particular stakeholders held different interests in particular issues and what their motivations were. It is only by further investigating stakeholders' frames of references that airports can better understand issues from different perspectives, identify key stakeholders with an interest in the issues and ultimately allow for a more specialised and targeted approach to stakeholder practices and

policies. By understanding stakeholder networks, airports can see which stakeholders are critical, where they are less connected or have limited resources and where they should focus their energies in relation to a particular topic in order to increase their position in a network and have better access to information sharing. The resulting Stakeholder Engagement Tool, discussed in the Outputs section of this reports, provides airports with the ability to do just that.

The research into stakeholder engagement has identified that the three components of stakeholder salience, frames of reference and stakeholder networks have the potential to provide a comprehensive overview of 'who is a stakeholder'. By arriving at a truly informed understanding of the salience of any stakeholder—their power and the urgency and legitimacy of their claim—knowing what their interests are and more importantly why they have those interests, combined with the knowledge of a stakeholder's location within the stakeholder network, can answer the question of how a stakeholder is most likely to respond to an issue and what the effect of the response will be. More importantly, it will not only predict the response and its effect on the principal stakeholder, but also its impact on the other stakeholders within the network. Stakeholder engagement based on this knowledge will be better able to appropriately match engagement strategies with stakeholders, helping to manage stakeholder behaviour in such a way that objectives are achieved as efficiently as possible. In particular, as the next section will illustrate, identifying and understanding stakeholders—most importantly those involved in decision-making networks—is of paramount importance to airports with the escalating importance of informal governance networks in the airport–region planning context.

Table 24. Overview of the Adelaide airport stakeholders—Adelaide (Source: Kivits, 2011)

Stakeholder	Stakeholder Group	Frames of reference				Salience			
		Aviation – an important economic contributor	Collaboration – the way forward	Aviation – connecting Australians	Back to centralised planning	Aviation noise	Airport noise	Planning integration & non-aeronautical developments	Airport access
AAL	Aviation industry	X		X		Definitive	Definitive	Definitive	Dormant
AFP	Commonwealth government	X				Non-stakeholder	Non-stakeholder	Demanding	Demanding
Airlines	Aviation industry	X		X		Dormant	Dormant	Dormant	Dormant
ASA	Commonwealth government			X		Definitive	Dormant	Dormant	Dormant
CASA	Commonwealth government			X		Demanding	Non-stakeholder	Non-stakeholder	Non-stakeholder
City of Adelaide	Local government		X			Dormant	Dormant	Definitive	Definitive
City of Charles Sturt	Local government			X		Dormant	Dormant	Dormant	Dormant
City of Holdfast Bay	Local government		X			Dormant	Dormant	Definitive	Dormant
City of West Torrens	Local government		X	X		Definitive	Definitive	Definitive	Definitive
Community	Community	X	X	X		Definitive	Definitive	Definitive	Definitive
DIT	Commonwealth government		X	X		Definitive	Dormant	Definitive	Definitive
DPLG	State government	X			X	Dormant	Dormant	Dormant	Dormant
DTED	State government					Definitive	Dormant	Definitive	Definitive
DTEI	State government			X	X	Dormant	Dormant	Dormant	Dormant
EPA SA	State government					Demanding	Demanding	Demanding	Demanding
On-airport Tenants	Non-aviation industry	X				Non-stakeholder	Non-stakeholder	Non-stakeholder	Non-stakeholder
SAFC	Non-aviation industry	X				Demanding	Demanding	Demanding	Demanding

Table 25. Identified frames of reference per stakeholder and their issues of interest—Brisbane (Source: Kivits, 2011)

Stakeholder	Traditional stakeholder group	Frames of reference				Salience			
		Aviation – an important economic contributor	Collaboration – the way forward	Self-regulated airport planning	Aviation – a threat to environ. sustainability and health	Aviation noise	Airport noise	Planning integration & non-aeronautical dev.	Airport access
AFP	Commonwealth government	X				Dormant	Dormant	Dormant	Dormant
Airlines	Aviation	X		X	X	Dormant	Dormant	Definitive	Definitive
Airtrain	Industry	X				Dormant	Dormant	Dormant	Dormant
ASA	Commonwealth government			X		Definitive	Dormant	Dormant	Dormant
ATC	Industry			X		Dormant	Dormant	Dormant	Dormant
BAC	Airport	X				Definitive	Definitive	Definitive	Definitive
BCC - Bris Infrastructure	Local government					Dormant	Dormant	Dormant	Dormant
BCC - Bris Marketing	Local government	X				Non-stakeholder	Non-stakeholder	Non-stakeholder	Non-stakeholder
BCC - Bris Transport	Local government					Non-stakeholder	Non-stakeholder	Non-stakeholder	Non-stakeholder
BCC - City Planning and Sustainability	Local government			X		Definitive	Definitive	Definitive	Definitive
CASA	Commonwealth government			X		Definitive	Dormant	Dormant	Dormant
Community	Community	X	X		X	Demanding	Demanding	Demanding	Demanding
DEEDI	State government	X				Dormant	Dormant	Definitive	Definitive
DIT	Commonwealth government		X	X		Definitive	Definitive	Definitive	Definitive
DERM	State government			X		Definitive	Definitive	Definitive	Definitive
DLGP	State government			X		Definitive	Dormant	Definitive	Definitive
Local Elected Members	Local government					Definitive	Definitive	Definitive	Definitive
MPs	State government					Definitive	Definitive	Definitive	Definitive
On-airport Tenants	Industry	X				Non-stakeholder	Non-stakeholder	Demanding	Demanding
Port of Brisbane	Industry					Dormant	Dormant	Dormant	Dormant
TMR	State government			X		Definitive	Dormant	Definitive	Definitive
Tourism Australia	Industry	X				Non-stakeholder	Non-stakeholder	Non-stakeholder	Non-stakeholder
Translink	State government					Dormant	Dormant	Dormant	Dormant
TTF	Industry	X				Non-stakeholder	Non-stakeholder	Demanding	Demanding
ULDA	State government			X		Non-stakeholder	Non-stakeholder	Demanding	Demanding

Table 26. Identified frames of reference per stakeholder and their issues of interest

Stakeholder	Traditional stakeholder group	Frames of reference				Saliency			
		Aviation – an important economic contributor	Aviation alternatives	Aviation – connecting Australians	Airports as unfair economic competition	Aviation noise	Airport noise	Planning integration & non-aeronautical developments	Airport access
ACTPLA	State government	X				Definitive	Dormant	Definitive	Definitive
AFP	Commonwealth government	X				Dormant	Dormant	Dormant	Dormant
Airlines	Aviation	X				Dormant	Dormant	Definitive	Definitive
ASA	Commonwealth government			X		Definitive	Dormant	Dormant	Dormant
CASA	Commonwealth government	X				Definitive	Dormant	Dormant	Dormant
CBR	Airport	X		X		Definitive	Definitive	Definitive	Definitive
Community	Community	X	X	X	X	Definitive	Definitive	Definitive	Definitive
CMDBACT	State government	X				Definitive	Dormant	Definitive	Definitive
Conservation Council	NGO		X			Demanding	Demanding	Demanding	Demanding
DIT	Commonwealth government			X		Definitive	Definitive	Definitive	Definitive
DTIRS	Industry			X		Definitive	Definitive	Definitive	Definitive
NSW P&I	State government				X	Dormant	Dormant	Definitive	Definitive
On-airport Tenants	Industry	X				Non-stakeholder	Non-stakeholder	Demanding	Demanding
QCC	Local government		X	X		Definitive	Definitive	Definitive	Definitive
TTF	Industry	X				Non-stakeholder	Non-stakeholder	Demanding	Demanding
Village Building	Industry				X	Definitive	Definitive	Definitive	Definitive

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Key Theme: Decision-making

In the wake of the increasingly blurred boundaries within airport regions, **governance is vast becoming the key area for debate** as to how to progress the practices of planning and development, in particular **collaborative planning.**

Governance

While originally identified as an interface in its own right, research now identifies governance as a key integrating mechanism underpinning all of the airport metropolis interfaces. In the wake of the increasingly blurred boundaries within airport regions governance is vast becoming the key area for debate as to how to progress the practices of planning and development, in particular collaborative planning.

As airports increasingly move from city airports requiring a single focus (namely airport, city and developer) to that of airport cities there needs to be a move towards a more interdependent management approach. The spatial planning of airports largely sits in isolation to the spatial planning of their surrounding cities, with decisions of what, where, when and how to plan and develop land being subject to different—and often isolated—approval laws, regulations and jurisdictions from one side of the airport fence to the other. However, despite the shared interests in what happens ‘either side of the airport fence’ relationships between airports, local and state governments are often strained—if not hostile. While this issue is not new to the airport arena, there is a need in current conditions, such as recent calls for greater collaborative planning approaches by the National Aviation Policy White Paper (White Paper), to ‘bridge the gap’ between airport and city planners. However, despite its relevance worldwide, the current conditions needed to bridge the gap are vastly under-explored.

Research aims

In addition to the lack of understanding on how to bridge the gap, governance practices are also often ahead of theory for integrating the conflicting interests of stakeholders and the planning practices of airport and regional planners. To address these problems, the governance component of the research set out to investigate the following:

- What does governance mean for airports and how can airports design their own governance structures to achieve and maintain high performance?
- How does the mix of governance arrangements and requirements impact on airports and their regions and how does this impact on management approaches?

- How do governance arrangements accommodate diverse stakeholder interests to achieve cooperation and partnership?
- What are appropriate processes and structures for dealing with these issues?
- What are the emergent public policy and public governance issues confronting airports and airport developments?

Key findings

The research findings show that network governance is a key component of airport and regional development. The project identified that airport–region decision-making currently adopts a hybrid model of informal, horizontal governance modes in the form of networks alongside the formal hierarchical, market modes of governance. In the case study region in particular (Brisbane Airport Region) informal actor networks underpin and combine with formal networks to create new governance spaces that facilitate decision-making during different phases of development projects.

Research also found that despite existing airport–region tensions a number of pathways and strategies exist to move decision-makers beyond ‘planning enclaves’ to more integrated mechanisms for city and regional planners. In particular, decision-makers were found to pursue alternative governance arrangements—broadly described as ‘shadowed’ and ‘functional’ actions—when formal, collaborative governance arrangements insufficiently met their strategic needs.

While research found there is no single model appropriate for network management in the airport region context, it is clear that an adaptive approach is necessary to suit the context, purpose and development phases being undertaken. In particular, the project identified that adaptive network management offers enhanced outcomes for all decision-makers.

Research methodology overview

The governance research stream used a mixed method approach, combining secondary qualitative data analysis, namely the TUD-deelrapport Fase 2 (Lessons for International Comparison for the Commission ROL)¹³⁵ which reported on

an international comparison of 21 airport and six airport cities, and a case study approach which incorporated the use of social network analysis (SNA). The case study component was primarily informed by the work of PhD student Timothy Donnet in his thesis ‘The governance of inter-organisational decision-making: Understanding the impacts of informal networks on formal decision-making regimes in the Brisbane Airport Region’, currently in its final stages of submission.

The secondary qualitative data analysis was used to identify tensions, barriers and enablers of integrative planning approaches, while three embedded cases of airport–proximal development within the Brisbane Airport Region (BAR)—an upgrade of a roundabout at the Brisbane Airport entrance, an on-airport land commercial development and an off-airport land development project still in proposal stage¹³⁶—were analysed from a network governance perspective to identify governance structures applied in on- and off-airport land developments involving airport, local, state, community and developer interests. The combination of SNA and thematic analysis allowed the research team to interpret the ways in which airport region decision-makers organise themselves to overcome complex planning problems in relation to the selected projects.

Governance and collaborative planning—an overview

In essence, governance is a form of social organisation. It is defined as the way in which society is organised to define who makes decisions, who is included in the process and how decision-making actors relate to one another.¹³⁷ There are three broadly accepted forms of governance—hierarchy, market and network—each with different organising assumptions and operationalised principles and logic. Table 27 (over) provides a summary of governance forms in urban infrastructure decision-making.

¹³⁵ Appold, S., D. Baker, T. Donnet, P. Kimmet, O. van de Riet and M. van Twist, (2008). *Internationale vergelijking (‘Lessons from International Comparison for the Commission ROL’): TUD-deelrapport Fase 2 ten behoeve van de Commissie Ruimtelijke Ontwikkeling Luchthavens; Deel C. TU Delft, Delft*

¹³⁶ De-identified for reasons of commercial sensitivity.

¹³⁷ Kooiman, J. 2003. *Governing as Governance*. London, Sage Publications.

Table 27. Governance of urban infrastructure decision-making¹³⁸

Governance Mode	Hierarchy	Market	Network
Orientation of actor relationships	Authoritative	Exchange	Interactive
Mechanisms of actor integration	Central and legitimate authority, rules, regulations, codes of practice, procedures, legislation	Formal, legal contractual arrangements, arms-length transactions, bargaining	Interpersonal trust, mutuality and reciprocity for actions, negotiating
Focus for managing development	Administrative procedures and accountable outcomes	Contractual delimitation and outcome efficiency	Utilising group resources and providing outcomes that satisfy group concerns
Planning orientation	Authoritarian, structured, top-down, public value, exclusive	Strategic, self-interested, exclusive	Collaborative, integrative, inclusive

Governance modes are often mixed to suit the purpose at hand, with arrangements to address societal issues often mixing and borrowing elements from a combination of governance modes.¹³⁹ The project research shows that new network governance arrangements are emerging to act as integrating arrangements. Network governance differs from other modes of governance in two ways:

- the focus is on interpersonal and informal structures rather than authority relation, facilitating dialogue and negotiation among interested parties¹⁴⁰
- integration is achieved through self-organisation, flexibility and inclusion.¹⁴¹

However, while network modes assume high levels of non-hierarchical processes and controls, in reality they often sit

alongside hierarchical modes of governance, as in the case of the BAR embedded case studies.¹⁴²

Network management

The evolution of network arrangements requires a change from ‘internal independent’ management to an ‘interdependent’ management approach. For airports and regions this means the ability to manage networks across entities and areas—a task more complex and difficult than conventional internal management. Not only does it require a different set of skills but also the ability to recognise and adapt from one management style to another. Table 28 outlines the typical characteristics of the three networks types (dependent, interdependent and independent).

Collaborative planning in the airport arena

In the case of the airport region—an area including the airport and the surrounding land that holds residents, business and infrastructures that influence and are influenced by airport operations and users—governance offers a better way to integrate the increasingly complex and crowded decision-making and planning activities. Integration in the planning context involves including the diverse interests of stakeholders throughout the decision-making process to ensure a fit between what is planned and what is needed.¹⁴³

Collaborative planning draws on genuine dialogue and an iterative process of negotiation between members to reach shared agreement on issues and their resolution with benefits including the

Table 28. Network overview

Network type	Description	Actions	Outcomes
Dependent	The more dependent the larger network with airports being members of a larger system	Integrating, engaging and accepting	Consensus in information, less overlap in decision-making fora
Interdependent	Airports are players in a planning game with surrounding game with surrounding actors	Sharing, discussing and tolerating	Contested information and multiple overlapping fora
Independent	The more independent the smaller the network with airports as network leaders	Managing, telling and defending.	

138 Adapted from Keast, R., & Hampson, K. (2007). Building constructive innovation networks: Role of relationship management. *Journal of Construction Engineering and Management*, 133(5), 364–373 by Donnet, T. 2011. *The governance of inter-organisational decision-making: Understanding the impacts of informal networks on formal decision-making regimes in the Brisbane Airport Region*. Unpublished thesis.

139 Keast, R., M. Mandell and K. Brown. (2006). Mixing state, market and network governance modes: the role of government in “crowded” policy domains. *International Journal of Organizational Theory and Behavior* 9 (1): 27–50.

140 Keast, R., M. Mandell and K. Brown. (2006); Klijn, E.-H. and J. Koppenjan. (2000). Public Management and Policy Networks, *Public Management* 2 (2): 135–158 Mixing state, market and network governance modes: the role of government in “crowded” policy domains. *International Journal of Organizational Theory and Behavior* 9 (1): 27–50; and Sorensen, E. and J. Torfing. (2007). Introduction. In E. Sorensen and J. Torfing (eds.), *Theories of democratic network governance* (pp. 1–20). London: Palgrave Macmillan.

141 Kickert, W. J. M., Klijn, E.-H., & Koppenjan, J. (1997). *Managing Complex Networks: Strategies for the Public Sector*. London: Sage; and Powell, W. (1990). Neither market nor hierarchy: Network

forms of government. *Research in Organizational Behavior*, 12, 295–336.

142 Keast, R., M. Mandell and K. Brown. (2006). Mixing state, market and network governance modes: the role of government in “crowded” policy domains. *International Journal of Organizational Theory and Behavior* 9 (1): 27–50.

143 Graham, S., & Marvin, S. (2001). *Splintering urbanism: Networked infrastructures, technological mobilities and the urban condition*. New York: Routledge; and Healey, P. (1997). *Collaborative planning: Shaping places in fragmented societies*. London: MacMillan.

increased likelihood of plans that better reflect the public interest and increased likelihood of implementation.

However collaborative planning also has its limitations:

- it is often only possible in situations where stakeholders have shared motivations and where parties are prepared to delegate decision-making responsibilities
- it can also be costly in terms of time and resources
- there is a tendency for the consensus approach of collaborative planning to achieve 'satisfying' as opposed to 'optimal' outcomes.

The calls for more collaborative planning are not new to the airport arena, the recent White Paper being a prime example. A number of efforts have been made to work towards a more integrative approach in the airport–region context; however these have fallen short of the true collaborative planning ideal. Analysis of 21 international airports and six airport cities (Amsterdam Schiphol, Dubai International Airport, Hong Kong International Airport, Incheon (Korea's Air City), Dallas–Fort Worth International Airport and Frankfurt International Airport) identified a number of key tensions, barriers to, and enablers of, integrative planning between airports and regions—many of which were mirrored in the embedded case studies.

Tensions in airport–region planning and development

Three key tensions impact integrative airport region planning:

- Limited land resources: increasing urban encroachment threatens aviation sustainability, for example unregulated off-airport development can impact aviation operations (e.g. imposed curfews as a result of increased residential areas).
- Increased commercial development: on-airport development (e.g. retail/commercial) drawing on local areas for customers, 'taking' business from the city; and perceived inequities over different planning regimes (e.g. application and approval fee disparities).
- Increased impact on transport and economic infrastructures from increased workers and consumers and reduced rents as a result of surplus retail/office space.

However, tensions don't necessarily negatively impact on decisions; they can provide a common ground for negotiations. Tensions appear to be mainly problematic in situations where decision-making processes experienced significant barriers.

Barriers to integrative planning and development

The main barriers were identified as:

- Physical environment—natural terrain and built environment often impacts both airport and city expansion or development (e.g. environmental sensitive systems impacting airport expansion, protected airspaces above cities limiting building heights).
- Historical planning—elements of social significance can form finite barriers of what is and isn't acceptable to a community, while historically significant structures can impact development design.
- Political impetus—while not as overt, political impetus also impacts on the ability to integrate planning and development decisions (e.g. the development of airport cities can be promoted as 'for the greater good' at the expense of other regional assets).

Enablers

However, despite these existing airport–region tensions and barriers the airports studied evidenced a number of enablers or 'pathways' used to move beyond decision-making enclaves to increasingly integrated mechanisms for city and airport planning:

- **Formal mechanisms:**
 - well defined protocols for the transmission of city into airport planning and development and legitimate pathways for the protection of city interests in airport development
 - clearly defined limitations to city development to protect aviation safety
 - in one example, the inclusion of flight path planning into the negotiated space for airport–city planning appeared to have significant benefits, protecting city interests without compromising aviation safety.
- **Informal mechanisms:**
 - social and professional networks linking decision-making from airport and regional planning agencies
 - formal forums between airport city decision-making that were 'unrelated' to planning and development decisions—these informal pathways provided airport and city planners with additional feedback for decision-making and provided informal forewarnings of positive and negative feedback to formal development proposals.

There were examples of some isolated airport and region planning processes which have found mutually compatible planning solutions to airport–region tensions, such as Estonia's Tallinn Airport's successful zoning of hi-tech business parks under flight paths. This outcome indicates that while there is a need for collaborative planning, where there is sufficient knowledge and legitimacy tensions can be leveraged for mutual benefit.

In essence, governance is a form of social organisation. It is defined as the way in which society is organised to define who makes decisions, who is included in the process and how decision-making actors relate to one another.

Kooiman, 2003

Governance arrangements in the airport–region decision-making space

In addition to understanding the tensions, barriers and integrating mechanisms, there is also a need to understand how decision-makers within the contested space of the airport region organise so that all interests are considered, how decision-making works, what roles exist and how actors adjust and reorganise to make decisions.

The impact of airport ownership on governance arrangements

To understand how decision-making works it is important to understand the impact airport ownership (wholly government owned through to fully privatised¹⁴⁴) has on framing the underlying interests and time horizons for strategic decisions.¹⁴⁵

Research found that different management focuses and privatisation arrangements suit different governance archetypes. By mapping airport operator accountability against typical foci for each arrangement using 18 international airport cases, the research team found that airport decision-making should be dominantly influenced by the governance model associated with its level of privatisation (as shown in Figure 22)

144 Graham, A. (2003). *Managing Airports* (2nd ed.). Oxford: Elsevier.

145 Carney, M. & Mew, K. (2003). Airport governance reform: A strategic management approach, *Journal of Air Transport Management* 9: 221–232.

The Airport Metropolis Project analysis found that:

- airports wholly owned and operated by government are subject to hierarchically dominant check and balances, highly centralised authority with oversight focussed on gaining public acceptance
- airports that are wholly privatised (such as major airports within Australia) are dominated by horizontal linkages with stakeholders, decentralised authority and oversight focussed on gaining stakeholder acceptance.

The need for greater engagement

As noted in the previous Stakeholder Engagement section, stakeholder consultation has adopted an increasingly central position in the planning and managing of airports and in managing the interfaces with regional centres. As airports move from the traditional city airport model to the increasingly popular airport city model, they are becoming more and more reliant on the ability of external infrastructure in particular to service their operational needs, with this reliance comes the increasing need for airports to actively engage with their local and regional urban surroundings in order to protect their long-term operational requirements and strategic objectives. Likewise, for regions, airports can be leveraged to support local

economic development and as such are now regarded as an essential part of the urban planning process. As a result there is a real need on both sides to challenge the notion of isolated decision-making. In particular the contested decision-making spaces for airport and city developments must consider the governance arrangements that underpin airport–region strategic decision-making.

Defining the airport–region decision-maker

In airport–regional planning, decision-makers are the governance representatives who have legitimate influence over decisions to approve expanding, developing and maintaining airport infrastructures and capacities. The primary decision-makers in this context are airports, city planners and, increasingly, developers. Decision-makers have their own:

- strategic interests—which are not necessarily compatible and often overlap and compete
- decision-making structures
- boundaries of authority
- vested interested in decision outcomes of what to build, where, when and how.

The overlapping interests and arrangements for airport region developments can be seen in Figure 23.

Figure 22. The fit of governance, privatisation and airport managerial focus

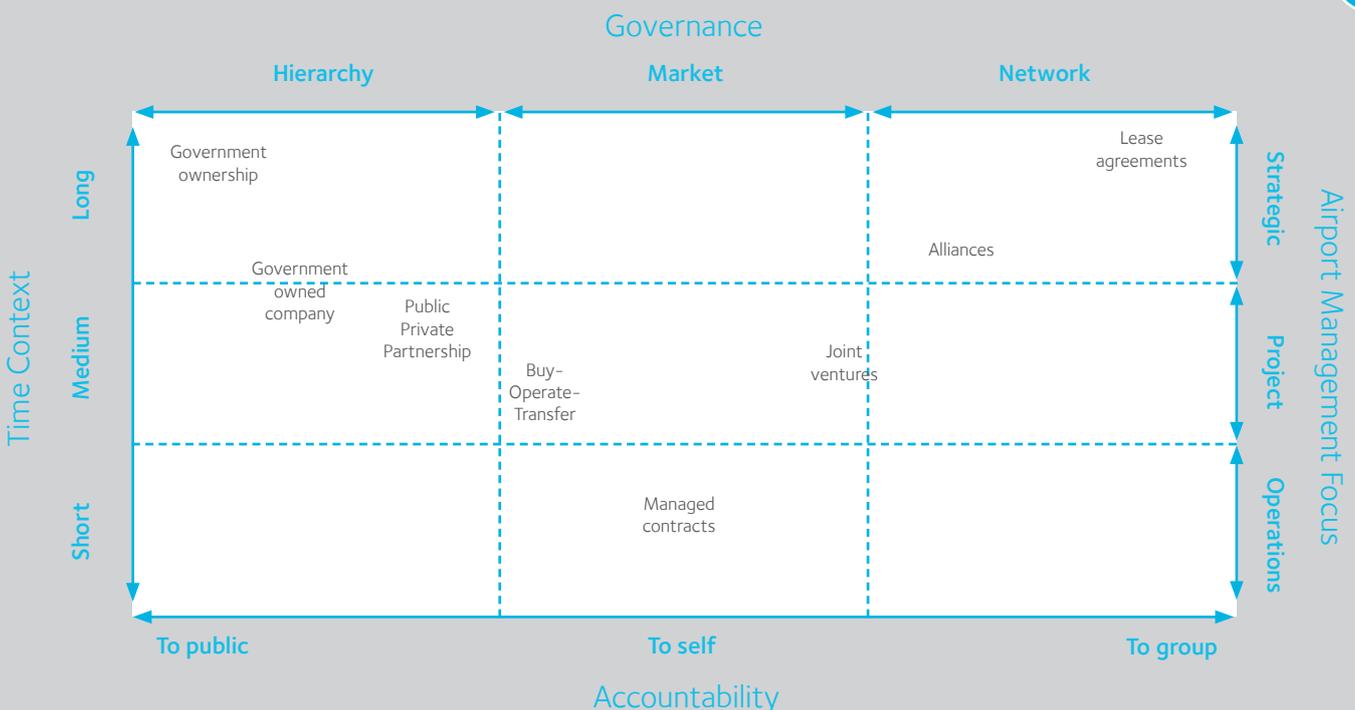


Figure 23. Competing interests in airport–region development



Current governance arrangements in the Australian context

The Commonwealth Airports Act 1996 (the Act) clearly cedes the strategic planning and development decision-making of airport land to lease holders (with federal approval and oversight). At face value the governance arrangement appears as a hybrid arrangement dominated by market forces and hierarchical oversight.

However, as evidenced in the BAR case studies, in response to increasing tensions and the increasing reliance on external stakeholders to meet strategic demands airports are increasingly creating horizontal, network-type relationships with local influential decision-makers. These horizontal and relational efforts by airports and regions have created new governance spaces for organising influential government, private and societal actors involved in airport-proximal planning.

The Brisbane Airport Region (BAR) case study

The BAR was selected for its sizeable projected growth numbers for regional economy, regional population and airport passenger demand.¹⁴⁶ Case selection focused on selecting larger, publicly visible developments that were close to airport and city transport/access corridors, near approach/takeoff flight paths, and espoused (by developers, city and/or airport) to generate substantial economic benefits within the region, all with the potential for stakeholder conflict. Three development projects located both within and outside of the airport boundary were selected to examine network governance arrangements: an upgrade of a roundabout at the Brisbane Airport entrance, an on-

airport land commercial development and an off-airport land development project still in proposal stage.

The Greater Brisbane Region faces population growth of 30% between 2001 and 2026.¹⁴⁷ To meet the challenges of accommodating its rapidly expanding population, the Greater Brisbane Area (surrounding and including Brisbane's CBD) is now characterised by large scale urban infrastructure projects to cope with the growing populace; growth which is increasingly encroaching Brisbane Airport boundaries. At the same time Brisbane Airport has been pursuing a rapid diversification development approach, adopting the airport city model as strategic intent. Brisbane Airport was noted in a recent government report as having added between \$80–\$420 million in tangible airport assets every year since the 2005–06 reporting period, representing a 43.5% increase in its tangible asset base.¹⁴⁸

Brisbane Airport serves as a passenger and freight transport hub with international and domestic passenger terminals, a cargo terminal and two run-ways. It is the third busiest airport in Australia, after Sydney and Melbourne and is operated by the Brisbane Airport Corporation (BAC) a consortium led by NV Luchthaven Schipol Group and a number of other government and non-government shareholders. In adopting an airport city development approach it has expanded the focus and orientation of the airport beyond that of solely a transport hub to include a wider array of development initiatives both aeronautical and non-aeronautical. This transformation is well underway with approximately 320 businesses located within the precinct, as well as a shopping centre and office complex. The airport was initially located some distance from the Brisbane CBD; over time, however, the distance between the airport and the city has been reduced with urban planning

strategies including housing and business developments now pressing on the airport boundary. The growing reliance on air travel coupled with the airport–region interface has led to increased traffic and congestion, noise concerns and other environmental considerations. Airport operation and planning previously occurred in a local planning vacuum¹⁴⁹ and local planning largely proceeded without airport input; better integration between the two decision-making domains is now a dominant concern for sustaining long-term growth strategies.¹⁵⁰

The rapid expansion on both sides of the airport fence has resulted in a history of tension between BAC and Brisbane City Council (BCC) and regional stakeholders¹⁵¹ including a two year Federal Court case between the owner of a nearby shopping mall and BAC in relation to an on-airport development which subsequently gained Federal Court approval. These tensions have eased over time with a number of forums now in place to facilitating the transfer of information at both operational and strategic organisational levels between BAC and BCC. These include:

- the BAC–BCC Protocol
- the Brisbane Airport Community Forum for engagement at regular intervals
- additional consultation between airport and city also occurs through requirements set in creating Airport Master Plans, Major Development Plans and Neighbourhood Plans
- involvement by both organisations in the Australia TradeCoast project¹⁵²
- City Master Plans providing a formal avenue for BCC to publicly communicate its strategic intentions.

¹⁴⁶ Brisbane Airport Corporation. (2009a). Brisbane Airport 2009 Master Plan. Retrieved from <http://bne.com.au/corporate/current-publications>; and Guhathakurta, S., & Stimson, R. J. (2007). What is driving the growth of new "sunbelt" metropolises? Quality of life and urban regimes in Greater Phoenix and Brisbane–South East Queensland Region. *International Planning Studies*, 12(2), 129–152.

¹⁴⁷ Greater Brisbane Area Consultative Committee. 2009. Regional Profile. http://www.gbacc.com/index.php?submenu=Our_Region&src=gendocs&ref=RegionalProfile&category=Our_Region.

¹⁴⁸ Australian Competition & Consumer Commission. (2011). Airport Monitoring Report 2009–10: Price, financial performance and quality of service monitoring. Canberra, Australia: Commonwealth of Australia. <http://www.accc.gov.au/content/item.phtml?itemId=971570&nodeId=c54d88ac95495a8f6c2dc8ebc142706a&fn=Airport%20monitoring%20report%202009-10.pdf>

¹⁴⁹ Baker, D, and Freestone, R. (2008). Reconciling Public and Private Interests in the planning and development of airports: the Australian experience, 1995–2008, in International Planning History Society 13th Biennial Conference: Public versus private planning: Themes, trends and tensions 10–13 July, Chicago, Illinois.

¹⁵⁰ Commonwealth Government of Australia. (2009). National Aviation Policy White Paper, Commonwealth Press, Canberra.

¹⁵¹ Brisbane Airport Corporation. (2010). Airport real estate. (<http://www.bne.com.au/airport-real-estate-0>).

¹⁵² Australia Trade Coast. (2008). What is Australia Trade Coast?, (<http://www.australiatradecoast.com.au/>)

However, despite these mechanisms research found that a number of developments within the BAR do not appear to appreciate the strategic interests of one, or sometimes all, the organisations impacted.

With White Paper recommendations for new formal arrangements to improve communication between Australian airports and their local/regional stakeholders the BAR presents itself as a decision-making arena with the potential to inform the White Paper regarding current mechanisms for airport–region integration, their benefits and problems.

Findings

An analysis of the case study data indicates that recent development in and around the Brisbane Airport shows little consistency in governance arrangements, with developments often receiving mixed reactions from stakeholders regarding their appropriateness and effectiveness. However both the airport and the region clearly recognise the need to work together, and informal, network-type mechanisms can be seen working in parallel to and overlapping traditional, hierarchical and market arrangements as a hybrid form of governance. In particular, informal actor networks underpin and combine with formal governance networks to create ‘realigned’ governance spaces that facilitate decision-making during different phases of development planning.

One significant outcome of the inclusivity in airport development decision-making is the emergence of ‘crowded decision-making networks’ such as those found in the Brisbane Airport context, where increasing numbers of institutions, perceptions and interests are included into the decision-making space. The impact of this is a reduced zone of potential agreement as illustrated in Figure 24.

Ultimately, the greater the number of actors, the increased potential for conflict and competing interests, which results in reduced common ground and increased difficulty in resolving planning tensions. This in turn creates an incentive for decision-makers to work outside the existing governance arrangements.

In the case of the BAR, research found that in response to tensions (most notably a need to advocate or protect strategic interests) and as a result of inadequacies in formal collaborative decision-making processes, actors in the BAR case studies routinely diverged from formal governance arrangements in two distinct ways:

Shadowed actions—where decision-makers acted in self-interested ways to advocate and protect strategic interest. These actions work against integrative forms of governance, promoting contested relationships and favouring hidden, external and informal relationships.

Functional actions—where decision-makers integrated with others to promote inclusiveness and structural efficiency and integrate strategic interests.

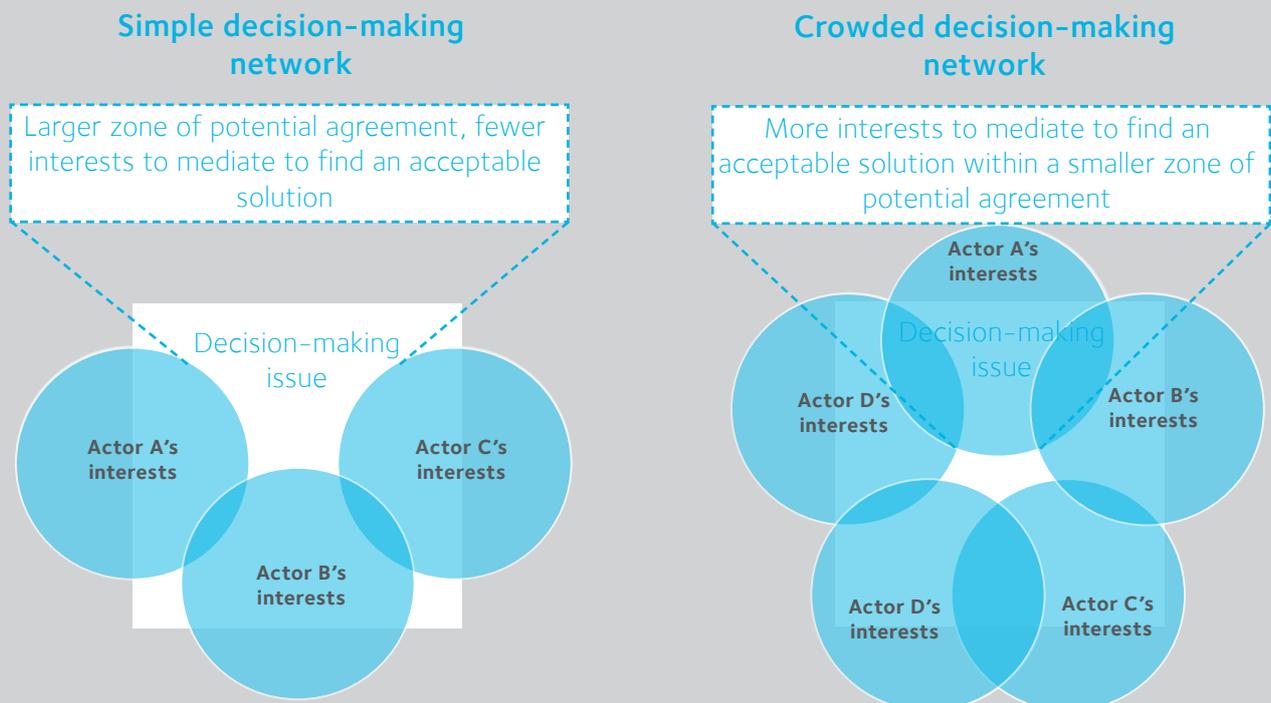
These actions were taken in order to preserve decision-makers’ strategic interests—sometimes at the expense of and possibly to the detriment of other stakeholders and the democratic equality of integrative decision-making. By working outside of formal decision-making arrangements actors were able to garner support for their positions as well as access alternative information flows—both with limited (or no) accountability.

Airport and city strategic interests

From an airport perspective the following strategic interests were identified as being critical to the long-term sustainability of affordable aviation services and prolific employment of workers in the region—in other words if any of these interests are compromised the airport may not be able to meet future regional demand for aviation capacity:

- sufficient land holdings to allow for infrastructure growth
- enduring access to airspace, particularly landing and take-off flight paths
- ground access to allow passengers and freight to enter and depart the airport on time
- sufficient revenue streams to develop infrastructure and shareholder profits.

Figure 24. The ever-reducing zone of potential agreement in project decision-making spaces (Source: Donnet, Forthcoming)



The threats that exist for the airport include alternative airport development (granted at a federal level), curfew status (such as reduced operations due to noise restrictions) and insufficient supporting regional infrastructure.

Likewise the council also has critical interests, namely quality living conditions for residents and the integration of new development into the urban environment. A significant threat facing council is the ability of the state government to exercise its discretion for taking over development approvals power.

Added to this is the third key decision-maker in the BAR case studies—the developer. Developers are largely political savvy actors, acutely aware of political sensitivities. It is in the interest of developers to engage with influential actors that have the capacity to influence the decision-making process particularly when seeking to protect their interests (such as return on investment potential, shareholder profits). In acting to advocate and protect their strategic interests, decision-makers were found to diverge from formal arrangements.

Strategies for protecting strategic interests

Negotiation is the ‘business as usual’ way of working for all decision-making for the BAR context and was used in all of the cases studied. However, when a decision-maker perceived that their strategic interests were not being adequately considered they escalated to one of four strategies:

- reiterating their positions in the decision-making domain

- reconfiguring relationships within existing formal arrangements
- reinforcing strategic interests by forming coalitions of interest with other actors
- restructuring relationships within existing formal arrangements

As can be seen in Figures 25 and 26. While negotiation was identified as the primary forum (used just under 68% of the time), in almost one third of relationships, decision-makers worked outside of existing arrangements to either advocate or protect their interests.

The ‘normal way of operating’ (negotiation) and the four strategic decision-making actions are outlined in Table 29.

Reiterating strategies were used while working inside the existing governance arrangements to primarily advocate or protect stakeholder interests. In particular, reiterating interests or repeat engagement with decision-makers specifically helped to advocate the positions of pro-development actors.

Decision-makers reconfigured relationships to protect their strategic interests. This type of strategy is highly dependent on other actors being willing to change the way in which they organise to make decisions.

In all of the cases decision-makers actively built or used relationships outside of formal arrangements to gain influence or compete against more legitimate flows of decision-making information. In particular this was achieved by reinforcing or restructuring relationships.

Figure 25. Summary of actors’ actions

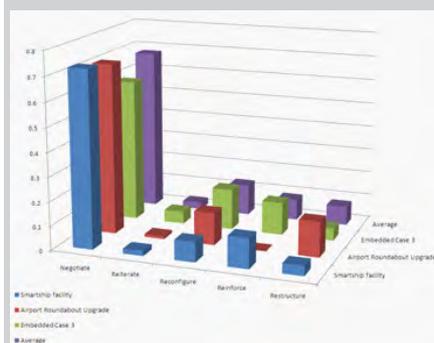


Figure 26. Actors’ actions within decision-making fora

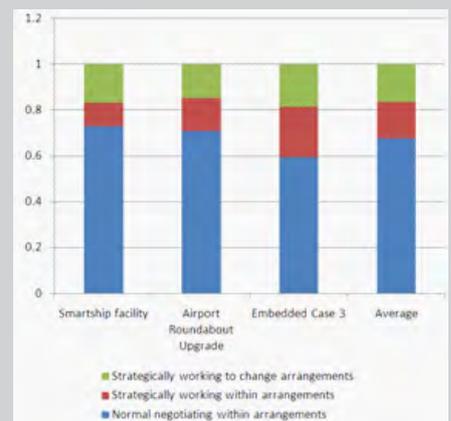


Table 29. A typology of actors’ strategic actions within decision-making networks

Action	Description	Impact on inclusivity	Impact on others	Way of working
(re)Negotiate	A normal way of working within existing arrangements	No change	No change	Normal
Reiterate	Reengaging with the same actor(s) multiple times	No change	Increased interaction and oversight	Self-interested, overt
Reconfigure	Changing roles within an existing arrangement to make use of other actors’ resources	Minor increase: some new relationships formed between existing actors	Some new relationships brokered by existing actors	Functional, purposeful
Reinforce	Forming coalitions with existing and/or external actors to work outside of formal arrangements	Decrease: legitimises new actors into decision-making spaces	Reduces the capacities of non-coopted actors to advocate their own interests	Self-interested, coopting, hidden
Reconstruct	Reorganising relationships around a more salient actor (i.e. an actor with a critical resource for achieving an outcome)	Increase: Legitimises new actors into decision-making spaces, and increases ties amongst existing actors	Redistributes flows of decision-making information around a central actor, increases other actors’ closeness within the network	Functional, pragmatic, efficient

In employing a reinforcing strategy, decision-makers used relationships outside of the formal governance arrangement to form coalitions for advocating their strategic interests. This involved lobbying to garner support from influential bodies (such as gaining the support of a state government department) and bringing new decision-making actors into the network, thus bringing additional resources, relationships and information flows in order to influence other network actors.

Restructuring involves departing from the formal vertical aligned governance structure and requires a network-wide rather than individual actor approach. An example of the formal network vs. the restructured network can be seen in Figure 27.

Restructuring often occurred when an actor rejected a decision-making arrangement's formal rule structure and rebuilt the

decision-making fora to suit the functional needs of the network, often when resources needed were not well accessed within existing arrangements.

Lessons from the Brisbane Airport Region

In this case study governance of decision-making in the airport-region context is a complex mix of formal and informal arrangements. Informal actor networks were found to underpin and combine with formal governance networks to create new and realigned governance spaces that facilitated decision-making during different phases of development planning.

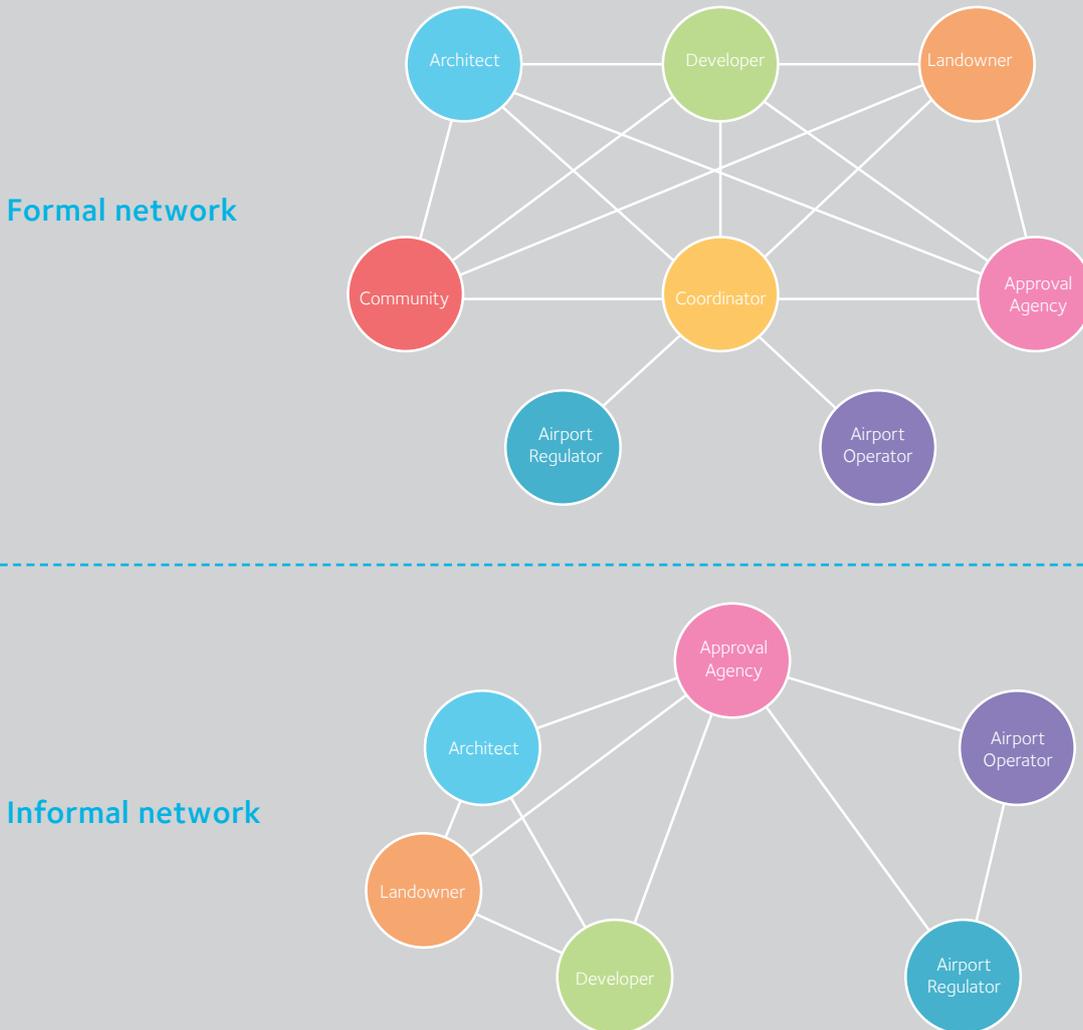
However, what is also evident is that collaborative planning is hampered by the self-interested and exclusionary actions taken by decision-making actors when they see a need to advocate or protect their strategic interests. Specifically, there is the ability for decision-making actors

to organise and operate within formal, visible governance networks to formulate and agree on solutions while at the same time use external, hidden relationships to influence key decision-makers.

The increasing number of actors in the airport-region decision-making arena is compounding the problem, reducing the likelihood of potential agreement and increasing the risk of self-interested, strategic actions.

However, the opposite applies when airports', regions' and developers' interests align; in these instances actors depart from formal arrangements to organise in more inclusive, functional and efficient ways. As a result, the Airport Metropolis Project findings support the notion that collaborative planning is best suited to environments where airport-region interests align.

Figure 27. An example of a formal and informal network



Conclusion

Governance is undeniably critically important to airport and regional planning. Rather than being simply one interface of the airport metropolis it is in fact an integrating component, underpinning the areas of spatial analysis, land use, infrastructure, economic development and stakeholder engagement. Network governance in particular is a key component of airport and regional development. In the both the international comparison of airports and the case study research, airports are found to be increasingly developing horizontal network ties to better engage key stakeholders and adapt and change formal governance arrangements to sit alongside the traditional hierarchical and market modes of governance.

While no one, clear, governance arrangement for airport–region decision-making nor one overall model for network management exists, what is clear is that adaptive network management offers enhanced outcomes and can reduce the overall risk associated with over commitment. In determining the right management approach some key considerations are:

- the levels of dependency and interdependency—the higher the interdependency the higher the engagement with network governance and management styles; the lower the interdependency the increased levels of internal management approaches
- the type of outcomes required.

There are a number of implications from this research:

- Local and state government agencies in particular need to be aware of existing modes of engagement and in particular consider the impact of actions such as lobbying on the existing governance arrangements to determine whether particular actors should be legitimised into the governance arrangements.
- There is clearly a need for early and open discussions. Without this, formal governance arrangements are likely to fail as a result of strategic, self-interested action.
- Identifying, articulating and considering city and airport interests in the development approval process can help to avoid outcomes that hinder airports and regions to meet their objectives.
- Findings show that there is merit in extending the principles put forward in the White Paper to include new developments on the airport fence—not just the large scale master planning of cities and airports.

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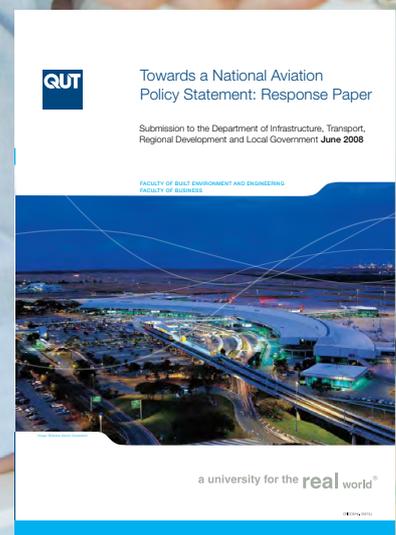


Project Outputs

This final report encapsulates the findings from the four years of ground-breaking research, conducted by five universities on three continents in partnership with 13 industry and government partners including three major Australian airports. A number of outputs were delivered including conferences, reports, publications, the Stakeholder Engagement Tool and the Planning Support System Prototype.

The project has facilitated a lot of sharing of information across Australia.

Department of Transport and Main Roads David Welsby





TUD-deelrapport Fase 2

ten behoeve van de Commissie Ruimtelijke Ontwikkeling Luchthavens

Ditell C_ Internationale vergelijking

Eindrapportage

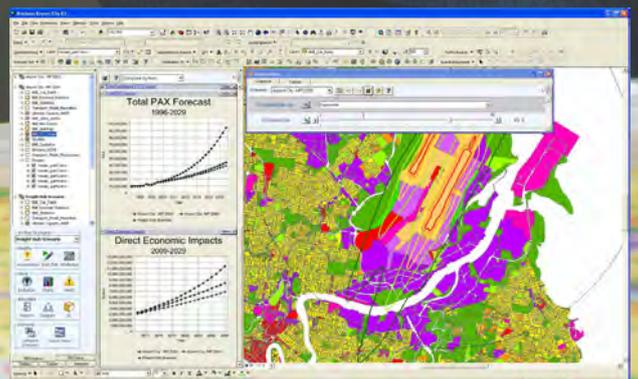
Prof. Stephen Appold
 Prof. Douglas Baker
 Timothy Coonnet
 Philip Kinnear
 Dr. Odette van de Riet
 Prof.dr. Mark van Twist

m.m.v. dr. Willemijn Dicke, dr. Wijnand Veerman, prof.mr.dr. Ernst ten Heuvelhof en Nick Stevens
 TU Delft, 12 December 2008



Airport Metropolis:
 Managing the Interfaces

An international collaborative research project



The Airport Metropolis Colloquium 2011

Redefining the Role of the Airport: An International Colloquium on the Airport Metropolis, The Second International Colloquium on Airports and Spatial Development

The Airport Metropolis Project hosted Redefining the Role of the Airport: An International Colloquium on the Airport Metropolis, The Second International Colloquium on Airports and Spatial Development on 9–11 February 2011. The Colloquium comprised a two-day program with international and national speakers and dovetailed with the Airports of the Future Research Project on day three of the Colloquium.

The conference gathered inter-disciplinary researchers and practitioners to meet, discuss and debate the changing role and future of airports worldwide. The colloquium gained interest from disciplines such as infrastructure, airport and transport management, policy and governance, urban, architecture, geography, urban studies, transport planning, design and environmental studies. The major foci was on airports within the metropolitan context; the evolution of the airport city concept; their adaptation to airline strategies;

design needs and opportunities airside and landside; broader commercial initiatives; and interactions with broader planning and environmental agendas.

Keynote Guest speakers included:

- Professor Jack Kasarda, Executive Director of the Kenan Institute for Business, University of North Carolina;
- Gert-Jan de Graaff, General Manager Strategic Planning and Development, Brisbane;
- Joop Krul, Managing Director, Schipol Airport; and
- John Terrell, Vice President Commercial Development, Dallas Fort Worth Airport.

The two-day program also included industry panel discussions and nine session presentations:

- The Airport City in an International Context: Robert Freestone and Rodney Jensen: Airport, Locality, and Region: A global survey of planning and development issues
- Tony Grist: Developing integrated sustainable strategies for airport communities

- Andreas Wittmer: Sustainability and air transport: Zurich Airport case study
- Christophe Petitjean: When Pigs Fly: The inability of airport operators to develop a successful real estate business
- Mikael Lind: Design Of sustainable passenger flows - The Stockholm Arlanda Example
- Kate Ralfe: The Stepping Stones to Africa's first Purpose - Built Aerotropolis
- The Airport Metropolis in Australia
- Robyn Keast: Governance of Privatised Airports
- Robyn Stokes and Jennifer Bartlett: Airport Relationships and Reputation
- Andre Dantas and Nateque Mahmood: Developing a Planning Support System

The Colloquium speakers and presentation were well received with two potential collaborations emerging relating to 'the luggage-less traveller' and 'real estate development'. In addition, the Viktoria Institute in Sweden expressed interest in working with the project's researchers.



Airport Cities, Singapore 2007

The 2007 Airport Cities conference was held in Singapore from 12–14 September. The conference was chaired by the Airport Metropolis Project's leading investigator, Associate Professor Douglas Baker, who gave the welcome address 'The business case for Airport Cities; Why do we need them?' In addition, members of the project team, Postdoctoral Research Fellow Arron Walker, Research Assistant Kelly Dungey and Land Use PhD student Nicholas Stevens, ran the pre-conference workshop "Understanding the Airport Metropolis". Kelly Dungey also presented a session title 'Airport Business Model' during the Conference.

The workshop involved groups workshoping the issues and impacts related to each of the airport metropolis interface areas, airports as development catalysts and planning considerations covering environment, coordination, community and security.



Professional Reports

TUD-deelrapport Fase 2: Lessons from International Comparison for the Commission ROL

Produced by the Airport Metropolis team, this report summarises the lessons from the international comparison for the Commission ROL ('Commission on the Spatial Development of Airports').

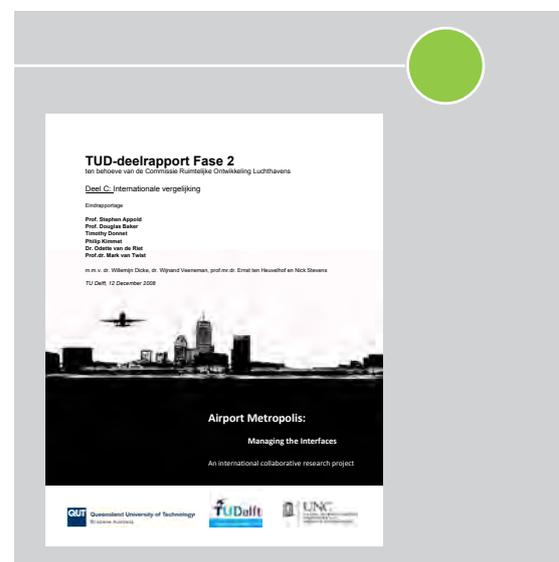
The Commission ROL Mandate and the International Comparison Request Amsterdam Schiphol Airport (Schiphol) is involved in the spatial development of the areas surrounding airports both as a real estate developer and as an actor in near airport development and planning decisions. The Dutch government had become concerned that these developments may be at the cost of a number of public interests. Furthermore, they were worried that these developments would increasingly lead to court cases such as those already witnessed. In response to a request by the Dutch parliament, the Dutch Minister of Transport, Public Works and Water Management and the Minister of Housing, Spatial Planning and Environment established the Commission ROL. The commission's mandate was to study the role and position of airports (Schiphol and

other Dutch airports) in the context of local land use, especially for non-aeronautical functions.

The Airport Metropolis team was involved in Task C of Phase 2, namely to undertake international comparisons to explore the airport governance issues cross-nationally. The Commission asked the team to gather cross-national information that might support the Commission in developing their advice and the Ministries and Parliament in policy making with respect to land development surrounding Schiphol and regional airports in the Netherlands. The Commission requested that 15 issues (previously identified by the commission through consultation with stakeholders and experts) covering societal goals, 'double' roles, lack of coherent policy making' and policy making shortcomings, be the starting point for the investigation and to undertake an international comparison to answer:

What roles do airports (as business organizations) play in land and real estate development near airports (as physical locations)? Furthermore, what is the state of affairs now, as compared to the past and possible future?

Which avenues are used abroad to safeguard public values, and how do they work, and what can the Netherlands learn from this international experience?



The study involved the analysis of 21 international airports and six airport cities—Amsterdam Schiphol, Dubai International Airport, Hong Kong International Airport, Incheon (Korea's Air City), Dallas–Fort Worth International Airport and Frankfurt International Airport. The report findings subsequently informed a number of Airport Metropolis Research efforts.

The copy of the report can be found at <http://www.commissierol.nl/> and on the iPad Airport Metropolis Library for Airport Metropolis partners.

Adelaide Airport: Integrated Airport Master Planning, Beyond Consultation — Towards Collaboration

The Adelaide Airport: Integrated Airport Master Planning report provides an overview of the Integrated Airport Master Planning stakeholder workshop held at the Shores Function Complex, Adelaide, South Australia on 2 July 2009. The workshop formed part of Adelaide Airport Limited's (AAL) wider community consultation agenda. The purpose of workshop was to inform core stakeholders on the Draft Master Plan (DMP) and provide the opportunity for feedback and discussion on the future of Adelaide Airport as part of a broader and ongoing strategy of community engagement. In doing so AAL sought to achieve the following outcomes:

- identify areas of agreement with the DMP
- identify areas of DMP uncertainty
- gain greater understanding of the future vision for Adelaide Airport
- engender a shared commitment to the role and significance of Adelaide Airport in the region.

The workshop design was developed by researchers from the Airport Metropolis project in consultation with Mr John McArdle of AAL. The research team also acted as independent facilitators for the workshop establishing a level of neutrality around the workshop proceedings. This role was identified early in the development process as a core strategy to achieving genuine commentary and feedback to the agenda items.

Participants for the event were drawn from AAL's extensive consultation listings, resulting in 34 industry, government and community representatives.

Two key messages were derived from the DMP presentation and plenary information session.

More detail on the precinct areas, including future development aspirations is sought in the DMPs to assist stakeholder groups to better respond to proposed airport development. The Commonwealth planning regimes for airports (the function of a Master Plan and Major Development Plans) needs to be clearly articulated to stakeholders; and

There was a strong interest in the facilitation of forums which foster increased levels of dialogue between stakeholders.

The Future Vision exercise distilled seven common themes on possible directions for stakeholders in Adelaide:

- Connectivity;
- Regionality;
- Integrated transport systems;
- Collaboration;
- Shared language;
- New forums for dialogue and shared planning;
- Community education.

These themes were further categorised into the two constructs of special and social connectivity. The first relates to the connections within the airport as well as its interconnections with the broader regions, while the second centres on the development of stronger working relationships between stakeholders.

Overall the workshop was regarded as a positive example of community engagement. It was perceived as an extension of the existing array of stakeholder initiatives already facilitated by the Airport. Moreover, the workshop findings indicate that AAL is moving from consultation with its stakeholders toward collaboration.

A full copy of the report is provided for Airport Metropolis partners on the iPad Airport Metropolis Library.

ADELAIDE AIRPORT: INTEGRATED AIRPORT MASTER PLANNING



BEYOND CONSULTATION — TOWARDS COLLABORATION | REPORT ON THE STAKEHOLDER ENGAGEMENT PROCESS

To implement the qualitative assessment a small survey was held among the participants. To engage the broad audience participants took in the interactive engagement process of the day. Four questions were asked each before and after the workshop. These questions are added on the next page to address the general goals of the workshop. The survey was also intended to provide information on whether or not that specific workshop or other stakeholder group will be consulted for future. It should be noted that there were 34 participants who stated that they were not a representative, though their survey did not significantly affect the overall results. The analysis of the results shows that overall there was an increase in confidence in the engagement process. This shows that on these points the workshop had exceeded the participant's expectations. There was also an increase in participant's perceived that their opinion would matter in future master plan decision making. However, the overall trend was still positive for the next 12 months.

Figure 1: Workshop - level of confidence in the engagement process

Confidence Level	Before Workshop	After Workshop
Very High	10%	25%
High	20%	40%
Medium	30%	25%
Low	25%	10%
Very Low	15%	0%

Figure 2: Workshop - level of confidence in the engagement process

Confidence Level	Before Workshop	After Workshop
Very High	10%	25%
High	20%	40%
Medium	30%	25%
Low	25%	10%
Very Low	15%	0%

To measure if participants felt the workshop had been useful for them, a different set of questions were asked after the activity. These were asked after participants' lunch. The workshop was successful in that it provided an opportunity for participants to voice their opinions, be heard and for their views to be taken into account. There was also general consensus on the representation of the workshop attendees.

**REPORT ON THE STAKEHOLDER ENGAGEMENT PROCESS
THURSDAY 2 JULY 2009
SHORES FUNCTION COMPLEX
WEST BEACH ADELAIDE**

**REPORT PREPARED BY
AIRPORT METROPOLIS PROJECT TEAM**



The National Aviation Policy White Paper Response

As reported on earlier, the project's paper Towards a National Aviation policy Statement: Response Paper, produced in collaboration with other QUT research consortiums, was a key output for the project. The project team specifically informed sections on the Australian Aviation Industry and Aviation Infrastructure. The submission was a major piece of work contributing to the ongoing debate surrounding airports and their impact on surrounding regions. The responses were based on a culmination of reviewing academic research and significant consultation with key project stakeholders, namely workshops carried out in Adelaide, Brisbane and Canberra.

The following key recommendations were put forward:

- Planning could be better coordinated between airports and the surrounding metropolitan area. Use of any Airport Area Plan could coordinate interests on and around the airport as a metropolitan/ regional strategy.
- Parallel community forums should be established to enable informal and formal engagement in planning and development.
- Before existing regulations and guidelines such as the Airport Development Consultation Guidelines are given greater force through incorporation in the Airports Act 1996, detailed consultation with major airports and other stakeholders is needed.
- An Airport Infrastructure Plan (as a supplementary document to the Airport Area Plan) could be established to balance and coordinate the costs and development of infrastructure.
- Establishing a national co-funded ARC Centre for Excellence in Aviation is a crucial next step for achieving a national approach that is informed, cohesive and future-oriented.
- To read the full response visit: <http://www.infrastructure.gov.au>

The Stakeholder Engagement Tool

The research into stakeholder engagement across the Adelaide, Brisbane and Canberra airport studies was instrumental in developing the interactive Stakeholder Engagement Tool. Developed as an iPad application, the tool draws information from a database, created using the three component stakeholder analysis and relevant case study information (outlined in the Stakeholder section of this report), and generates stakeholder maps, displaying relevant information specific to the three airports. (Brisbane Airport Corporation Mark Willey)

The stakeholder maps allow airport managers and city planners to differentiate stakeholders by four categories of salience:¹⁵³

- definitive
- demanding
- dormant
- non-stakeholders.

These categories indicate whether a stakeholder has an interest in an issue, such as whether they perceive high urgency and importance towards the issue, and whether a stakeholder is perceived to have the power to influence decisions regarding the issue.

Users also have the ability to interrogate the relationships between stakeholders to identify weak and strong ties, indicating possible engagement issues and potential strategies.

The benefit to users is that they now have the ability to predict and consider different stakeholder scenarios, such as the impact of potential stakeholder reactions or actions to airport decisions, and use those predictions to develop effective engagement strategies.

Piloted with the three airports, the tool has been a resounding success.

¹⁵³Based on Mitchell, R. K., Agle, B. R., & Wood, D. J. (1997). Toward a Theory of Stakeholder Identification and Saliency: Defining the Principle of Who and What Really Counts. *Academy of Management Journal*, 22(4), 853-886.

“The Stakeholder Engagement Tool is a useful tool in understanding the functioning of relationships dealing with Airport matters. It assists to show the strength of relationships and the regularity of communications. This assists to identify which relationships may need strengthening and which ones are already operating effectively. It also assists to understand the broader dynamic of interrelationships between other key stakeholders. It has the potential to be used for a wide range of applications where stakeholder engagement is a critical issue.”

Mark Pattermore, Brisbane City Council

The Planning Support System

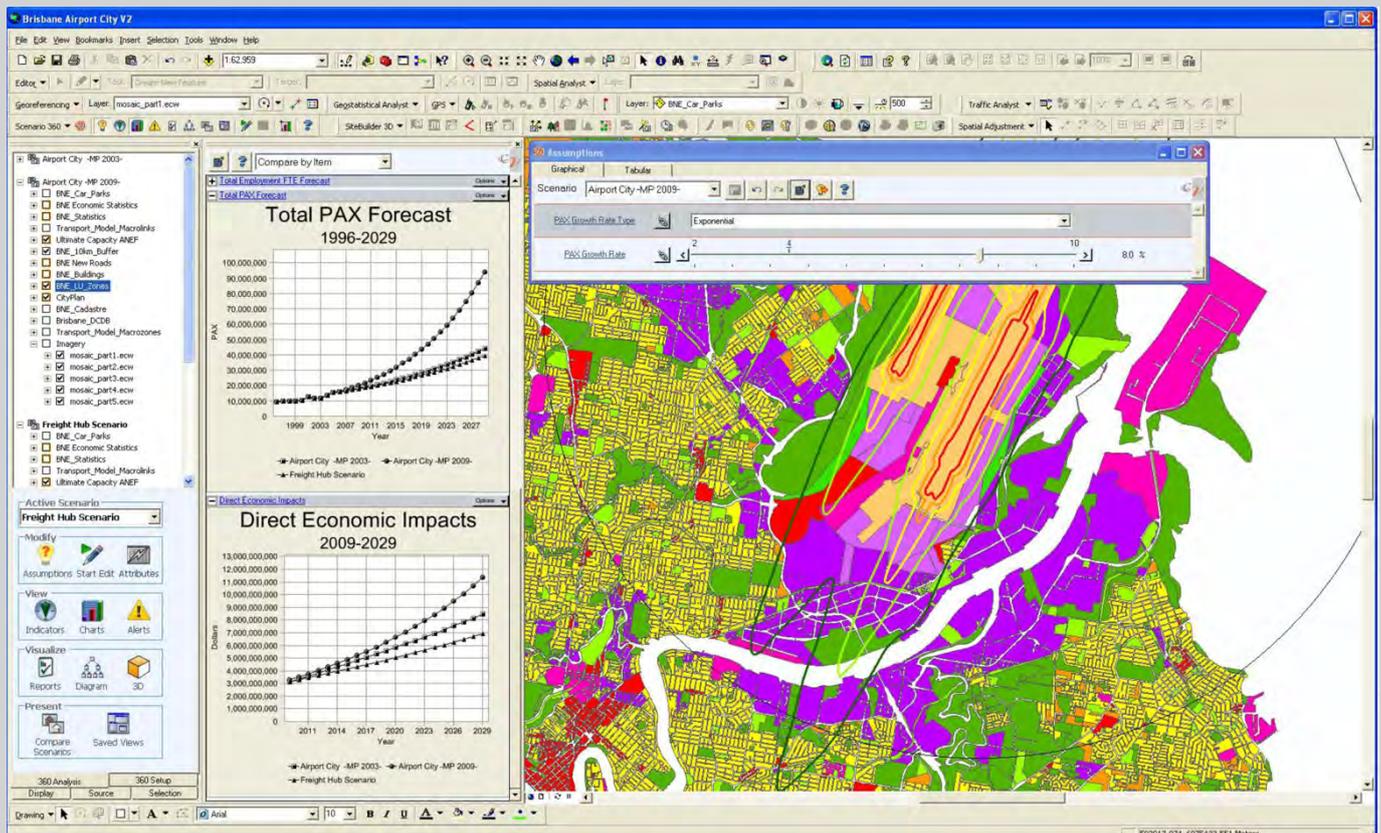
As airport–regional interactions become more complex, a broader understanding of trends, problems, challenges and sustainable policy solutions become increasingly important for public and industry policy-makers. Modelling these interactions and integrating them into one system has the potential to support stakeholders grappling with the challenges of new airport city type developments—particularly where stakeholders have conflicting interests. However, while tools exist for regional planning and for airport operational planning there is no one tool that addresses both on-airport and regional planning simultaneously. Recognising this shortfall, the researchers developed a prototype Planning Support System (PSS) framework to support all stakeholders in the planning and development of an airport city, incorporating land use, infrastructure, governance, and economics models into the framework to simulate the relationships between an airport city and the surrounding urban interface.

The benefits of this research cannot be underestimated. Providing stakeholders with a tool that can integrate—often conflicting—interests into one common goal for the airport–region is significant. Not only will it aid with the implementation of the Planning Coordination Forums called for in the National Aviation Policy White Paper by facilitating the communication of spatial planning policies and their impacts and benefits, it will ultimately lead to better decision-making.

The current prototype has been presented to industry partners through the RAC meetings and the team has recently received external interest in the PSS concept. A final viewing of the PSS model is planned for December 2011.

“The informal benefits have been very good as a principal in planning, given us the ability as a technical developer of transport models to be able to look at what others are doing and have discussion with them and see if that’s the direction we may take. This process has built up the ability to build good models; it has assisted in that coming together.”

Department of Transport and Main Roads,
David Welsby



The iPad Airport Metropolis Library

From 2007 through to 2011, the research collaboration produced 85 written outputs including 12 peer reviewed journal articles, 5 book chapters, 22 peer reviewed conference proceedings, 13 professional and other publications, 7 reports, 12 presentations for the Airport Metropolis Colloquium, 18 presentations and 2 PhD theses (The governance of inter-organisational decision-making and Integrated stakeholder analysis: A methodology applied to Australian capital airports) which are currently in the final stages of submission.

All of the produced reference material is available online and was provided to industry partners in the form of an iPad library in conjunction with the Stakeholder Engagement Tool.

A complete list of material produced follows.

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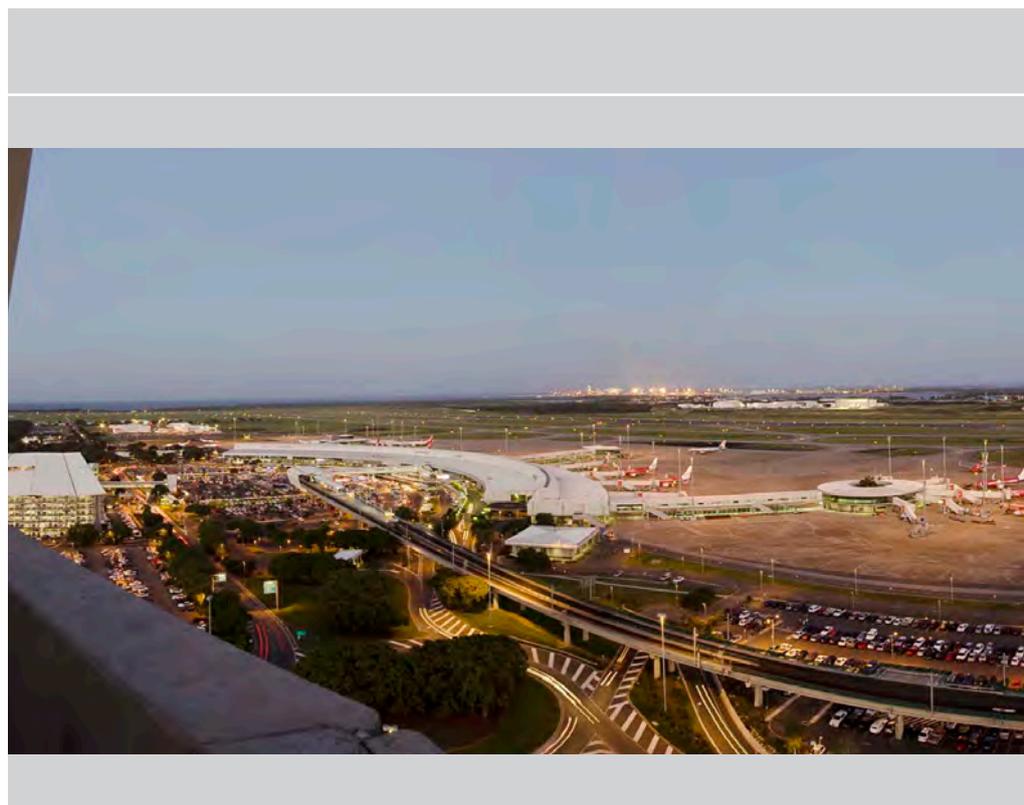
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Glossary

Actor

A person, or group of persons, that has an interest in the system being analysed and has the power to make changes to that system. Actors are people involved in the problem at hand. They are concerned about the outcomes of the system, as they have something to win or lose; but they can also take action to change the system to ensure that outcomes are closer to their goals. Their interest is at stake when the values of certain factors in the system change.¹⁵⁴

Airport region

The term 'airport-region' is used to identify an area that includes an airport and the surrounding land that holds residents, businesses and infrastructures that influence and are influenced by airport operations and users. This includes areas affected by aircraft noise, areas with increased traffic density from airport users [transport corridors], and areas that attract businesses for the benefit of being located near an airport.

CBD

Central Business District

Central Business District

The commercial centre of a city.

Governance

Governance is defined as the way in which society is organised to define who makes decisions, who is included in the decision-making process, and how decision-making actors relate to one another.¹⁵⁵

Governance network

Governance networks can be defined as: i) relatively stable horizontal articulations of interdependent, but operationally autonomous actors who ii) interact with one another through negotiations that iii) take place within a regulative, normative, cognitive and imaginary framework that is iv) self-regulating within limits set by external forces, and which v) contributes to the production of public purpose. This definition includes most of the features commonly ascribed to governance networks.¹⁵⁶

Major Development Plan

Documentation required by the Department of Transport for developments on airport land that meet any of a series of triggering criteria.

MDP

Major Development Plan

NAPWP

National Aviation Policy White Paper, a document distributed as a part of the federal policymaking process that introduces and highlights the federal government's vision for the future of Australia's civil aviation sector.

Network

Networks can be described as more or less stable patterns of social relations between mutually dependent actors that form themselves around policy problems or clusters of resources and which are formed, maintained and changed by a series of games.¹⁵⁷

Off-airport development

This refers to the combination of aeronautical development and non-aeronautical development within the boundaries of the airport

On-airport development

This refers to the combination of aeronautical development and non-aeronautical development within the boundaries of the airport

Planning

Planning is a process that evaluates a 'problem', decides on a course of action, develops strategies to resolve the 'problem', and implements the developed strategy into physical representations of the decision.¹⁵⁸

Policy discourse

A person, or a group of persons, that perceives the current state of the system to analyse as problematic. Problem owners, like decision makers, can make certain changes in the system.¹⁵⁹

Problem owner

A person, or a group of persons, that perceives the current state of the system to analyse as problematic. Problem owners, like decision makers, can make certain changes in the system.¹⁶⁰

Stakeholder

Individuals, groups or organisations that can affect, or are affected by, an organisation's operation and objectives.

Stakeholder arena

The stakeholder arena encompasses a space within a specific context, i.e., a specific airport, delineated by all the stakeholders. The stakeholders in the stakeholder arena potentially form the stakeholder network.

Stakeholder network

Within the stakeholder arena and its context, those stakeholders that are connected to each other through various links, together form the stakeholder network.

Stakeholder salience

Stakeholder salience is the degree to which managers give priority to competing stakeholder claims.¹⁶¹

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