Towards a National Aviation Policy Statement: Response Paper

Submission to the Department of Infrastructure, Transport, Regional Development and Local Government **June 2008**

FACULTY OF BUILT ENVIRONMENT AND ENGINEERING
FACULTY OF BUSINESS

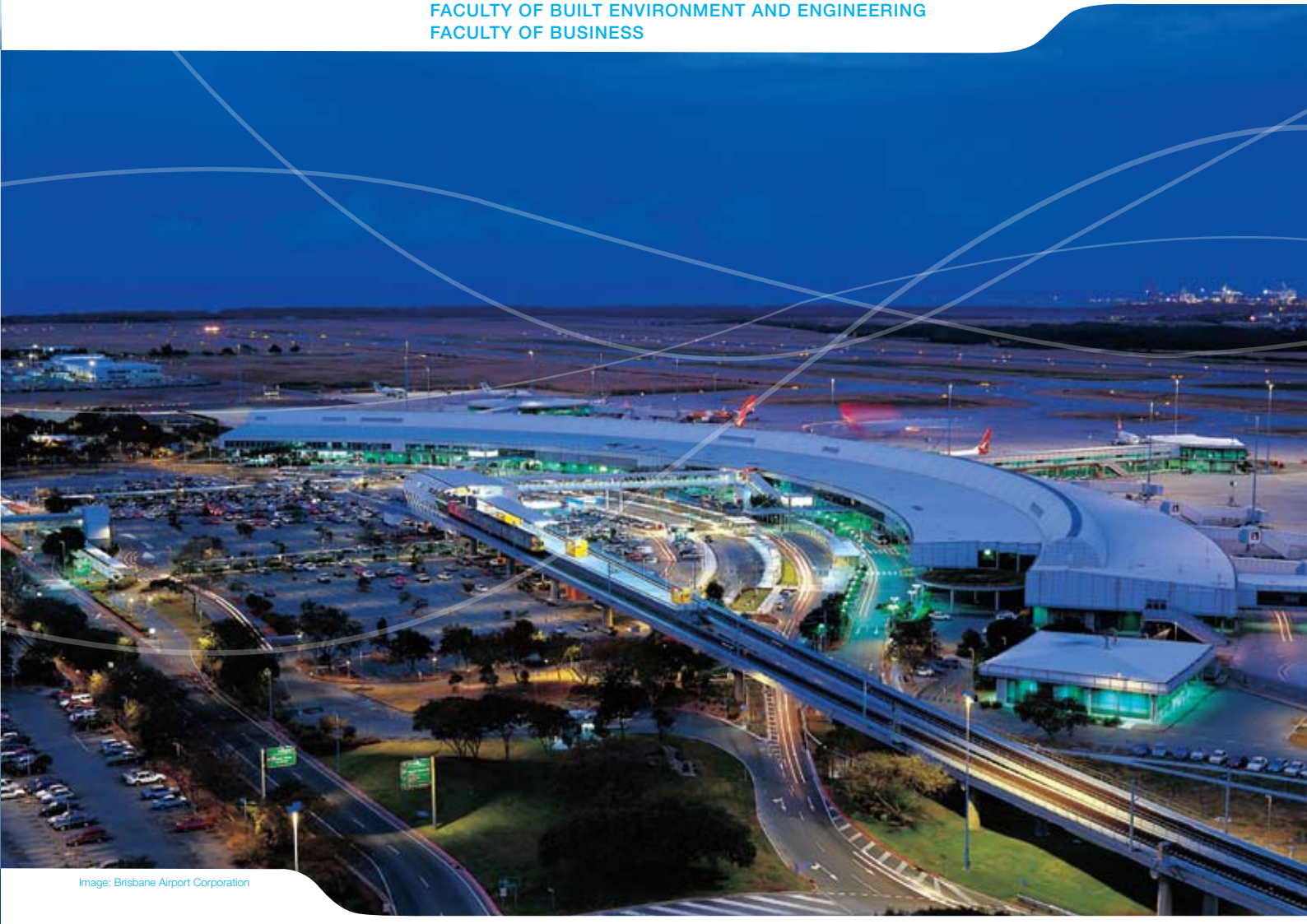

Image: Brisbane Airport Corporation

a university for the real world®

CRICOS No. 00213J

Towards a National Aviation Policy Statement: Response Paper

Submission to the Department of Infrastructure, Transport, Regional Development and Local Government **June 2008**

FACULTY OF BUILT ENVIRONMENT AND ENGINEERING
FACULTY OF BUSINESS

Foreword

A dynamic, viable and future orientated (proactive) aviation industry has a critical role in creating Australia's ongoing prosperity. The aviation industry generates multiple benefits – supporting economic growth; enhancing productivity and employment through integrative infrastructures; increasing social advantage through expanded personal horizons, inter-locational employment opportnities, and cultural exchanges; and, increasing connectivity between people and places. A strong focus on sponsoring, supporting and delivering technological developments has contributed to an impressive track record in furthering safer, more secure and efficient airspace utilisation.

Clearly there are many benefits and opportunities yet to be derived from the industry that will enhance the future of this country. However, alongside the opportunities there are also costs and challenges – particularly in terms of sustainability of the workforce, environmental consequences (noise and greenhouse gas emissions), and greater, but unobtrusive safety and security requirements. The impact of the industry's infrastructure requirements on local communities is a central concern.

These challenges must be more comprehesively identified, explored, and overcome for the aviation industry to realise its full potential as a partner in Australia's progress.

Queensland University of Technology is well placed to offer an empirically considered and integrated response to many of the opportunities and issues confronting the aviation industry in this country and around the world. It has established an Aviation Research Centre with three major thrusts dedicated to: infrastructure and land use (the Airport Metropolis Project); security and facilitation land-side and airside; and automation in aerospace vehicles and systems (airside). This research crosses traditional disciplinary and institutional boundaries and engages with more than 40 private and public organisations in the Australian aviation sector, connecting strongly with international leaders and authorities in outcomes-focused aviation research.

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. Genuine engagement with stakeholders is an additional requirement.

The following response reports on the findings and recommendations of key researchers in the aviation space. It evokes a vision for Australia to continue to be a world leader in aviation provision, application and development. Taking the leap forward to build strong expertise and capability in the aviation field will require coherent policy direction, strategic linkages and a 'turbo-charging' of the capabilities of existing research institutions.

We commend this response to you.

Professor Martin Betts
Executive Dean
Faculty of Built Environment and Engineering

Professor Peter Little
Executive Dean
Faculty of Business

Contents

1. Executive Summary

The Australian aviation industry delivers multiple benefits and opportunities to Australia. It has a vital function in supporting economic growth and employment through the development of integrated infrastructure and enhanced sector productivity. Social advantage is enhanced through expanded opportunities, and increased connectivity between people, places and cultures. A strong focus on sponsoring, supporting and delivering technological developments has contributed to an impressive track record in furthering safer, more secure and efficient airspace utilisation. The industry also offers many new opportunities for alternative service delivery modes, security and monitoring of dispersed resources, as well as the way we do business and interact.

The aviation industry is at a critical juncture. The following themes have been identified as central enabling actions to address current and future challenges and deliver on its potential.

Image: Brisbane Airport Corporation

Expanded debate and collective solutions

It is clear that the future of aviation is a complex one. The industry is part of a larger transportation and communications system that services a range of stakeholders, each with potentially different needs, perspectives and priorities. Many of the issues confronting the industry are interdependent, involve complex trade-offs and cannot be solved by any one agency or sector working alone. Successfully tackling these challenges demands a more systemic approach which draws together relevant stakeholders, their resources and knowledge sets. The complexity of the issues and the diversity of the stakeholders require fresh thinking, renewed debate and broader, more collaborative and innovative solutions. Government has an important role to play in setting the context and facilitating processes for expanded debate and collective solutions.

The important parts of the aviation industry are located at the intersection of the metropolitan cityscape and intensive industry-based activities. This mix requires expanded governance arrangements that include stakeholders across business, community, government and academia.

Focused industry– integrated policy, planning and regulatory processes

With the deregulation of the aviation industry, private sector governance and decision making principles have been overlaid upon the regulatory and oversight functions of various governments and their departments. This 'crowded policy domain ' contributes to overlap, confusion and uncertainty (and cost escalation) within the sector (Keast et al., 2006). The shift to what is effectively the private governance of public spaces calls for greater transparency of decision making to ensure the appropriate balance of private gain and public value.

Accordingly, an integrated policy, planning and regulatory framework that links together the diverse functions of the industry, specifies roles and responsibilities, and is contextualised within a broader strategy for national economic development and sustainability, is a base operating requirement for this sector. Policy integration must move beyond coherency and coordination to be more far reaching, interactive and sophisticated in its approach. Reflecting the complexity of the operating environment, integration mechanisms should follow a multi-level, multi-party and cross-issue approach.

Integrated infrastructure – compatible land use

Privatisation and commercialisation have transformed the landscape and use of many capital city and major urban airports and have brought airport development and urban expansion into closer proximity. Lack of coordination can undermine the potential of airports to deliver economic and social gains beyond their immediate borders. Understanding the interrelationships between airport and related infrastructures is a critical starting point for airport planning and extension activities. More dynamic interaction and integration within and across locations, infrastructures and modes is argued to be the way forward.

Mediating arrangements and institutions that search for compatible land use activities provide one way to facilitate cooperation between airport and regional/local development. These could enhance existing integration mechanisms such as Airport Master Plans and Major Development Plans through the inclusion of informal and formal stakeholder engagement, thereby affording a more comprehensive coverage of issues and solutions, while ensuring continuity and progress. A National Aviation Policy which sets out a clear roadmap for the future of aviation, establishes the contribution and connections of the various elements of the industry and which is embedded within a broader economic framework is required.

Regional airports must also be located within a national aviation policy to contextualise them within a broader industry and economic framework and mitigate against scale and scope problems such as funding, security, retaining airlines and management and personnel. In such a complex development space the way forward lies in an integrated approach to airport and regional development.

Sources / References
Keast, R. Brown, K. and M. Mandell (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.

Future-proofing aviation – safe, secure and sustainable

Safety

The aviation sector is under ongoing pressure to continually improve upon its protection of citizens, public assets and the environment. Maintaining the current high standards of safety currently requires the set of responsible agencies to work across boundaries. While forming the core strategy, traditional integrative tools such as legislation, regulations and standards, must be supplemented by new, collective ways of working and associated behavioural changes. Coupled with this is an imperative for ongoing research and development to accurately equip the sector to meet the current and emergent safety challenges of a rapidly evolving market space.

Security

The increased vigilance required in contemporary airports continues to generate new measures for security checking and surveillance. Many of these new developments continue to be 'bolted' onto existing arrangements using today's technologies and discrete processes, restricting their overall impact. A more comprehensive approach – flexible, situationally appropriate and risk-based - would be a significant step forward for the industry and assist in overcoming the limitations of the currently dispersed and piece meal solutions and processes.

Sustainability

The current and likely future impact of aviation on sections of the public and the environment points sharply to the need for public policy formulation that is grounded in empirical research. This will enable an informed re-positioning of aviation within the context of sustainable development and set a clear direction for industry operation and development/advancement.

Aviation sustainability does not have to be an intractable problem. The industry has already demonstrated a high level of innovation in addressing environmental and sustainability issues. This innovative capacity should be built upon, enabled and leveraged to ensure that the industry can work with government and other stakeholders to be a part of the solution. To do so will require government and businesses to engage with local communities, NGOS and competitors in new ways.

To be truly effective sustainability must be embedded within the industry. Simply bolting it onto existing strategies and processes is likely to leave it marginalised and insignificant. Vision and conviction are necessary to make this happen.

Charting the National aviation course - leading from the front

Future air vehicles and systems and security development

Australia's unique physical environment has fostered an innovative aviation history. The industry has long been an early adopter and innovator of aviation technologies and services. This technology leap was facilitated by a forward looking aviation environment. New and emerging aviation developments such as unmanned aerial vehicles (UAVs) offer even greater scope to leverage from and expand Australia's national competitive advantage in this field, create opportunities for new business spaces and provide alternative, more cost efficient modes of service delivery. Technologies being developed within this arena have transference capacities to other sectors.

The current regulatory context is impeding the advancement of the industry and relegating the nation to a follower rather than leader status. Proactive and visionary leadership combined with enabling programs, policies and funding sources that encourage innovation in aviation systems and related technologies are a key part of the answer.

Moving forward

There are world-class Australian research groups that have formed over the last 15 years, but typically are not engaged effectively with decision makers in the aviation industry. There has been limited potential for shared knowledge, economies of scale or collaborative research advantage. There needs to be better coordination with research and education groups who will provide a long term view and train the highly skilled professionals who will run the industry into the 21st century. Clustering this research potential within a dedicated research facility such as a Centre for Excellence can 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.

By continuing to build on its achievements and aggressively pursuing new and emerging opportunities, the aviation industry has the potential to continue to make significant contributions to Australia's prosperity. Central to this is a strong integrative orientation – across agencies, policies, infrastructures and technologies.

Reclaiming Australia's leadership role within the aviation industry will require coherent direction, commitment and an enabling regulatory environment. A strong aviation industry is the basis for a strong nation, particularly a sparse and expansive nation such as Australia.

2. Introduction

Queensland University of Technology (QUT) has established a strong aviation focused research capacity. Aviation research activities are focused in three major areas dedicated to cooperative airport and regional development infrastructure and land use (Airport Metropolis), land-side and airside security and facilitation (Airports of the Future) and UAV airspace systems (Smart Skies).

This program engages leading researchers from several disciplines such as urban and regional planning, design, business, public policy, information technology, engineering and science. Together, the three research programs above involve over 50 academics and 20 post graduate students clustered within the QUT Gardens Point precinct – creating opportunities for knowledge sharing and synergistic innovation. The research engages with more than 40 private and public organisations in the Australian aviation sector and connects strongly with international aviation business leaders (eg. Boeing Phantomworks), government authorities (eg. DSTO, CSIRO) and other academic institutions in outcomes-focused research.

An additional research consortium concentrating on Rural, Remote and Regional Airports has recently been formed. Through a series of industry based workshops this group has generated knowledge and insights into the particular requirements and challenges of rural, remote and regional airport operations in Australia.

Responses to the specific issues raised in the Australian Government's Issues Paper: *Towards a National Aviation Policy Statement* are given in section 4 of this paper. For ease of reading, the responses have been grouped under the headings in the Issues Paper. Additional points and themes outside the scope of the issues paper have been clearly identified. These responses draw primarily from the expertise and experience of researchers within the aviation specific research programs described in section 3.

It should be noted in considering the themes and recommendations of this paper, that the research undertaken to date has been preliminary in nature. The three research programs referenced in section three (3) of this paper are recently established and this paper can thus be based only on the early findings of their major research. Further, though the research continues to be conducted in partnership with key aviation stakeholders (industry and government), the findings outlined in this paper represent the views of QUT researchers only. Consultation between QUT and its key partners is planned as the issues raised here are further investigated, particularly in responding to the anticipated white paper and green paper.

This paper also argues strongly that a strengthened focus on collaborative research is key to obtaining an informed, coherent approach across the sector to national aviation policy issues into the future.

3. Research Informing the Future of National Aviation

3.1 AIRPORT METROPOLIS

In Australia, many capital city and major urban airports have transformed over the past decade as a result of commercialisation and privatisation, emerging as important sub-regional activity centres. As a consequence of these changes, airport impacts now pose considerable challenges for both airport operation and the surrounding urban and regional environment (Stevens et al., 2007). Airports and growing cities are increasingly in conflict where airport-driven development and urban expansion are not coordinated. Furthermore, conflict is exacerbated when airports and surrounding urban regions do not coordinate growth, planning or infrastructure. The airport can no longer be considered in isolation from the metropolitan area that it serves.

As airport-regional interactions become more complex, a broader understanding of trends, problems, challenges and sustainable policy solutions becomes increasingly important for public policy and industry decision-makers. In recognition of these issues, a research project, "Airport Metropolis: Managing the Interfaces", has been funded by the Australian Research Council as a four year study (QUT, 2008) . The project is being led by QUT with collaboration from the University of New South Wales, Technical University of Delft (Netherlands), University of North Carolina – Chapel Hill (United States of America) together with a cooperative of 13 industry and government partners (http://airportmetropolis.qut.com).

The aim of this project is, from a multi-disciplinary perspective, to investigate and make an integrated response to four major interface issues of the new 'airport metropolis': economic development, land use planning, infrastructure and governance. The primary benefit and significance of this project is the integration of all stakeholders in developing unified solutions to airport development and the airport regions with reference to particular sustainability criteria: economic efficiency, environment, coordination, community, security and resilience.

3.2 AIRPORTS OF THE FUTURE

Contemporary airport operations have to deal with the tensions between the timely flow of passengers, the conduct of commercial business operations and the effective detection of potential terrorism and criminal activities. The design and operation of airports includes the provision of inspection points at critical locations in terminal buildings. Processing people and goods through inspections causes bottlenecks, impedes flow and heightens stress amongst passengers and staff, thereby adversely affecting passenger experience and commercial operations.

Many organisations are involved in the operation of airports, from the organisations which set national and international aviation policies, to the airport operators, the airlines, customs, quarantine and immigration authorities, security organisations and the enterprises that operate commercial outlets. Many are also involved in processing passengers and goods, forming a complex transport security system integrated with an economic system. In building a properly functioning system, human rights, human-centred design and economic goals need to be balanced against secure travel in a holistic approach involving all sectors of the airport community.

The recent increased focus on airport security within the existing framework has come at the expense of passenger facilitation. This issue has emerged for both out-bound and in-bound passenger travel, particularly in Australia where there is an additional layer of strong customs and quarantine matters to address for in-bound travel. This has resulted in airports which may be considered as obtrusive and inefficient–further resulting in the generation of a strong and increasing trend of discontented passengers. This project addresses the improved design and operation of airports of the future with regard to the combination of airport security, operations management, and passenger facilitation. The project brings an integrated approach with a broad cross-disciplinary team examining aspects across domains of people, technology, process, and information.

3.3 AUSTRALIAN RESEARCH CENTRE FOR AEROSPACE AUTOMATION

The Australian Research Centre for Aerospace Automation (ARCAA) is a joint venture between Queensland University of Technology and the CSIRO. With 30 staff, the mission of ARCAA is to provide research excellence in the area of automation in the aviation environment. Its program examines next generation air traffic management (ATM) technologies and future Global Navigation Satellite Systems (GNSS) concepts for Australia, including from the perspective of automating aircraft systems – both manned and unmanned.

ARCAA is the largest and leading research group of this type in Australia with partners such as the Defence Science and Technology Organisation, Airservices Australia, Boeing Phantom Works (USA) and Boeing Australia. It typically produce 3-4 highly skilled aviation professionals with PhD qualifications in advanced avionics fields per year, along with approximately 30 avionics engineers with Bachelor qualifications from QUT's undergraduate avionics engineering course. Over $20M has been attracted in research projects for automation in the aviation industry over the last 5 years including $6M to build a state-of-the-art aviation automation research facility at Brisbane Airport [refer to ARCAA website www.arcaa.aero].

3.4 REMOTE, RURAL AND REGIONAL AIRPORTS

Currently being developed in conjunction with the Airport Association, this research program is focused on evaluating the significance of local airports or remote, rural and regional (RRR) communities throughout Australia and the opportunities and challenges for these airports in a rapidly changing environment. The expected outcomes of the research are; first, to quantify the social and economic significance of RRR airports; second, to assist local communities with respect to planning for airport management and development; and third, to provide cooperative regional planning for improved airport network efficiency and resource allocation. A suite of workshops with regional Australian airports has provided this project with detailed and previously largely unavailable insights into the operation of non-metropolitan airports.

4. QUT Response to Specific Issues

4.1 THE AUSTRALIAN AVIATION INDUSTRY

What should be the basis of government and industry policy towards air services to regional and remote communities?

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.

Four recent workshops (N.S.W., S.A., QLD, VIC) with regional, rural and remote (RRR) airport stakeholders identified seven basic areas of policy significance:

- 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.
- The training and retention of staff at RRR airports. (Baker et al., 2008)

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.

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?

The decision on whether to adopt security and safety measures is presently dependent on the type of aircraft servicing the regional/remote airport. It is understood that regional jet services attract passenger and checked bag screening as for through travellers this avoids the need for re-screening at onward ports. However, consultation with members of the Australian Airports Association has revealed the following concerns:

- Regional and remote airports are alarmed about the prospect of having to pay for screening equipment and expansion of terminal facilities and staffing.
- The uncertainty of regional aviation makes the risk of capital infrastructure provision high.
- Further, it is unclear why large turbo-propeller aircraft do not attract screening while similar sized regional jets do.

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. For example, other national governments pay for and implement screening, thereby lessening the burden on the regional/remote airport.

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?

These factors need to be considered in conjunction with decision-making on scheduled commercial airline activity as the two sectors share the same resources at rural, regional and remote airports. 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.

What role should all levels of government have in protecting secondary airport infrastructure and providing for new infrastructure?

Secondary airport infrastructure needs to be addressed at a tripartite level – the whole of government. 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. Presently only two states in Australia have such policies. Local government has two roles: first as a manager of airports, and second as a land use regulator impacting development around airports. 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. 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

It is surprising that *Towards a National Aviation Policy Statement* considers only these two questions in addressing the multi faceted and complex issues surrounding remote, rural and regional aviation in Australia. Extensive consultation with RRR aiport owners/ operators and their communities across Australia has indicated that a broader set of issues/questions needs to be considered in order to effectively address the complexity associated with these operations, particularly considering the implications of scheduled commercial airline activity (RPT) and Charter services to these communities. Of particular note are the issues of: 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.

4.2 AVIATION INFRASTRUCTURE

4.2.1 Airport Planning and Development.

Are the planning and development mechanisms under the Airports Act working effectively?

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. For example, judgements on Westfield Corporation vs. Brisbane Airport Corporation, 2003; Village Building Company vs Canberra International Airport Ltd, 2002 reinforced the important role of the Airports Act.

If there were to be strategic amendments made to the Airports Act, these should be cognisant of the above. In particular, it is recommended that local and state planning policies comprehensively consider the impact of regional land use planning on airport aeronautical operations.

How can we improve consultation with state and local authorities and with the community?

Three strategic mechanisms can be used to improve relationships with state goverment, local authorities and regional communities:

1. Planning and development, including consultation with state and local authorities may be improved through 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. International examples from Canada and California have indicated that this method may be an effective means to improve consultation and coordination.
2. Research from recent industry workshops held at two Australian capital city airports indicates that there could be greater coordination and communication between airports and local communities. For example, an Airport Area Plan could coordinate interests on and around the airport as a metropolitan/regional strategy. The research also suggests that integrated airport and regional planning may be informed by: state government strategic targets, demographic projections, airport corporation strategic goals, local government planning schemes, community benefits and social capital (Stevens, 2008).

Sources / References

Baker, D, Donehue, P. and J. Bunker. (2008). Remote, Rural and Regional Airport Workshops: Rockhampton (May), Warrnambool (May), Port Lincoln (April), Sydney (April). Australian Airports Association Regional Meetings

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 Airports 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).

3. Whilst existing regulations and guidelines such as the Airport Development Consultation Guidelines could be given greater force through the Airports Act, prior consultation with major airports is recommended.

Could the regulatory regime better facilitate genuine long-term co-operation between airport operator companies and state and local governments on land use planning?

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.

How can we better integrate investment on airport with the funding and construction of improved road and rail links to and from our airports?

There is a present crisis in infrastructure provision around major airports in Australia. Whilst airports ensure the adequate provision of on-airport infrastructure, connecting infrastructures from state and municipal authorities have been poorly coordinated and funded (Baker, 2006; Stevens, 2008).

QUT research suggests 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. This could lead to better services for the region and the airport.

What mechanisms might be used to ensure an effective on-going dialogue between airport operators and their local communities?

Effective on-going 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.

How can the regulatory regime better ensure non-aeronautical developments do not compromise the aeronautical requirements of airlines and airports?

In other regions, regulatory regime are used to guide non-aeronautical development. For example, regulations may ensure a percentage of all non-aeronautical development revenue generated by an airport is spent on aeronautical development at that airport (similar to the American model). This approach has been asserted to remove the incentive for wholesale non-aeronautical development and ensures necessary aeronautical capacity (Tretheway, 2001).

An alternate approach, based on the development of 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. Further research into these alternatives would provide insights into what might be most appropriate in a substantially privatised airport environment in Australia.

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 (MIC 1999; DoT 2002; Wells and Young 2004):

- 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:

- Address urban, city, regional and national planning policies;
- Address the implications of each other's strategic planning;
- Provide the rationale for land-use controls; and
- 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.

Further, there is a need for the progression of 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.

How should the potential commercial impact for off airport competition be taken into account in planning on-airport non-aeronautical development?

Within the aforementioned 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. This will require commercial/business strategies that complement the vision of the specific plan for that area. Both the airport and the metropolis should be developed together in response to community demand.

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?

A joint plan needs to be formulated which incorporates safety zones, noise contours and land use planning zones into the Airport Area Plan. This holistic document could be developed jointly by the proposed Airport Community Council, the three tiers of government and the airport owner (i.e., a document similar to the Southeast Queensland Regional Plan). This airport region (or airport area of influence) master plan would give a comprehensive vision of the airport and its surrounding environment. 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.

The operation of the airport within its metropolitan environment needs to be assessed in the context of sustainable development. Aviation can be perceived to be a significantly unsustainable industry. However, there is significant potential for airport operations and the management of the interfaces with the metropolis served by the airport to deliver off-setting positive impacts. A framework could be designed specifically for airport development using sustainability assessment indicators and benchmarking that considers the regional setting of the airport. Included within this framework should be metrics for the evaluation of airport locational aspects with regard to regional development as well as broader social, political and cultural considerations.

Internationally a variety of tools are used which may assist in the Australian context. In the United States comprehensive, stakeholder agreed documents (AOPA 1999; DoT 2002) include:

- The zoning of compatible uses through land designation in town planning documents, which recognise airport regions as being suitable for particular land uses. These zonings should have regard to the protection of critical approach and departure corridors within the region, as a direct reflection of current and forecast airport noise overlays. Zoning must also include restrictions to building height and density, preserving controlled areas for future aeronautical requirements, in the same way that airport operators must, even though a specific use is not immediately evident.
- Building codes relating to establishing noise performance requirements for the interior noise levels of both new and existing structures on and near airports. Where noise or traffic levels are expected to increase through the expansion of operations, such as the construction of additional runway capacity, the cost of insulating existing structures needs to be determined equitably.
- Disclosure of airport location, potential noise impacts and aircraft traffic patterns by real estate agents and developers.
- In the United States some governments allow the airport to purchase 'avigation' easements or development rights to property prior to general sale or from a property owner. This in effect allows the airport to produce noise over the property, and / or give them the right to ensure compatible development of the land, leaving the property owner with all other rights.

The current regulatory mechanisms take into account the impact of off-airport development but off-airport development continues to impact airport management. Both airport managers and local authorities are hampered in their ability to manage off-site impacts. Neither stakeholder is able to endorse, influence, or veto land use planning decisions of the other. A regulatory response could alleviate this situation. Consultation with key stakeholders should pre-empt such a response.

Additional Issues

Integrated Approach to Airport Infrastructure Asset Management

There are several operational components to the overall airport infrastructure. These include - runways and taxiways, aprons, control tower, airport terminal, air bridges, services, car parking facilities and approach roads. Each component is an asset managed somewhat independently from each other. 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.

Use of GIS and GPS in Airport Infrastructure Management

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 undertaken without disruption to the operation of the runway.

Recommendations:

- 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, 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.

Sources/ References:

Baker (2006) Report of the Brisbane Workshop. Airport Metropolis: Managing the Interfaces, September.

Department of Transport (DoT) (2002). State of California. Division of Aeronautics California *Land Use Planning Handbook*. January http://www.dot.ca.gov/hq/planning/aeronaut/htmlfile/landuse.php , accessed 27/6/2006).

Metropolis International Congress (MIC), 6th (1999). Final Report. Commission 1: Airports and their Surrounding Zones as Catalysts of Metropolitan Development. Barcelona. http://www.metropolis.org/index.php?action=mostrar_contenido&id_seccion=70&template=interior

QUT (2008) *Airport Metropolis: Managing the Interfaces*, http://www.airportmetropolis.qut.com/, accessed on 25 May 2008.

Stevens, N., Baker, D. & Freestone, R. (2007) Understanding the Australian Airport Metropolis. *State of Australian Cities 2007*. Adelaide.

Stevens (2008) Report of the Adelaide Workshop. Airport Metropolis: Managing the Interfaces, April.

Tretheway, M. (2001) Airport ownership, management and price regulation: Research conducted for the Canada Transportation Act Review. InterVISTAS Consulting Inc.

Wells, A. and Young, S. (2004). Airport Planning and Management (5th Ed.) New York: McGraw-Hill

4.2.2 Air Traffic Management

Modern air navigation infrastructure and technology is required to accommodate the projected growth of the industry. Since 1993, the Australian Research Centre for Aerospace Automation (ARCAA) has been conducting research into the provision of future satellite navigation infrastructure for the Australian environment. From 1997 to 2005 ARCAA was responsible for developing a GNSS payload which was launched and operated successfully on a small satellite. This includes a next generation ADS-B concept along with computer vision aircraft sense and avoid systems.

These activities have provided the ARCAA researchers with great insight into international GNSS and ATM trends and plans and there is little doubt that it is a tumultuous time for aviation.

How can Australia's air traffic management system best take advantage of new and emerging satellite navigation technologies?

What is the role of government in the take up of the new technologies?

Are there any regulatory impediments to maximising the use of new and emerging surveillance and navigation technology?

World-wide satellite navigation infrastructure is constantly evolving (with upgrades and new constellations such as Galileo). It is likely that within the next 10 years the provision of high-integrity navigation (for en-route and APV) could be provided completely by the combination of the world-wide GNSS providers and a new generation of multi-mode GNSS receivers. This will provide unheralded performance to general aviation (who will purchase low-cost products available for the US or Europe) and this will place pressures on the air navigation service providers here in Australia to ensure that these global products operate correctly in Australia. This was observed within the WAAS debate in Australia.

This new global technology will force a paradigm shift to occur in the provision of air navigation services, mainly due to sovereignty issues -.i.e. foreign countries providing ANSP infrastructure. If this approach provides the most economic solution for aviation users in Australia, then it would appear that it is the role of government to make international agreements such that access to this technology can be secured.

How do we enhance both air traffic management safety and capacity and efficiency?

New ATM concepts based on ICT and network data-link technologies are rapidly maturing. ARCAA's Smart Skies project is developing centralised and automated ATM concepts that will allow much more flexible and efficient use of the airspace. Additionally through globalisation and development of ICT, ATM service provision need not be provided from within Australia. These advancements will facilitate growth in new aircraft technologies such as UAVs and personal Aerospace Vehicles which will create new airspace management problems with today's technology.

Are we effectively aligning airspace classifications and the level of services and facilities provided to reduce risk to passenger transport operations? Can we better identify risk factors?

One study conducted by ARCCA researchers investigated the development of a set of metrics that could be used to quantify when different classes of airspace would be required. This study examined current statistics of airspace utilisation at airports (class C and D) around Australia based on passenger and aircraft movements. This study noted a great disparity from one airport to the next in terms of the level of ATM service provided, particularly for class D airspace. Upon investigating why certain airports seemed to have a higher level of ATM compared to other airports (with fewer movements), it appeared that the motivation for this was historical or political (or both). No clear and consistent approach appeared to have been used to allocate class D airspace in Australia. Specifically this study found that only 30% of class D airspace in Australia would meet the trigger values used by international bodies (and proposed at one time by CADA). Based on a literature review, a deductive trigger proposal was presented that could be used to equitably provide the same level of ATM to all Australian airports. This study however found that 10 current MBZ and CTAF airports (Ayers Rock, Broome, Devonport, Dubbo, Gove, Gladstone, Mount Gambier, Mildura, Port Lincoln and Wagga Wagga) would meet the trigger points for consideration as class D airspace.

What steps need to be taken to ensure the retention, training and future supply of skilled air traffic controllers and associated professionals?

A successful strategy employed by Airservices Australia has been to support an Australian Research Council funded project with ARCAA from 2005-2008. This project provided funding to train two PhD qualified experts in the field of GNSS for Australian aviation. These two ARCAA staff have studied this problem for three years and become national authorities on aviation GNSS. Recently ARCAA were asked to perform a study on future trends in GNSS by the CEO of Airservices Australia. ARCAA was able to provide expert advice to Airservices on their specific problems because of the investment they had made in supporting the research training of these staff.

These industry partner research programs have been an excellent mechanism for training highly skilled professionals with both theoretical and academic credibility along with industry experience. It is these professionals that will lead the aviation industry through the early part of the 21st century.

In light of these issues, the following recommendations are made:

- Establish a national panel with a combination of industry and researchers to best map out the strategic directions for the provision of ATM infrastructure in Australia (a revised ASTRA group).
- The national panel should be of similar structure to the former DoTARS GNSS Coordination Committee which was disbanded in the previous government but with broader scope than GNSS.
- This panel should put forward a plan or roadmap, along with a methodology for keeping this plan updated. A product similar to the Defence UAS Roadmap would be suitable.
- The group should have resources to be able to task specific studies where and when appropriate.
- A website should be established to communicate this to the broader aviation group.
- A training concept plan should also be established to ensure the availability of appropriately qualified people to assist in preparing Australia's strategic view.

Sources / References:

Bruggemann, Troy S. and Greer, Duncan G. and Walker, Rodney A. (2007) GPS Integrity Monitoring with an Aerodynamic Model and Low Quality INS. In *Proceedings International Global Navigation Satellite Systems Society IGNSS Symposium 2007*, Sydney, Australia.

4.3 AVIATION SAFETY

How can CASA strengthen the way it relates to industry while meeting the community expectations of a firm regulator?

Responsibility for the provision of a safe, secure and efficient aviation industry is shared between the government and operators. A complex arrangement of federal, state and often local regulations and rules has been put in place under legislation to guide action and ensure the safe and efficient operation of airports and air space use. This arrangement is considered at times to have resulted in overlap, inconsistency and uncertainty. The complexity of the environment is endemic to the industry and can not be overly simplified. Mechanisms that help to establish connections and avoid overlaps between the various entities, harmonising rather than controlling processes and outcomes, are considered to be more effective in this context. That is, elements of the system may not all be working to the same legislation but they will be aware of each other, understand which rules exist and act within agreed terms of reference. Co-ordination mechanisms, such as mutual recognition and adaption of different policy and regulatory regimes, may help to develop a coherent approach. Legislation provides an important anchoring point that demands and facilitates ongoing compliance, even if contested.

The traditional tools such as legislation and regulation have generally formed the core strategy to achieve compliance. In more complex environments in which there is shared responsibility and diverse interests and commitments, processes that encourage the development of agreed points of action, shared outcomes and targets are useful. These are underpinned by a focus on incentives and collective action rather than compliance and control. Embedding this shift within the industry will require a change in culture to prevent reversion to a total reliance on vertical processes.

How can the Australian government and industry ensure CASA completes its long running regulatory reform process as soon as possible, to give clarity to industry and to clear the way for new approaches to meeting the regulatory challenges?

Completing the regulatory reform process in a timely manner can be enhanced through a genuine engagement with the industry and stakeholders to secure agreement on key points of action and commitment to working together for implementation. Without this base agreement there remain opportunities for dissension.

What changes could be made to improve how Australia's aviation agencies work together?

The changing nature of the industry and its operating environment point to the need for flexibility in approach. There is no 'one size fits all' answer. What is needed is a fit-for-purpose response that can change according to context, conditions and life cycle stages.

Given the number of agencies operating within the aviation space, tensions in working relationships are inevitable. This can be ameliorated and even overcome by an investment of time and effort up front to discussing and setting the working relations or 'terms of engagement' between entities. Specifically this will involve clarifying roles and functions, as well as agreeing how they will work together, share information and responsibilities, solve problems and deal with conflict. Such an approach has moved from the extraordinary and is now accepted practice in complex project management.

Traditionally the aviation industry has relied on a combination of high-level technological and analytical skills and traditional project management skills. While these skills are fundamental to the aviation industry, they are not sufficient in the increasingly complex operating environment. The growing imperative to work across organisational boundaries demands additional core skills for policy and program managers as well as for others responsible for the administration of the system. These 'new' skills include – communication and interest-based negotiation, systemic thinking, influencing rather than directing skills, and the ability to work cooperatively. New ways of working across organisations are also called for including, shared or collaborative leadership, pooled budgets and joined up processes such as co-location and joint initiatives. With this new way of thinking and working comes a need for revised performance measures based on shared measures and an emphasis on relationships and connections.

What steps should be taken to ensure that Australia maintains a high standard of aviation safety in the context of global developments?

The Australian aviation industry does not operate in isolation. It is part of a larger international system of transportation and therefore subject to global changes. Staying on top of these changes, particularly to ensure safety standards are appropriate, will require a strong system of monitoring, expanded information search and management systems, participation in a broader community of practice (such as global aviation bodies to share and develop standards) and strong leadership capabilities.

As an example, one area worthy of consideration relates to the development of safety metrics, that are consistent with FAA and similar overseas regulations, to assist the emerging UAV industry. For instance the "See and Avoid" requirement of human pilots must be synthesised for use in robotic systems, however the requirements are not specified. Applying a consistent approach to developing models and metrics for safety objectives is a mandatory requirement as we progress aviation into the 21st century

Recommendations:

- Undertake aviation whole of industry regulatory mapping to discover and remedy regulatory overlap and inconsistency and implement mutual recognition where practicable along with adaptive co-ordination.
- Investigate and establish collaborative governance structures based on shared or collaborative leadership, pooled budgets and joined up processes such as co-location and joint initiatives.
- Develope revised performance measures that include shared measures and an emphasis on relationships and connections.
- Support a community of practice through global aviation bodies to share and develop standards and strong leadership capabilities.
- Through the aviation governance institute, develop new generation skills of: communication and interest-based negotiation, systemic thinking, and influencing rather than directing skills.

Sources / References

Reece A. Clothier, Neale L. Fulton, Rodney A. Walker, Journal of Risk Research (accepted to appear) Pilot-less Aircraft: the Horse-less Carriage of the 21st Century?

Clothier, Reece A. and Walker, Rodney A. (2006) Determination and Evaluation of UAV Safety Objectives. In Proceedings 21st International Unmanned Air Vehicle Systems Conference, pages 18.1-18.16, Bristol, United Kingdom.

Carnie, Ryan J. and Walker, Rodney A. and Corke, Peter I. (2006) Image Processing Algorithms for UAV "Sense and Avoid" . In Proceedings 2006 IEEE Conference on Robotics and Automation, pages pp. 2848-2853, Orlando, Florida.

Huxham, C. (1996). *Creating Collaborative Advantage*, London: Sage.

OECD (1996). *Building Policy Coherence, Tools and Tensions*, Public Management Occasional Papers, No 12, Paris.

Keast, R, Brown, K. and Mandell, M.P. (2007). Getting the Right Mix: Unpacking Integration Meanings and Strategies, *International Public Management Journal 6 (3): 363-371*

Mandell, M.P. and Keast, R. (2006). Evaluating Network Arrangements: Toward Revised Performance Measures, *Journal of Performance Management and Review*

Keast, R, Brown, K. and Mandell, M.P. (2006). Mixing State, Market and Network Governance Modes: The Role of Government in 'Crowded Policy Domains' International Journal of Organizational Theory and Behaviour 9 (1): 27-50.

Koppenjan, J. and Klijn, E-H. (2004). *Managing Uncertainties in Networks: A Network Perspective on Problem Solving and Decision Making Routledge:* London:

Stead, D. Geerlings, H and E. Meijers, (Eds). (2004). *Policy Integration in Practice: The Integration of Land Use Planning, Transport and Environmental Policy-making in Denmark, England and Germany* DUP Science: The Netherlands.

4.4 CUSTOMER AND COMMUNITY PROTECTION

What practical steps can the aviation industry take right now to reduce greenhouse gas emissions? Are carbon offset schemes enough?

Airports and airlines need to take a proactive approach to reduce the greenhouse gas emissions of all aspects of their on-ground operation. This includes ensuring ground transport to the airport is as efficient as possible (this relates to road and transport infrastructure access to airports discussed above), and even encouraging public transport. Given the high impact of aviation, airports and airlines should be taking a leadership role in other areas of operations (buildings, ground operations etc) and go beyond other industry sectors.

Offset schemes for air travel are not adequate in the long term, but are important as recognition of the problem of greenhouse gas emissions. These should be built into airline operations and not seen as an option. However this is only a stop gap measure.

What measures should the aviation industry be taking in the short and medium term to reduce emissions, such as clean engine technology and clean aviation fuels?

It is imperative for the industry to actively pursue new technology options for aircraft and fuels. In the short term, other approaches can be employed, such as ensuring that older aircraft are taken out of service and new aircraft acquired. For long haul flights, there have been trials of flexible flight paths (taking advantage of wind patterns) which have been demonstrated to significantly reduce fuel use. This should be adopted as normal practice as soon as possible.

While clearly important in terms of the issues of emissions control, climate change and noise critically cross-cut a number of other

factors relating to the aviation industry. This is highlighted in the Minister's foreword, which points out that the "sustainable development of our aviation industry largely depends upon private investment and the effective management of the businesses which make up the sector". This appears to represent a departure from the use of sustainable development as a way of describing the nature of development, implying its interpretation as a management and governance framework. The broad objectives of efficiency, safety, security and environmental responsibility remain in place, but government is flagging a new conceptual approach to their delivery.

To support this new conceptual approach, there is an imperative to develop a set of decision support tools which incorporate sustainability analysis and indicators for aviation - including all aspects of the industry. These would provide a mechanism for the industry to manage these issues, and for the community to understand the role of airlines and airports in addressing all environmental issues (focusing on climate change and noise in the first instance) associated with the industry. Advanced modelling of the various interfaces between airport development (economic, social and environmental) is required.

Is the reference to sustainability in the foreword indicative of a shift from the use of sustainability as a 'catch-all' way to do things, to something more profound, and perhaps even more elusive. Specifically, is sustainable development being reinvented as a balance to get right the mix of investment, institutions, and organisations? The assumption can be drawn that sustainable development in the aviation sector is decreasingly being viewed as a cogent strategy, and increasingly conceptualised as the function of a culture of applied social responsibility.

Key Points

- Government appears to be canvassing a managerial as opposed to a developmental approach to delivering sustainability outcomes.
- Sustainability is an 'upfront' priority objective, but the detail on its provision tends to be subsumed by discussions about delivery mechanisms in preference to the question of what actually has to be done.

Recommendations

- There should be a shift in emphasis (which may be driven by regulation or internally from the industry) from sustainability compliance (management inducing) models, to sustainability incentive (culture inducing) frameworks based on award recognition for explicit sustainability advances that are well defined, communicated, measured, reported and received.
- Decision support tools should incorporate sustainability analysis and indicators.
- Investment needs to be made in research to map and understand the complex interdependencies between all aspects of aviation and between aviation and surrounding social, economic and environmental systems.

4.5 AVIATION SECURITY

4.5.1 Key Challenges

Could Australia improve its approach to protecting air travellers from threats while facilitating quick and efficient travel? How can we improve the system to improve both security outcomes and passenger facilitation through airports?

The privatisation of Australian airports has been a profound success with resultant increases in operational efficiency, financial performance and capital investment. However, the industry is experiencing significant changes and dynamically evolving conditions. Privatisation alone will not equip Australian airports to meet these evolving challenges or provide adaptable security systems that can continually meet emerging threats while supporting the considerable industry growth domestically and internationally (from the Chinese and Indian markets in particular). Current security requirements impact significantly upon passenger satisfaction, regulatory and border control requirements, the commercial imperatives of the industry, and operational goals requiring the high throughput of passengers. These conflicts are anticipated to intensify over the medium to long term.

A contributing factor to these conflicts is what is considered to be a deep organisational mismatch between the many stakeholders that operate within airports. Aircraft manufacturers and the major airlines are all global entities that involve international design teams and services that span multiple continents. The planning, design, and management of airports however, are largely local affairs. Airports must balance strong commercial interests, they must operate alongside a whole range of government, policing and border control agencies with very different objectives, and they have shareholder commitments to operate at an economic profit in one of the most highly regulated industries. With no single architect or authority for the design of airport security and facilitation systems, airport stakeholders often manage individual components of the facilitation process and neglect important interactions and inter-dependencies that cannot be easily planned, understood, or catered for.

Due to the relatively small size of those airports that respond to legislative security requirements only, they often do not have the expertise to design and implement effective security solutions. Nor do they have the resources to invest in the development of innovative solutions, training programs or other cost-saving and efficiency-enhancing procedures. The end result is the implementation of often ad-hoc local security solutions and

operational procedures, no system-wide arrangements, and airlines dealing with numerous local practices.

Research in the aviation industry is currently very active. However, it frequently only addresses isolated/individual components of security or facilitation. This includes advanced passenger processing systems and registered traveller programs, security proccesses and equipment (eg. multi-view x-ray, metal and explosive detectors), techniques for improving security checks (process or human factors), IT security, logistics, emerging technologies such as radio frequency identification, biometrics, surveillance, expert systems for x-ray screening, and economic research. It is also now widely accepted that there is a pressing need to balance security and efficiency of aviation. This has led to initial developments in linked security and terminal operation systems by industry leaders such as Siemens, GE, Raytheon and Honeywell. However, little existing work synoptically or systematically captures the multidimensional and multi-disciplinary aspects of airport operations and security. Existing knowledge is both inadequate and insufficiently integrated across the various research disciplines to identify holistic solutions which will deliver high levels of security and enhanced passneger experiences.

There is a clear need for Australia to improve its approach to facilitate a safe and secure travel experience and to ensure the long-term sustainability of the industry. It is evident that an integrated and holistic approach is required for the design of airport security and facilitation systems to overcome current piecemeal efforts and to uncover new opportunities for improved efficiency. A perspective of airports as a dynamic complex system should inform a structured development process centred on passenger facilitation. This will provide the best possible avenue for improving the passenger experience and create innovative methods for integration and optimisation of the entire end-to-end process. Such a systems approach to design will cascade through specific requirements into individual stages of the facilitation process correctly informing design and implementation. This approach would also correctly inform targeted research and development in contrast to current technology-driven research programs.

QUT is committed to ongoing research and development in the aviation security arena and is addressing these issues through two significant research projects outlined below.

1. QUT has led a consortium of aviation industry stakeholders in the formation of a multi-disciplinary collaborative research project beginning July 2008. The aim of the study is to address the growing conflicts between aviation security and passenger facilitation through the use of emerging technologies for the design of seamless secure airports with enhanced efficiency, economic viability and passenger satisfaction. The research proposal involved 30 stakeholders drawn from five sources; airport owners and operators, government agencies, airlines, service providers, and research providers. Over $2M from industry was raised to perform multi-disciplinary research across information, process, people, and technology domains.
2. QUT has also submitted a proposal to the ARC which aims to create a state-of-the-art test bed facility for airport operations research – an airport without aircraft or runways. This will be an integrated airport facility comprising a suite of airport terminal infrastructure, equipment and supporting technologies including: airport facilitation hardware; visualisation and simulation platforms; surveillance, access control, and biometric equipment; multi-sensor platforms for threat detection and model capture; data management tools; collaborative technology platforms; and a command and control centre. This facility will support and enable research in sustainable airport operations, security, passenger facilitation, complex systems integration, data management and visualisation, transport management and critical infrastructure protection. The facility will provide a forum for the integration of research outcomes with existing commercial solutions. The facility will also double as a training centre and open resource for the aviation industry and will be the first facility of its kind within Australia.

Sources / References:

1. ATAG, *The Economic and Social Benefits of Air Transport*, Geneva, 2005.
2. M. Abbot, S. Wu, *Total Factor Productivity and Efficiency of Aust. Airports*, Aust. Economic Review 35(3): 244-260, 2002.
3. IATA, *Simplifying Passenger Travel (SPT) Program: Air Passenger Process*, 2004.
4. M. Prismon, D. Johnston, *Airline Industry Security*, in Tech. and Privacy in the New Millennium, Ethica Pub. 2004.
5. K.E. Yoo, Y.C. Choi, *Analytic hierarchy process approach for identifying relative importance of factors to improve passenger security checks at airports*, Journal of Air Transport Management, 12, pp135-142, 2006.
6. US DoD Human Systems Information Analysis Center, *Gateway*, Vol 13, No 4, 2003.
7. DFAT, *Combating Terrorism in the Transport Sector – Economic Costs and Benefits*, 2004.
8. The Boston Consulting Group, *Airports – Dawn of a New Era*, Munich, April 2004.
9. DOTARS. *Aviation Statistics, Airport Traffic* Data 1994-95 to 2004-05. Canberra: Australian Government, 2006.
10. CASA, *An assessment of trends and risk factors in passenger air transport*, The Australian Government, 2008.

4.5.2 International developments

Should more be done at airports where passengers leave for Australia to make clear our own security requirements?

What can be done by government and industry to achieve greater international harmonisation of aviation security measures?

Safety of aviation operations is a priority influence on airport and interface management. However, there is no doubt that, within the present global context, infrastructure protection and personal security is a national priority. Security and risk considerations extend to the linkages with the region and international contacts. Effective risk management and crisis response to emergencies will have a priority influence on the various dimensions of the airport's interfaces and will require a well developed and understood framework across all interfaces.

4.5.3 Threat

Should aviation security remain the key focus for government and industry?

Should more attention be paid elsewhere?

Is enough being done to enhance security in the aviation sector?

Are we thinking broadly enough about the likely threats we may face and how they may be encountered?

The public is particularly aware of and sensitive to many issues related to aviation security. Although the industry has undergone significant security changes since the events of September 11, many of these changes and investments have only improved perceived security and increased policing resources and first responders in Australian airports. Inconsistencies are still visible, such as the lack of ID checking on domestic flights or inconsistencies in screening procedures between airports. Breaches still occur and uncover flaws in the system and the public is conscious that many of the security checks and balances are performed by humans (often un-skilled). So the potential for human error or oversight is always present. As the rigidity and complexity of regulation increases, there is also a danger that airport owners and operators could become overly fixated on legislative compliance at the expense of focusing on robust threat assessment and the development of appropriate mitigation strategies.

There is no doubt that aviation security should remain a key focus for government and industry and improvements should be continually pursued to remain proactive in a dynamic threat environment. Aviation is the only mass transportation hub that comprises such a large grouping of diverse stakeholders, including government law enforcement and policing agencies, border control agencies, and numerous domestic and international commercial/ retail entities. Such a complex grouping of stakeholders, operating within a common high-profile environment, will invariably generate vulnerabilities that would not exist within other mass transportation hubs. The aviation industry is also a key economic driver of the global economy and represents 8% of the world's GDP. The economic impact is even more critical for Australia due to its unique population sparseness. It is clear that the industry is a critical asset for the country and requires the highest ongoing levels of vigilance to ensure the security and safety of Australia's passengers, workforce, and productive infrastructure.

Despite the high-profile nature of the aviation industry, however, vulnerabilities in other mass transportation hubs are being uncovered and increasingly targeted worldwide. Consequently, the security focus should be broadened to achieve consistent standards and security outcomes across the board. To achieve this, it will be essential to leverage new innovative methodologies developed for aviation security and apply them to other mass transportation systems. As the aviation industry represents the external point on a continuum of environment complexity, security requirements and threat levels, application to other transportation hubs could be achieved through the use of transferable and appropriately scaled-down common security modules.

Further research is required to develop appropriate model-based system engineering solutions to airport security and facilitation processes and to identify those common system architectural features. Such common features can then be represented by a reusable component-based architecture. This architecture would then be adaptable and thus could be modified to suit the requirements and functionality of new airports, airports undergoing significant changes, or airports operating in different contexts (such as regional or charter-only airports.) The commonalities in these system architectural features could then be exploited to develop model-driven airport facilitation systems with each component adequately specifying its particular design rationale, functionality, inputs and outputs, underlying assumptions and known weaknesses. Not only could such a model-based system be transferable to airports operating within different contexts, it could also be transferable to other mass transportation hubs and areas of critical infrastructure protection. Thus, focusing on the most complex and dynamic environment in airport security for the development of these component-based solutions would provide for the most effective transferability to other contexts.

Furthermore, while the scope of threat recognition capability is important, a more critical factor should be whether threat assessment and risk mitigation capacities exist and their prevalence throughout the aviation sector. Further, vulnerability analysis

capacities are equally as important because without them definition of counter-measures for plausible threats will be difficult. The source of threats may also be unexpected and not connected with conventional expectations. Given the significant increase in aviation activity into the future, both in international visitors and from related commercial activity, threat recognition and assessment capabilities across the industry are critical.

Another dimension to this is the changing revenue streams privatised airports attract from onsite commercial operators. The ability to recover from emergencies and resultant business disruptions is a critical capacity not yet adequately explored or addressed. The ability to recover functionality after onsite emergencies - especially if an evacuation of premises is required - is critical given the potential for loss of significant earnings. There is an absence of fit-for-purpose business continuity planning capacity across the aviation industry and among participants, which needs to be addressed as a matter of urgency. Equally, the growth of commercial-centred and cargo-related infrastructure within airport precincts requires careful coordinated planning for emergency response across all areas of an airport.

Sources / References:

ATAG, *The Economic and Social Benefits of Air Transport*, Geneva, 2005.

J. Wheeler, *An Independent Review of Airport Security and Policing for the Government of Australia*, Airport Security and Policing Review, Australian Government, September 2005.

CASA, *An assessment of trends and risk factors in passenger air transport*, The Australian Government, 2008.

Barnes, P.H. (2008) "Evolving Issues in Australian Emergency Management," in the *Australian Security Magazine*, 2008, March (Invited Article)

Charles, M.B. & Barnes, P. H. "Sustainability and the Airport City" in *Global Sustainability Initiatives; new models and new approaches*, Wankel, C. & Stoner, J.A.F. (Ed.), Information Age Publishing, (forthcoming, 2008).

Barnes, P.H., Branagan, M. Charles, M. & Knight, A. (2007) "Intelligence and Anticipation: Issues in Security, Risk and Crisis Management," in *the International Journal of Risk Assessment & Management*, Vol. 7, No. 8.

Barnes, P.H. (2007) "Anticipating Vulnerabilities in Infrastructure(s)," in the proceedings of the Australian Academy of Science sponsored High Flyers Think Tank – *Extreme Natural Hazards*, University of Melbourne, Oct., 30. ISBN: 0-85847-247-3.

Lagadec, P. (2005) *Crisis Management in the 21st Century "Unthinkable" Events in Inconceivable"* Contexts, Cahier N° 2005-003, Laboratoire D'econometrie, Ecole Polytechnique, Centre National De La Recherche Scientifique.

4.5.4 Growth and Industry Development

Should current passenger security screening requirements based around jet aircraft should be extended to non-jet aircraft of similar capacity, speed and weight?

Is the security infrastructure at airports adequate?

The current focus of the aviation security system is regular passenger transport services. Should it be extended to include aircraft providing for example charter services?

It is essential that aviation security is consistent in its response to all known and potential threats. Undue focus in one area at the expense of another with comparable levels of risk will create vulnerabilities within the system. Thus, it is important that current passenger screening requirements based around jet aircraft be extended to non-jet aircraft of similar capacity, speed and weight as the potential for risk and damage through exploitation of these aircraft is of comparable significance. A similar response should also be formed in the extension to charter services. However, adoption of a 'one-size-fits-all' approach is unrealistic and unsustainable in the long term. In particular, one size does not fit all when it comes to imposing security on regional airports. Rather, methodologies, systems and guidelines should be developed for the design of flexible, risk-based security policies and contingency plans that identify threats and mitigate emergency incidents, while ensuring optimal business continuity, satisfying government regulations, and meeting evolving needs of different airport contexts within the aviation industry. In this regard, current security infrastructure at Australian airports is inadequate as it will not continue to meet evolving security and technical requirements. It is not flexible enough to expand with large forecast increases in passenger numbers nor does it allow for easy adoption of flexible, risk-based security policies.

The capacity of airports is another major challenge for Australian regulators and the industry itself. Some major airports are facing enormous capacity constraints due to their inability to expand terminal size. Other, smaller airports have more than enough physical capacity. However, they often lack the financial and human resources (and simply lack passenger numbers) needed to pay for the cost of mandated security. Solutions to these problems can only be found through further investment in technology, efficient processes, and research to develop innovative solutions that meet these challenges and increasing demands. The research and development of model-based security and facilitation systems, highlighted earlier, is one potential solution for implementing a flexible and adaptable solution which is transferable to different contexts.

Sources / References:

Lagadec, P. Crisis: *A Watershed from Local, Specific Turbulences, to Global, Inconceivable Crises in Unstable and Torn Environments. Future Crises, Future Agendas*: An Assessment of International Crisis Research International Workshop, November 24-26, Sophia-Antipolis, France, 2004.

4.5.5 Technology

Should we introduce new technologies for passenger screening that can improve processes even if they are more invasive or costly?

Biometrics are an effective way to manage access arrangements at airports and an improvement on current practice. Is there value in introducing biometrics into Australia's airport for people working there?

Should we expect the same security technology standards from all airports regardless of location, the traffic levels at the airport, and the costs?

Recent surveys, across the large majority of Australian airports, by QUT research personnel have clearly highlighted that increased security requirements and legislation have dramatically increased security costs and complicated the facilitation process and general operations. This carries potential to impact on the capacity of airport operators and reduce their ability to manage traditional security risks. Without major injections of human resources or physical space, the best opportunity to meet these challenges is further investment in technology and further investment in research of new innovative cost-saving and efficiency enhancing security and facilitation systems and procedures. The questions to be addressed then, do not simply focus on those related to the introduction of more invasive technologies, rather, they should focus on pervasive technologies that truly enhance security outcomes and lesson the burden on current security bottlenecks as well as glean new methodologies for business processes and delivery of service to passengers.

To elevate the capacity and levels of service of Australian airports, the following areas need further focus and investment:

- Improvement of productivity and operational management,
- Increased situational awareness and intelligent use of information,
- Increased resilience in operations and response capabilities,
- Increased coordination amongst aviation stakeholders,
- New knowledge of the interaction and integration between operational, economic, and security factions within the airport and how these impact upon passenger and staff experiences,
- Optimal design and retrofitting of pervasive technologies and facilitation systems.

Within the information domain, airports are plagued by inefficient and segregated information management systems; a lack of coordination and information sharing between different stakeholders of aviation operations and security; and a considerable lack of integration between the many discrete facilitation systems which deliver service to passengers as they proceed through various checkpoints and processes within an airport environment. New methodologies are required for knowledge integration and visualisation through shared information and management models that encompass operations, building functionality, security and facilitation systems, and are supported through the provision of strategic decision support systems. Advanced data-mining techniques, that satisfy and promote new legal regimes for data exchange and disclosure, are required to facilitate event monitoring and intelligence gathering activities. Complex systems engineering models are required to model complex interactions and identify common system architectural features for the development of reusable and model-driven airport facilitation systems. The development and integration of supporting infrastructure for the facilitation process is also required including an electronic incoming passenger card system and in-line x-ray screening protocols for the increased throughput of passengers on the inbound side.

Within the process/people domain, there is currently a segmentation of business and operational activities and a lack of understanding of, and the inability to map, the economics of business entities within airports. Airports also lack robust business continuity plans to ensure the resilience and effective emergency response of airport operations during periods of significant, or more often, seemingly insignificant disturbances. Furthermore, the strong trend of decreasing passenger satisfaction is a direct result of the distinct gap in the knowledge of how people behave within airports and how they interact with security intensive processes and technology. Innovative sets of integrated modelling methodologies are required to develop airport-specific business process models with rich qualitative information and that incorporate technical, systems, as well as economic and human-centric modelling techniques (including passengers' experiences, expectations, behaviours and interactions). Combined with emergency response frameworks, these models will lead to a better platform for decision making and impact analyses.

Within the technology domain there are several issues which need to be addressed. First, the majority of surveillance systems do little

more than acquire footage for review by human operators, while current intelligent systems have limited robustness (particularly to varying pose, illuminations, and occlusions), and are plagued by some fundamental research problems. These include: (a) multi-view tracking, (b) human identification at a distance, (c) automatic calibration of large ad-hoc camera networks, and (d) complex human activity recognition. Second, the inspection technologies employed during passenger and baggage screening have limited and inefficient abilities to identify a range of threats; they represent almost two-thirds of direct security costs; and they reside in a single bottleneck which severely impacts facilitation processes. Third, access control management is expensive and fraught with duplication and potential for error due to. (a) the necessity to carry numerous identity and access cards; (b) the lack of interoperability of independent systems; (c) and hundreds of issuing authorities.

New methods for distributed threat detection, utilising unobtrusive but pervasive surveillance and inspection technologies, are required to improve the end-to-end screening of passengers and identification of abnormal events. Access control issues need to be addressed through the research and use of federated identity management systems that maintain the administrative autonomy of individual operators but allow cross-recognition of user identities. Biometrics also need to be incorporated into the identity management system to improve the verification of individuals and remove the dependency on private information and token based security (passwords, PINs and swipe cards). Furthermore, although the Aviation Security Identification Card (ASIC) was never intended to be used for access control, many Australian airports are using it for this purpose. The evolution of the ASIC (or similar card) as a platform for a nationally interoperable, biometrically enabled, access control card needs close consideration with heavy input from Australian regulators with regard to legislation.

As highlighted earlier, it is unrealistic to expect identical security solutions across all airports regardless of location, traffic levels and costs. Rather, flexible, risk-based security policies should be implemented that are commensurate with the context of the airport, its location, traffic levels and passenger flows. Technology should be leveraged to ensure identical security standards where appropriate. However, other elements of security relating to process, structure, layout and resources should adopt a model-based architecture to provide transferable and context-specific security solutions.

It is clear that a dedicated Australian research centre for airport security and related technologies would be a significant step forward and would assist in the reduction of currently dispersed and piecemeal solutions. Built as part of a strong public-private partnership, such a research facility would proactively deliver focused research which would be informed by the requirements of the entire airport system rather than pursuing a particular technology and looking for airport applications retrospectively.

The role of Australian regulators would then be to promote robust security outcomes and deliver education in best-practice while being strongly supported by a dedicated aviation research centre. This facility would assist Australian regulators in setting security policies, delivering education and training programs, and would support the aviation industry through independent assessment and trials of technology, processes and systems. This approach would ultimately improve security outcomes, behaviour and culture within the Australian aviation industry.

Recommendations:

- Undertake detailed investigation of the synergies obtainable from integrating airport information management systems (surveillance, passenger processing and terminal operations) and the resultant benefits to aviation security.
- Define mechanisms to incorporate effective threat assessment and risk mitigation techniques into transport security planning capabilities and practices throughout the aviation sector.
- Identify options for designing flexible emergency response and business continuity planning and decision-making protocols that match the ongoing needs of airport operators, commercial leaseholders and regulatory agencies.
- Investigate the optimal combination candidate security technologies and systems that maximise effectiveness and efficiency of processing passengers from landside to airside.
- Establish a dedicated collaborative Research Centre for Aviation Security that investigates and defines solutions to security concerns, passenger experience issues and the long-term sustainability needs of the aviation industry.

Sources / References:

CASA, *An assessment of trends and risk factors in passenger air transport*, The Australian Government, 2008.

Lagadec, P. Crisis: *A Watershed from Local, Specific Turbulences, to Global, Inconceivable Crises in Unstable and Torn Environments. Future Crises, Future Agendas*: An Assessment of International Crisis Research International Workshop, November 24-26, Sophia-Antipolis, France, 2004.

R.E. Caves, D.C. Pickard, *The satisfaction of human needs in airport passenger terminals*. Transport. 147(1): p. 9-15, 2000.

R.J. Wales et. al, *Ethnography, Customs and Negotiated Interactions at the Airport*. IEEE Int. Systems, 17(5): p. 15—23, 2002.

B. Schatz, G. Mohay and A. J. Clark, *Generalising Event Correlation across Multiple Domains*. Journal of Information Warfare, 4(1):69-79, March 2005.

IAI, *Industry Foundation Classes*, http://www.iai-international.org/Model/IFC(ifcXML)Specs.html, Accessed 18/04/2006.

V. Popovic, *Expert and Novice Users Models and their Application to the Design Process*, Journal of 6th Asian Design Conference, vol 1(1), Tsukuba, Japan, 2003.

A.W. Scheer, ARIS – *Business Process Modeling*. 3rd edition. Springer-Verlag: Berlin et al. 2007.

G. Aggarwal, A.K.R. Chowdhury, and R. Chellappa. *A system identification approach for video-based face recognition*. In Proc. of the Int. Conf. on Patt. Rec., volume 4, pages 175 – 178, 23-26 Aug 2004.

S. Rastan et. al, *An early warning and response system for buildings at risk to toxic airborne materials*, in Safety and Security Engineering, Eds. C.A. Brebbia, et. al, WITpress, Southampton, pp 427-438, 2005.

S. Cantor et al., *Assertions and Protocols for the OASIS Security Assertion Markup Language* V2.0. OASIS SSTC, Jan 2005.

5. Additional Issue

Aerospace Technology of the Future – Unmanned Aerial Systems

One area that ARCAA has made progress in is the area of Unmanned Aerial Systems (UAS). In December 2005 and December 2006, ARCAA organised international workshops to discuss impediments facing the UAS industry. Each workshop attracted approximately 100 international delegates who discussed, over a two-day period, the potential of the civilian UAS industry. It soon became apparent that Australia was internationally recognised as providing a unique environment in which to develop and test new concepts for the operation of unmanned aerial systems. It was also apparent from the wide cross section of industry present, that there were many important roles that UAS could play in supporting triple-bottom-line problems in Australia.

In the minister's forward of the NAPS document, the following statement was made:

> ***"Australia's aviation industry plays a crucial role overcoming the tyranny of distance. This has always been a significant task"***

The workshops identified that UAS are the next generation of aviation technology that will contribute to this "significant task". As ICT matures into the aviation industry and as more mature, military grade UAS systems become available on the market, more and more industry sectors will explore how to make use of this revolutionary technology. Indeed this is already occurring with numerous civil trials underway, including but not limited to:

1. ARCAA, in conjunction with the CRC for Plant Bio-security, is evaluating how UAS can be used to provide biosecurity surveillance for Australia's agricultural industry. The heightened surveillance that UAS can provide increased the value of Australian agricultural products on the international market.
2. ARCAA, in conjunction with the CRC for Spatial Information and Ergon Energy, is developing concepts and technologies for utilising UAS surveillance systems to perform powerline inspections. Ergon has over 150,000km of powerline spread across the entire state of Queensland. UAS are an attractive alternative for surveilling this asset when compared to manned helicopter surveillance.
3. The Australian Government Border Protection Command has trialled UAS in May 2007 [ref http://www.customs.gov.au/site/page.cfm?u=5798] and May 2008 [ref http://www.customs.gov.au/site/page.cfm?c=10417] to explore more cost-effective means of surveilling Australia's expansive coast-line. One important aspect of the trials to date is the recognition that significant CO2 emissions savings can be made by transitioning to unmanned systems.

Additionally this industry has attracted the attention of a new generation of aviators. In September 2007 ARCAA organised Australia's first UAV competition called the unmanned aerial vehicles (UAV) Outback Challenge (www.uavoutbackchallenge.com.au). The competition was designed to showcase how UAS could be used to perform search and rescue tasks in Australia's expansive outback. It attracted competitors from around the world and was so successful that the sponsors have supported the event again in 2008.

This next generation of aviation technology is on our doorstep and Australia has a unique competitive advantage to lead the world in exploiting this technology for our economic advantage. The airspace in Europe and the USA is simply too congested – in support of this many UAS companies have established themselves in Australia, namely: Insitu Pacific, Boeing Australia, BAE Systems, Aerosonde and MLB (through VTOL Aerospace).

With so many benefits to the expansive and sparsely populated country described in the minister's forward of the NAPS, an additional issue for the NAPS is proposed, namely:

How might the Australian Government best ensure that the opportunities provided by UAS in overcoming the tyranny of distance are best exploited for Australia's social, economic and environmental problems?

Recommendations

1. UAS are recognised in the NAPS to be an important component of the future aviation environment.
2. UAS are recognised to be of special significance to Australia for overcoming our tyranny of distance problems.
3. Australian government establishes a UAS program office to work with industry in order to progress regulations, policy and operations in a timely fashion.
4. The primary point of contact for the UAS industry be made through the ***UAS Australia*** consortia [ref www.UASAustralia.org]. The sole purpose of this independent and national industry group is to address the policy and regulatory issues facing the Australian UAS industry. UAS Australia is also making a submission to the NAPS.

Sources / References

Department of Tourism, Regional Development and Industry, *Aviation and Aerospace Industry*, Queensland Government http://www.dtrdi.qld.gov.au/dsdweb/v3/guis/templates/content/gui_cue_cntnhtml.cfm?id=63828

Cork, L.R, Clothier, R. A., Gonzalez, L.F. and R.A. Walker (2007). *The Future of UAS: Standards, Regulations, and Operational Experiences IEEE Aerospace and Electric Systems Magazine* 22 (11): 29-44.

6. Contributing Respondents

Airport Metropolis

Associate Professor Douglas Baker

Dr Arron Walker

Mr Nicolas Stevens

Mr Phil Kimmet

Dr Robyn Keast

Professor Kerry Brown

Remote, Rural and Regional Airports

Associate Professor Douglas Baker

Dr Jonathon Bunker

Dr Paul Donehue

Airports of the Future Project

Professor Prasad Yarlagadda

Dr Clinton Fookes

Dr Paul Barnes

Australian Research Centre for Aerospace Automation

Professor Rod Walker

Faculty of Built Environment and Engineering, QUT

Professor Arun Kumar

Professor Ashantha Goonetilleke

Professor Sridha Sridharan

Adjunct Professor David Hood

7. Respondents' Short Curriculum Vitae

Associate Professor Douglas Baker

Business Telephone: 07 3138 2505
E-Mail: d2.baker@qut.edu.au
Postal Address: School of Urban Development.
QUT, Brisbane Q 4001

CV Summary

POSITIONS HELD:

- **Associate Professor** 2006 - present
  School of Urban Development
  Faculty of Built Environment and Engineering

FORMER POSITIONS:

- **Senior Lecturer Level C** 2004 – 2006
  School of Urban Development
  Queensland University
- **Associate Professor** 1994 - 2004
  School of Environmental Planning
  College of Science and Management
  University of Northern British Columbia

QUALIFICATIONS:

PhD University of Waterloo (1992)
MRM Simon Fraser University (1987)
BA Simon Fraser University (1978)

RELEVANT EXPERTISE:

- **Research Leader:** Australian Research Council Linkage Grant: The Airport Metropolis: Managing the Interfaces

KEY RELEVANT PUBLICATION:

- **Baker, D.C.** and R. Freestone. July 10-13, 2008. "Reconciling Public and Private Interests in the Planning of Development of Airports: The Australian Experience 1995-2008" under review for the 13th International Planning History Society Conference, Chicago.
- Stevens, N., **Baker, D. C.** and R. Freestone. Nov. 28-30, 2007. "Understanding the Australian Airport Metropolis" In Proceedings of the State of Australian Cities National Conference. Adelaide, Australia. pp. 110 – 120.
- Freestone, R. and **D.C. Baker.** 2008. "The Aerotropolis as a Normative Model of Sustainable Urban Form" submitted to Journal of Environment and Planning B. forthcoming
- Stevens, N., **Baker, D.C.** and R. Freestone. 2008. "Understanding the New Australian Airport Metropolis" submitted to the Journal of Transportation Geography. forthcoming

RELEVANT EXPERIENCE:

- **Invited Speaker.** June 18-19, 2008. "Land Use and Australian Airports" presented at Bureau of Infrastructure, Transport and Regional Economics 8th Transport Colloquium, Parliament House, Canberra.
- **Invited Speaker.** June 4-5, 2008. "Land Uses Around 75 International Airports: Trends and Challenges" presented at Aviation Business Airport Development 2008 Conference. Sydney, Australia.
- **Invited Speaker.** November 12-15, 2007. "The Three Year Regional, Remote and Rural Airports Research Program" presented at the Australian Airports Association 26th Annual National Convention. Melbourne.
- **Keynote address and Conference Chair.** September 12-14, 2007. "The Business Case for Airport Cities: Why Do We Need Them?" presented at the Asian Development Business Airport Cities Conference. Singapore.

7. Respondents' Short Curriculum Vitae

Dr Paul Barnes

Business Telephone: (07) 3138 9019
E-Mail: p.barnes@qu.edu.au
Postal Address: School of Management, QUT, Brisbane Q 4001

CV Summary

POSITIONS HELD:

- **Deputy Director & Research Leader** (Risk & Crisis Management), Information Security Institute; Senior Lecturer, School of Management – Queensland university of Technology Current
- **Director** (Security Policy Development) Defence Security Authority, Australian Department of Defence
- **Corporate Risk Manager** Queensland Department of Primary Industries
- **Manager** - State Community Safety Unit Queensland Fire and Rescue Authority (QFRA

QUALIFICATIONS:

- **BSc** (Environmental Studies) Griffith University (1987)
- **PhD** (Risk & Organisational Analysis) Griffith University (1997)

RELEVANT EXPERTISE:

- Risk Management and Business Continuity Planning
- Threat Analysis (Critical Infrastructure Protection)

KEY RELEVANT PUBLICATIONS

- **Barnes, P. H.** & Nakamura A. (eds.) *Resilience and Crisis Planning in Mega-Cities (Tokyo, New York, Paris & London): Issues, Opportunities and Uncertainties*, Edward Elgar, London (Forthcoming 2009).
- **Barnes, P. H.** "Security, Business Continuity & Crisis Planning," in *Resilience and Crisis Planning in Mega-Cities: Issues, Opportunities and Uncertainties*, Barnes, P. & Nakamura A. (eds.), Edward Elgar, London (Forthcoming 2009).
- Charles, **M.B. & Barnes**, P. H. "Sustainability and the Airport City" in *Global Sustainability Initiatives; new models and new approaches*, Wankel, C. & Stoner, J.A.F. (ed.), Information Age Publishing, (forthcoming, 2008)
- **Barnes, P.H.** (2007) "Anticipating Vulnerabilities in Infrastructure(s)," in the proceedings of the Australian Academy of Science sponsored High Flyers Think Tank – *Extreme Natural Hazards*, University of Melbourne, Oct., 30. ISBN: 0-85847-247-3.
- **Barnes, P.H.** & Oloruntoba, R. (2007) "The Co-evolution of Safety Cultures and Crisis Management Capacities in Maritime Trading Systems," Chapter 12 in *Risk Management in Port Operations, Logistics and Supply Chain Security,* (ed.) Bichou, K. et. al., Lloyd's *Practical Shipping Guides*, Informa, London, ISBN: 978-1-84311-655-4.
- Charles, **M.B., Barnes**, P.H., Ryan, N. & Clayton, J. (2007) "Aerotropolis: Towards a critique of the model," in *Futures*, Volume 39, Issue 9, pp. 1009-1028.
- **Barnes, P.H.**, Branagan, M. Charles, M. & Knight, A. (2007) "Intelligence and Anticipation: Issues in Security, Risk and Crisis Management," in the *International Journal of Risk Assessment & Management*, Vol. 7, No. 8.
- **Barnes, P.H.** & Oloruntoba, R. (2005) *"Assurance of Security in Maritime Supply Chains: Conceptual Issues of Vulnerability and Crisis Management, in a special edition of* The Journal of International Management, Vol.11, No. 4.

RELEVANT EXPERIENCE:

- **Chair:** National Community Education Committee, Australasian Fire Authorities Council.
- **Member:** State Counter Disaster Coordination Group & State Disaster Mitigation Committee; Multi-Agency Threat assessment Team (Chemical, Biological, Radiological incidents) – Queensland State Government).
- Development of strategic policy on non-financial risk issues and advice on threat and risk assessment (Major State Government Agency).
- Research on emergency response infrastructure and resource planning, Coordination of Workplace Health & Safety (First Responders), Advice on safety and risk assessment requirements for large-scale developments (including major hazardous facilities (State First Response Agency).
- Oversight of the development & maintenance of non-operational security policy within the Australian Defence Department including development of Risk Analysis & Management concepts for Physical Security.

Professor Kerry Brown

Business Telephone:
E-Mail: ka.brown@qut.edu.au
Postal Address: Faculty of Business, QUT GPO Box 2434
Brisbane, Q 4001

CV Summary

POSITIONS HELD:

- **Professor** of Management;
- **Program Leader**, Strategic Human Dimensions Research Program, Cooperative Research Centre for Integrated Engineering Asset Management (CIEAM)
- **Executive Officer**, Australian Asset Management Collaborative Group (AAMCoG)

QUALIFICATIONS:

- **Ph.D** Griffith University
- **B.A.** (Hons) Murdoch University
- **B.A.** (Hum) Griffith University

RELEVANT EXPERTISE:

- CI on ARC Linkage Grant: Airport Metropolis: Managing the Interfaces
- Infrastructure policy and capacity building in construction and engineering asset management.
- Culture change and innovation
- Public management and policy

KEY RELEVANT PUBLICATIONS:

- Furneaux, C., **Brown, K.** and Allen, D. 2008 Public Values Embedded in Public Works Procurement, *Public Money and Management, June*.
- Keast, R, **Brown, K.** and Mandell, M.P. (2007). Getting the Right Mix: Unpacking Integration Meanings and Strategies, *International Public Management Journal 6* (3): 363-371
- Keast, R, **Brown, K.** and Mandell, M.P. (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
- Ryan, N. and **Brown, K**. 2006. Public-Private Relations: Managing Inter-Organisational Relationships, in G. Boyce, S. Macintyre & S. Ville (Eds.), How Organisations Connect: *Investing in Communication. Melbourne: University of Melbourne Press.*
- Hampson K. and **Brown, K**. 2005. Introduction: Mapping the Terrain, in (Eds) K. Brown, K., Hampson, and P. Brandon, Clients Driving Construction Innovation: *Mapping the Terrain, Icon, Brisbane.*
- Frahm, J. and **Brown, K**. 2006. Developing communicative competencies for a learning organization. *Journal of Management Development, 25* (3), 201-212.

RELEVANT EXPERIENCE:

- Serves on executive board of the International Society for Engineering Asset Management and the International Research Society for Public Management
- Serves on the editorial board of Public Administration To-Day, International Journal of Change Management and the International Journal of Globalisation and Small Business.

7. Respondents' Short Curriculum Vitae

Dr Jonathan Bunker

Business Telephone: 07 3138 5086
E-Mail: j.bunker@qut.edu.au
Postal Address: School of Urban Development. QUT, Brisbane Q 4001

CV Summary

POSITIONS HELD 2005 - present:

- 2005 - present **Senior Lecturer and Discipline Coordinator**, School of Urban Development
- Faculty of Built Environment and Engineering, QUT

FORMER POSITIONS:

- 2000 – 2005 **Lecturer**, School of Urban Development, Faculty of Built Environment and Engineering, QUT
- 1997 – 2000 **Senior Transport Engineer**, Eppell Olsen and Partners (Cardno), Brisbane
- 1995 – 1997 T**ransport Engineering Associate**, Kittelson and Associates Inc, Portland, Oregon

QUALIFICATIONS:

- **PhD** Queensland University of Technology (1996)
- **BE** (Civil) (Hons1) Queensland University of Technology (1991)

RELEVANT EXPERTISE:

- **Researcher:** Australian Airports Association: Remote, Rural and Regional Airports: Opportunities and Challenges

KEY RELEVANT PUBLICATIONS :

- **Bunker J.M**. and Baker D. 2008. *"Infrastructure Challenges Facing Remote, Rural and Regional Airports in Australia"* submitted to the Regional Airports 2009, UK. forthcoming

RELEVANT EXPERIENCE:

- **Invited Workshop Presenter.** 13 March 2008. "Remote, Rural and Regional Airports: Research Needs" presented at Australian Airports Association, South Australia Chapter Annual Meeting, Port Lincoln, SA.
- **Invited Workshop Presenter.** 23 April 2008. "Remote, Rural and Regional Airports: Research Needs" presented at Australian Airports Association, New South Wales Chapter Annual Meeting, Sydney, NSW.
- **Invited Workshop Presenter.** 30 April 2008. "Remote, Rural and Regional Airports: Research Needs" presented at Australian Airports Association, Queensland Chapter Annual Meeting, Rockhampton, QLD.
- **Invited Workshop Presenter.** 9 May 2008. "Remote, Rural and Regional Airports: Research Needs" presented at Australian Airports Association, Victoria Chapter Annual Meeting, Warrnambool, VIC.

Dr Clinton Fookes

Business Telephone: (07) 3138 2458
E-Mail: c.fookes@qut.edu.au
Postal Address: SAIVT, School of Engineering Systems, QUT, Brisbane, Q 4001

CV Summary

POSITIONS HELD:

- 2008-current: **Senior Research Fellow**, Faculty of Built Environment and Engineering, Information Security Institute (ISI), QUT
- 2004-2007: **Research Fellow / Research Laboratory Manager**, ISI
- 2003-2004: **Postdoctoral Research Fellow**, School of Electrical and Electronic Systems Engineering, QUT

QUALIFICATIONS:

- **B. Eng** (Aero/Av) (Hons) (1998)
- **Ph.D.** (2004)

RELEVANT EXPERTISE:

- Computer Vision, Machine Learning, Pattern Recognition, Image Processing.
- Biometrics, Intelligent Surveillance, Person Tracking, Super-Resolution, Camera Management, Face Recognition, Human Activity Recognition, Gait Recognition.
- Image Registration, Stereo Vision, Medical Imaging, Audio-Visual Processing, Visual Attention.

KEY RELEVANT PUBLICATIONS

- **C. Fookes**, G. Mamic, C. McCool and S. Sridharan, "Normalisation and Recognition of 3D Face Data using Robust Hausdorff metrics", *International Biometrics Summer School* (Forthcoming June 2008).
- F. Lin, **C. Fookes**, V. Chandran and S. Sridharan, "Super-Resolved Faces for Improved Face Recognition from Surveillance Video", Proceedings of the Second International Conference on Biometrics, Seoul, 2007.
- G. Mamic, **C. Fookes**, S. Sridharan, "What is the Average Human Face?" *Lecture Notes in Computer Science*, Vol. 4319, Springer, 2006.
- S. Denman, **C. Fookes**, J. Cook, C. Davoren, A. Mamic, G. Farquharson, D. Chen, B. Chen, and S. Sridharan, "Multi-view Intelligent Vehicle Surveillance System", *Proceedings of the IEEE International Conference on Video and Signal Based Surveillance*, Sydney, Nov. 2006.
- G. Mamic, **C. Fookes**, S. Sridharan, "Human Face Reconstruction using Bayesian Deformable Models", *Proceedings of the IEEE International Conference on Video and Signal Based Surveillance*, Sydney, pp.59-64, Nov. 2006.
- A. Maeder, **C. Fookes** and S. Sridharan, "Gaze-Based User Authentication for Personal Computer Applications", *International Symposium on Intelligent Multimedia, Video and Speech Processing*, Hong Kong, Oct 20-22, 2004.
- **C. Fookes**, A. Maeder, S. Sridharan and J. Cook, "Multi-spectral Stereo Image Matching using Mutual Information", *2nd International Symposium on 3D Data Processing, Visualization, and Transmission*, Thessaloniki, Greece, Sept 8-10, 2004.

RELEVANT EXPERIENCE:

- Senior Research Fellow with the Speech, Audio, Image and Video Technologies group within the Faculty of Built Environment and Engineering and the Information Security Institute at QUT. He has, to date, published over 39 internationally refereed conference and journal publications, and has attracted over $865K of cash funding from competitive granting bodies and industry sources. He has collaborated with over 20 industry partners during the last 3 years and has engaged in a number of research projects funded by commonwealth defence related organisations (such as DSTO), international defence organisations (including the Office of Naval Research in the area of face recognition), participated in several Australian Research Council grants. The applicant was successful in 2006 as a co-investigator for a research project funded by the National Security Science and Technology (NSST) Unit of the Department of Prime Minister and Cabinet for performing counter-terrorism research in the CCTV and intelligent surveillance area ($360K). Recently, Dr Fookes has developed a keen interest in the application of computer vision research to the area of airport security and has engaged in a number of airport funded projects including human surveillance, vehicle monitoring, biometrics, and multi-spectral sensing. He is also the bid manager and technical director for a large multi-disciplinary collaborative research project addressing aviation security and passenger facilitation and regularly engages with a large international consortium of aviation industry stakeholders involving airports, airlines, commonwealth agencies, and service providers.

7. Respondents' Short Curriculum Vitae

Adjunct Professor David A Hood

Business Telephone: 07 3878 2114
E-Mail: davidahood@mac.com
Postal Address: Faculty of Built Environment and Engineering QUT, Brisbane Q 4001

CV Summary

POSITIONS HELD:

- **Managing Director (owner)** David A Hood & Associates Pty Ltd, consulting engineers.
- **Adjunct Professor**, Faculty of Built Environment and Engineering, QUT
- **Chairman**, Australian College of Environmental Engineers
- **Chairman**, Australian Green Infrastructure Council
- **Deputy President**, Australian Sustainable Built Environment Council
- **Member**, Lord Mayor's CitySmart Advisory Board (Chair Infrastructure and Transport Sub-committee)
- **Accredited Presenter**, Al Gore's Climate Project

QUALIFICATIONS:

- **BE** (Civil) University of Queensland

RELEVANT EXPERTISE:

David graduated in civil engineering from the University of Queensland in 1969, and spent ten years in the Royal Australian Air Force as a Commissioned Officer involved with the planning, development, and construction of RAAF bases throughout Australia. After a further seven years as an airport planner, and Project Director with the Federal Department of Aviation, David was appointed Senior Property Executive with the Parliament of Australia where he was responsible for the take-over and commissioning of Australia's then New Parliament House in Canberra. Following the successful start-up of Parliament House, David moved back to the aviation sector where he managed a number of technology IP commercialisation projects, including the establishment of joint venture companies to develop and market air traffic control related software and other products around the world.

- He has worked as National Manager Aviation and Defence with Maunsell Pty Ltd, before being appointed National Director Engineering Practice with the Institution of Engineers, Australia where he was responsible for technical standards, registration, and the delivery of the Institution's continuing professional development and education programs.
- He was a Founding Director of the Australian Construction Industry Forum (ACIF), and of the Australian Council of Building Design Professions (BDP), and was for six years a Councillor, and for three a Director of Standards Australia International and is currently Chairman of his own consulting engineering practice specialising in the areas of sustainability in the built environment, "green projects", energy efficiency policy, engineering education and global engineering infrastructure. David has also directed a number of government and industry funded programs throughout S E Asia and Africa assisting the engineering profession in evolving economies with the development of competency standards and assessment processes, practice registration and education upgrading and accreditation systems.
- As an investor, Chairman, and Board member David has led the successful turnaround of CBD Energy Limited, a small public company involved in energy saving technology and solutions for the property industry.
- David is actively involved with industry and professional associations promoting the improved energy performance of buildings. David sits on a number of industry, community and university advisory boards where his extensive engineering background and considerable involvement at a senior level in the built environment sector is influencing change in the "energy culture" of Australia.

Dr Robyn Keast

Business Telephone: + 61 313381010
E-Mail: rl.keast@qut.edu.a
Postal Address: School of Management, Faculty of Business, QUT, Brisbane Q 4001

CV Summary

POSITIONS HELD:

- **Senior Lecturer**, School of Management, Faculty of Business
- **Research Director**, Airport Metropolis Project, Faculty of Built Environment and Engineering

QUALIFICATIONS:

- **PhD** (Public Management) QUT
- **MA** (Sociology and Psychology) James Cook University of North Queensland
- **BA** (Social Sciences) Curtin University
- **Diploma** in Community Work, James Cook University, North Queensland

RELEVANT EXPERTISE:

- Networks, collaborations and inter-organisational relations
- Network Analysis; stakeholder analysis
- Public management and policy development

CRITICAL INCIDENT INVESTIGATION AND REVIEW:

- Governance models – requisite governance arrangements
- Community engagement
- Government/community relations
- Integrated policy and service delivery

KEY RELEVANT PUBLICATIONS:

- **Keast, R.** and Hampson. , K. Building and Managing Innovation Networks in the Construction Industry, *Journal of Construction, Engineering and Management*
- **Keast, R**, Brown, K. and Mandell, M.P. (2007). Getting the Right Mix: Unpacking Integration Meanings and Strategies, *International Public Management Journal 6* (3): 363-371
- Mandell, M.P. and **Keast, R.** (2006). Evaluating Network Arrangements: Toward Revised Performance Measures, *Journal of Performance Management and Review*
- **Keast, R**, Brown, K. and Mandell, M.P. (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
- **Keast, R.** and Brown, K. (2006). Adjusting to New Ways of Working: Experiments with Service Delivery in the Public Sector, *Australian Journal of Public Administration*
- **Keast, R.** and Waterhouse, J. (2006). Participatory Evaluation: The Missing Component in the Social Change Equation? *Strategic Change* 15: 23-35.
- **Keast, R.**, Mandell, M., Brown, K. and Woolcock, G. (2004) Network Structures: Working Differently and Changing Expectations *Public Administration Review 64* (3): 363-372
- Brown, K. and **Keast, R.** (2003). Citizen-Government Engagement: Community Connection Through Networked Arrangements Asian Journal of *Public Administration 25* (1): 107- 132.
- **Keast, R.** and Brown, K. (2002). The Government Service Delivery Project: A Case Study of the Push and Pull of Central Government Coordination, *Public Management Review 2* (3): 1-17.
- **Keast, R**, Baker, D. and K. Brown,(forthcoming). Balancing Infrastructure for the Airport Metropolis. International Conference on Infrastructure Systems, November 2008 TU Delft Netherland

RELEVANT EXPERIENCE:

- Extensive experience in public sector, practitioner, policy and senior management
- Community development and social infrastructure development – practice and research
- Current consultancy/research: government/community relations, social and economic development, partnerships, networks and governance evaluation and performance measures and social/ physical infrastructure compatibility.

7. Respondents' Short Curriculum Vitae

Professor Ashantha Goonetilleke

Business Telephone: 07 3138 1539
E-Mail: a.goonetilleke@qut.edu.au
Postal Address: School of Urban Development, QUT, GPO 2434 Brisbane 4001

CV Summary

POSITIONS HELD:

- **Professor** in Airport Innovation
- **Leader**, Infrastructure Research Theme, Faculty of Built Environment and Engineering, QUT

QUALIFICATIONS:

- **BSc** (Civil Engineering), University of Sri Lanka
- **MSc** (Environmental Management), Griffith University
- **PhD** (Environmental Hydrology), Queensland University of Technology
- Chartered Professional Engineer, Institution of Engineers Australia
- National Professional Engineering Register (Civil and Environmental), Institution of Engineers Australia

RELEVANT EXPERTISE:

- A proven track record of technology transfer from research into practice with research outcomes acting as a catalyst for changing industry practices.
- Pioneered the use of multivariate analytical techniques for resources management and risk analysis from an engineering perspective.
- Development of environmental best practice for sustainable resource management.

KEY RELEVANT PUBLICATIONS

- Bailey, D., **Goonetilleke, A.** and Campbell, D., 2003, 'A new fuzzy multi-criteria evaluation method for group site selection in GIS', *Journal of Multi-Criteria Decision Analysis*, Vol. 12, Issue 6, pp. 1-11.
- Carroll, S., **Goonetilleke, A.**, Thomas, E., Hargreaves, M., Frost, R. and Dawes, L., 2006 'Integrated risk framework for onsite wastewater treatment systems', *Environmental Management*, Vol. 38(2), pp. 286-303.
- Khalil, W., **Goonetilleke, A.**, Kokot, S. and Carroll, S., 2004, 'Use of chemometrics methods and multicriteria decision-making for site selection for sustainable on-site sewage effluent disposal', *Analytica Chimica Acta*, Vol. 506, pp. 41-56.

RELEVANT EXPERIENCE:

- Pioneering research undertaken for Brisbane Airport Corporation under an Australian Research Council (ARC) funded grant for the creation of a decision support system incorporating multi-criteria evaluation and approximate reasoning for airport infrastructure development.
- A Chief Investigator for the $1.5M ARC funded project developing unified solutions to airport regions in relation to economic efficiency, environment, community, security and resilience for coordinating airport-driven development and urban expansion and to reduce conflict at the interfaces.
- Responsible for managing the research partnership with Brisbane Airport Corporation. Duties entail:
  - providing independent technical advice on sustainability initiatives;
  - assisting in the development of policies and procedures; and
  - contributing to staff development activities.

Professor Arun Kumar

Business Telephone: 07 3138 2731
E-Mail: arun.kumar@qut.edu.au
Postal Address: School of Urban Development,
QUT, Brisbane Q 4001

CV Summary

POSITIONS HELD:

- Jan 06 – present **Professor of Infrastructure Management**, QUT
- 1995 – present **Professor of Civil**, Re-titled in 2000 to Professor of Infrastructure Management; 2006: Professor Emeritus RMIT University
- Sept 04 – Dec 05 **Dean** (Research & Innovation), Business Portfolio, RMIT
- July 2000 – Dec 02 **Associate Dean** (Research & Development), Faculty of Engineering, RMIT University, Melbourne, Australia
- 1993 – 1995 **Associate Professor of Civil Engineering**, RMIT University
- 1992 – June 2000 **Head**, Department of Civil & Geological Engineering (including environmental engineering), RMIT University

INTERNATIONAL POSITIONS

- 2002 – present **Advisor and Consultant**; The World Bank, Washington D.C.
- 2004 – present **Vice President**, Australia and NZ: International Society for Maintenance & Rehabilitation of Transport infrastructures, University of Mississippi, USA

QUALIFICATIONS:

- 1987 **Post Graduate Diploma** in Management, RMIT University, Australia
- 1976 **Ph D** in Civil Engineering, Purdue University, Lafayette, Indiana, USA
- 1973 **Masters** in Civil Engineering, Purdue University, Lafayette, Indiana, USA
- 1968 **BE** Civil Engineering, Indian Institute of Technology, New Delhi, India

RELEVANT EXPERTISE:

- Infrastructure (Asset) Management, Project Management, Institutional strengthening, Road and Construction Materials, Pavement and Maintenance Management Systems

KEY RELEVANT PUBLICATIONS:

- N. Piyatrapoom, **Kumar A**, Robertson N, Justin. Weligamage J, (2006) "Framework for Probabilistic Method for Road Network Asset Management" *29th Australasian Transport Research Forum* 2006 (ATRF 2006) Surfers Paradise, September 2006
- Piyatrapoomi, N., **Kumar, A.**, Robertson, N., Weligamage, J. (2006) *"Framework for risk-based analysis for large road networks maintenance and rehabilitation investment"* International Conference on Computing and Decision Making in Civil and Building Engineering, 14-16 June 2006, Montreal, Canada.
- Venkatesan. S., **Kumar, A.**, & Setunge. S, (2006) "Assessment and integration of Residual Service Life models", *International conference on Recent Advances in Engineering Mechanics* (RAEM) California State University, Fullerton, USA, January 12 - 14, 2006
- Piyatrapoomi, A., **Kumar, A.**, "Framework for Investment Decision-Making Under Risk and Uncertainty for Infrastructure Asset Management" *Economic Impacts of ITS: Innovations and Case Studies: Series: Research in Transportation Economics* Elsevier, New York 2003

RELEVANT EXPERIENCE:

Professor Kumar has over 35 years experience in pavement construction maintenance, rehabilitation and asset management. He has received over $1.5M in grants over the last six years related to asset management research. Under his leadership the team was awarded: Institution of Engineers, Engineering Excellence Award 2005: High Commendation Award for "Road Asset Management Investment": "The judges were impressed that industry leadership by Queensland Government in a national research team led by RMIT had produced a system applicable to road infrastructure cost savings throughout Australia and the world."; RMIT University 2005 Innovation Team Award: "Investment Decision Framework for Infrastructure Asset Management"; and 2004/05 Divisional Excellence Award by the Queensland Government for Innovative Research into Applications of Stochastic Properties of Asset Data. He has written over 160 papers in journals and conferences; has been an invited speaker in several countries; has been on the international committees and has chaired at the international conferences. His international experience includes the countries of: Australia, USA, Japan, China, India, Malaysia, Singapore, Vietnam, Lao PDR, Cambodia and Indonesia.

7. Respondents' Short Curriculum Vitae

Mr Nicholas Stevens

Business Telephone: (07) 3138 1594
E-Mail: n.stevens@qut.edu.au
Postal Address: Airport Metropolis Project, Faculty of Built Environment and Engineering, QUT, Brisbane Q 4001

CV Summary

POSITIONS HELD:

- September 2007 – Current: **APAI PhD Candidate**, Airport Metropolis Research Project, QUT
- June 2006 – September 2007: **Senior Research Associate**, School of Urban Development, QUT
- September 2005 – June 2006: **Research Assistant**, School of Urban Development, QUT

QUALIFICATIONS:

- **BBE** (Landscape Architecture),
- **Master of Urban and Regional Planning** (MURP)

RELEVANT EXPERTISE:

- Remote Sensing, ARC GIS, **Workshop Leader and Facilitation**, Master Planning and Regional Policy Development.

KEY RELEVANT PUBLICATIONS:

- **Stevens, N.** (2006). *City Airports to Airport Cities.* Queensland Planner 46 (1) p37.
- 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* submitted & accepted for publication, X'ian.
- **Stevens, N.**, Baker, D. & Freestone, R. (2007) Understanding the Australian Airport Metropolis. *State of Australian Cities* 2007. Adelaide.
- **Stevens, N.**, Baker, D. & Freestone, R. (2008) Understanding the New Australian Airport Metropolis. *Journal of Transport Geography. (forthcoming)*
- A. Walker, **N. Stevens**, D. Baker. (2007). Preconference Workshop: Understanding the Airport Metropolis", presented at Airport Cities Conference, Singapore, September.

RELEVANT EXPERIENCE:

Nicholas Stevens is a Landscape Architect and Urban Planner with a background in regional planning and urban design. He has previously been involved in the Airport Metropolis research project as a Senior Research Associate evaluating the coordination and integration of airport master planning and regional planning within the context of cooperative airport development. Nicholas' PhD research will evaluate the development, interaction and management of airport and regional land use.

Prof Sridha Sridharan

Business Telephone: (07) 3138 2113
E-Mail: s.sridharan@qut.edu.au
Postal Address: SAIVT, School of Engineering Systems, QUT, Brisbane QLD 4001

CV Summary

POSITIONS HELD:

- 2000 – Current: **Professor**, School of Engineering Systems; Deputy Director, Information Security Institute; Program leader, Speech, Audio, Image and Video Technologies, QUT
- 1997 – 2000: **Associate Professor**, School of Electrical and Electronic Systems Engineering, QUT
- 1986 – 1996: **Senior Lecturer**, School of Electrical and Electronic Systems Engineering, QUT

QUALIFICATIONS:

- **BSc, MSc** (Manchester), **PhD** (University of New South Wales).

RELEVANT EXPERTISE:

- Speech Recognition, Speaker Recognition, Audio-Visual Processing.
- Intelligent Surveillance, Image Processing, Computer Vision, Person Tracking, Super-Resolution, 2D and 3D Face Modeling and Recognition, and Camera Calibration.

KEY RELEVANT PUBLICATIONS :

- J. Cook, V. Chandran and **S. Sridharan**, "Multiscale Representation for 3D Face Recognition," *IEEE Trans. on Information, Forensics and Security*, vol. 2, no. 3, part 2, pp. 529-536, Sept. 2007.
- S. Denman, V. Chandran, and **S. Sridharan**, "An Adaptive Optical Flow Technique for Person Tracking Systems," *Pattern Recognition Letters*, vol. 28, pp. 1232-1239, 15 July 2007.
- G. Mamic, C. Fookes and **S. Sridharan**, "What is the Average Human Face?" *Lecture Notes in Computer Science*, Vol. 4319, pp.692-701, Springer, 2006.
- K.Thambiratnam and **S. Sridharan**, "Rapid Yet Accurate Speech Indexing Using Dynamic Match Lattice Spotting", *IEEE Trans. on Audio, Speech and Language Processing*, pp. 346-357, Jan 2006.
- A. Busch, W. Boles and **S. Sridharan**, "Texture for Script identification" *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Vol. 27, No.11, pp. 1720 -1732, Nov. 2005.
- S. Denman, V. Chandran, and **S. Sridharan**, "Robust Multi-Layer Foreground Segmentation for Surveillance Applications," *Proc. IAPR Con. on Machine Vision Applications*, Japan, 2007, pp. 496-499.
- S. Lucey, **S. Sridharan** and V. Chandran, "Improved facial-feature detection for AVSP via unsupervised clustering and discriminant analysis," *EURASIP Journal on Applied Signal Processing*, Volume 2003, Number 3, pp.264-275, March 2003.
- J. Baker, V. Chandran, **S. Sridharan**, "Techniques for Improving Stereo Depth Maps of Faces," *IEEE International Conference on Image Processing (ICIP-2004)*, Singapore, pp.3279-3282, 24-27 October, 2004.
- R. Vogt and **S.Sridharan**, "Explict modelling of session variability modelling for speaker verification", *Computer Speech & Language*, Volume 22, Issue 1, pp. 17-38, January 2008.

RELEVANT EXPERIENCE:

Prof Sridha Sridharan is the Research Director of the Speech, Audio, Image and Video Technologies group within the Faculty of Built Environment and Engineering and the Information Security Institute at QUT. During the last 15 years the CI has been successful in attracting over 100 research grants from external and internal funding bodies in the areas of Image and Speech Technology totalling to over 5 million dollars. In 2003 the CI was awarded a commercial research contract of $300,000 to develop face and speaker recognition technologies for person authentication for the US Navy through the Office of Navel Research (ONR). In 2006 the CI was awarded a major contract ($360,000) by the National Security Science and Technology Unit (NSST) - Research Support for Counter-Terrorism to conduct research in the area of Video Surveillance. In 2007 the CI has been awarded $220,000 by NSST to work on Speech Detection. The CI received funding from Australian Customs to evaluate face recognition technologies for border control. He has also received funding from the Queensland Police Service to develop an image compression scheme for fingerprint compression. He has received a major research contract of $400,000 in cash from the Brisbane Airport Corporation to conduct research in the areas of human surveillance, perimeter protection, vehicle monitoring, biometrics, and multi-spectral sensing.

7. Respondents' Short Curriculum Vitae

Dr Arron Walker

Business Telephone: 07 3138 2597
E-Mail: ar.walker@qut.edu.au
Postal Address: School of Urban Development,
QUT, Brisbane Q 4001

CV Summary

POSITIONS HELD:

- Jan 2007 to Present, **Research Fellow**, Airport Metropolis Project, School of Urban Development, QUT
- May 2003 to Present, **Army Reserve Officer, Troop Commander 1 Topographical Survey Squadron**, Australian Army, Brisbane, QLD
- Jul 2005 to Dec 2006, **Research Fellow**, Synthetic Environment Laboratory, QUT
- Feb 2002 to Feb 2007, **PhD student**, QUT, Brisbane, QLD
- Jan 2003 and Jan 2004, **IT Programmer**, QUT
- 2nd Semester for 1999 to 2002, **Part-time Lecturer**, QUT
- Jan 1997 to Feb 2002, Senior Engineer, Global Connect, Telstra, Brisbane, QLD -
- Jan 1995 to Dec 1996 – **CD&C, Acting Senior Engineer**, Telstra, Brisbane, QLD

QUALIFICATIONS:

- **Doctor of Philosophy** (Spatial Information Retrieval) , QUT 2007
- **Bachelor of Engineering** (Electronics) / Bachelor of Information Technology double degree, QUT, 1995

RELEVANT EXPERTISE:

- During the last 17 months, Arron has been working closely with Professor Warren Walker (TUDelft) on developing a policy analysis framework for Airport planning. In addition, Arron completed his PhD in Spatial Information Retrieval in 2007. This research developed intelligent spatial data retrieval methodologies for Geographic Information Systems (GIS). In particular he constructed a Bayesian framework that learns causal relationships between spatial datasets from historical expert knowledge. Finally, while working for the Synthetic Environment Laboratory at QUT, Arron gained expertise in complex system modeling and virtual reality environments.

KEY RELEVANT PUBLICATIONS:

- A. Walker, D. Baker, "Meeting the challenges of increased passenger movement for Airports in Australia", to be presented at Queensland Spatial Conference 2008, Gold Coast, Australia
- A. Rowlings, A. Walker, "Sustainable Energy Options for the Future Airport Metropolis", presented at Energy, Environment, Ecosystems and Sustainable Development Conference 2008, Portugal
- A. Walker, N. Stevens, D. Baker, "Preconference Workshop: Understanding the Airport Metropolis", presented at Airport Cities Conference 2007, Singapore
- A. Walker, M. Moody, and B. Pham, "A spatial similarity ranking framework for spatial metadata retrieval", presented at Combined 5th Trans Tasman Survey Conference & 2nd Queensland Spatial Industry Conference 2006, Cairns, Australia, 2006
- A. Walker, S. Gard, B.J. Williamson and J.M. Bell, "A Virtual Reality Bushfire Mitigation Tool for Community Consultation", presented at Australasian Bushfire Conference 2006, Brisbane, Australia, 2006
- A. Walker, B. Pham, and M. Moody, "Spatial Bayesian learning algorithms for geographic information retrieval", presented at ACM GIS 2005, Bremen, Germany, 2005
- A. Walker, B. Pham, S. Bucolo and M. Moody, "Spatial Bayesian learning for dataset retrieval in geographic information systems", presented at GISRUK 2005, Glasgow, Scotland, 2005
- J. A. Summerville, L. Buys, S. Ginn, S. Bucolo, A. Walker, S. Gard, and L. Bell, "Engaging people in environmentally sustainable behaviours using interactive Virtual Reality: a conceptual framework", presented at Social Change in the 21st Century 2005 Conference, Brisbane, Australia, 2005
- A. Walker and A. Maeder, "Automated dataset retrieval geographic information systems", presented at the Inaugural Queensland Spatial Industry Conference, Brisbane, Australia, 2004
- A. Walker, B. Pham, and A. Maeder, "A Bayesian framework for automated dataset retrieval geographic information systems", presented at the 10th international Conference on Multi-Media Modelling, Brisbane, Australia, 2004
- A. Walker, B. Pham, and A. Maeder, "A framework for a dynamic interactive 3D GIS for non-expert users", presented at Graphite 2003, International Conference on Computer Graphics and Interactive Techniques in Australasia and South East Asia, Melbourne, Australia, 2003

RELEVANT EXPERIENCE:

Extensive industrial and academic experience in Virtual Reality, Decision Support Systems and GIS. As part of the Airport Metropolis project, he is developing a Decision Support System (DSS). The DSS will integrate regional decision-making with airport management and operations (both airside and landside) and will inform all stakeholders of the impacts and consequences of those processes. The DSS will produce information relating to transport systems and their impacts on land use decisions and will be used to estimate the impacts of policy options in the substantive interface areas. As airport-regional interactions become more complex, a broader understanding of trends, problems, challenges and sustainable policy solutions becomes increasingly important for public and industry policy-makers. The DSS can be used by decision-makers in industry and government to assess alternative policy options and policy recommendations.

Professor Rod Walker

Business Telephone: 0417 791 311
E-Mail: ra.walker@qut.edu.au
Postal Address: ARCAA, School of Engineering Systems, QUT, Brisbane QLD 4001

CV Summary

POSITIONS HELD:

- **Visiting Researcher**, Rutherford Appleton Laboratory, Oxford, UK 1996-1997
- **GPS Program Manager**, Cooperative Research Centre for Satellite Systems (1997-2005)
- **QUT Academic** 1999 to current. Current position Professor of Aerospace Avionics.

QUALIFICATIONS:

- **B.Eng** (electronics),
- **B.App.Sci** (Computing), PhD(Satellite Navigation),
- **Private Pilot** with Night VFR and Aerobatics endorsements.

RELEVANT EXPERTISE:

- GNSS, Aviation Avionics Systems, Trends in UAVs operations and research, ADS-B, ATM procedures (from pilots perspective).

KEY RELEVANT PUBLICATIONS
(A SELECTION FROM THE LAST TWO YEARS.)

Greer, Duncan G. and Bruggemann, Troy S. and Walker, Rodney A. (2007) Sigma Point Kalman Filters for GPS Navigation with Integrity in Aviation. In Dempster, Andrew, Eds. Proceedings IGNSS 2007, Sydney, Australia.

Bruggemann, Troy S. and Greer, Duncan G. and Walker, Rodney A. (2007) GPS Integrity Monitoring with an Aerodynamic Model and Low Quality INS. In Proceedings International Global Navigation Satellite Systems Society IGNSS Symposium 2007, Sydney, Australia.

Eng, Pillar C. S. and Mejias, Luis and Walker, Rodney A. and Fitzgerald, Daniel L. (2007) Simulation of a Fixed-wing UAV Forced Landing with Dynamic Path Planning. In Proceedings Australasian Conference on Robotics and Automation, Brisbane, Australia.

Westall, Paul and Carnie, Ryan J. and O'Shea, Peter J. and Hrabar, Stefan and Walker, Rodney A. (2007) Vision-Based UAV Maritime Search and Rescue Using Point Target Detection. In Proceedings AIAC12 - Twelfth Australian International Aerospace Congress, Twelfth Australian Aeronautical Conference, Melbourne, Australia.

Dusha, Damien and Boles, Wageeh W. and Walker, Rodney A. (2007) Attitude Estimation for a Fixed-Wing Aircraft Using Horizon Detection and Optical Flow. In Proceedings 9th Biennial Conference of the Australian Pattern Recognition Society on Digital Image Computing Techniques and Applications, pages pp. 485-492, Adelaide, Australia.

Cork, Lennon R. and Clothier, Reece A. and Gonzalez, Luis F. and Walker, Rodney A. (2007) The Future of UAS: Standards, Regulations, and Operational Experiences. IEEE Aerospace and Electronic Systems Magazine 22(11):pp. 29-44.

Clothier, Reece A. and Walker, Rodney A. and Fulton, Neale and Campbell, Duncan A. (2007) A Casualty Risk Analysis For Unmanned Aerial System (UAS) Operations Over Inhabited Areas. In Proceedings AIAC12 – Twelfth Australian International Aerospace Congress, 2nd Australasian Unmanned Air Vehicles Conference, Melbourne.

Wu, Paul P. and Clothier, Reece A. and Campbell, Duncan A. and Walker, Rodney A. (2007) Fuzzy Multi-objective Mission Flight Planning in Unmanned Aerial Systems. In Proceedings IEEE Symposium on Computational Intelligence in Multi-Criteria Decision Making, pages pp. 2-9, Honolulu, Hawaii.

Carnie, Ryan J. and Walker, Rodney A. and Corke, Peter I. (2006) Image Processing Algorithms for UAV "Sense and Avoid" . In Proceedings 2006 IEEE Conference on Robotics and Automation, pages pp. 2848-2853, Orlando, Florida.

RELEVANT EXPERIENCE:

Detailed knowledge of the limitations of GNSS having conducted a PhD on GNSS multipath (one of the error sources). Have built several UAV systems, applied for the relevant approvals and operated these in and around the Brisbane area. 200+ hour private pilot with a significant amount of this flying having been performed to collect experiment data for our research programs. Regularly consult to DSTO, Boeing, Airservices Australia and SMEs on aviation issues.

7. Respondents' Short Curriculum Vitae

Professor Prasad KDV Yarlagadda

Business Telephone: 07 38185167
E-Mail: y.prasad@qut.edu.au
Postal Address: School of Engineering Systems, QUT, Brisbane Q 4001

CV Summary

POSITIONS HELD:

- Aug 2005 – present **Director** Smart Systems Research and Professor, School of Engineering Systems, Queensland University of Technology, QUT
- July 2004 – Dec 2004 **Associate Director**, (Centre for Built Environ & Engg Research) and Asst. Dean (Research), Faculty of Built Environment and Engineering, QUT
- Aug 2003 – July 2005 **Associate Professor**, School of Mechanical, Manufacturing and Medical Engineering (MMME) and Program Leader: Product Design & Manufacturing
- Aug 1998 – July 2003 **Director**, Manufacturing Systems Engineering Research Concentration Senior Lecturer, School of MMME, QUT
- Jan 1996 – July 1998 **Lecturer**, School of MMME, QUT

QUALIFICATIONS:

- **B.Tech.** (Mechanical), M.E. (Production Engineering), PhD (Production), CPEng.
- Fellow of Institution of Engineers, Australia (FIEAust.)
- Fellow, World Academy of Manufacturing and Materials Engineering, Poland
- Fellow of Institution of Engineers, India (FIE).
- Senior Member of Society of Manufacturing Engineers, USA (Sr. Mem SME)
- Member, American Society of Mechanical Engineers, U.S.A.(Mem. ASME)
- Member of Institution of Mechanical Engineers, U.K. (M.I.MechE)

RELEVANT EXPERTISE:

- CAD/CAM Applications in Manufacturing and Aerospace Industry
- Artificial Intelligence. and Neural Network Applications in Manufacturing
- Process Control, Control Systems for Weld Process Automation
- Product Data Modelling and Engineering Knowledge Management
- Image Processing and Surveillance Applications to Aviation Security

KEY RELEVANT PUBLICATIONS:

Prof. Yarlagadda has published more than 200 publications in various international journals and conference proceedings. Some of relevant publications as follows:

- A. Wiliem, V.K. Madasu, W. Boles and **P.K.D.V. Yarlagadda**, "A feature based face recognition technique using Zernike moments", in *Proceedings of the 2007 RNSA Security Technology Conference*, 2007, pp. 341-355.
- M. Hanmandlu, A. Kumar, V.K. Madasu and **P. Yarlagadda**, "Fusion of hand based biometrics using particle swarm optimization", *Proceedings of the IEEE Fifth International Conference on Information Tech.: New Generations*, 2008, pp. 783-788.
- V.K. Madasu and Prasad KDV Yarlagadda, "An in-depth comparison of four texture segmentation methods", *Proceedings of the DICTA Conference 2007*, pp. 366-372.
- Q. Ni, Prasad KDV Yarlagadda and W.F. Lu, "A flexible reporting method for enterprise information system", Int. Journal of Computers in Industry, 58, 2007, pp.416-427.
- Qianfu Ni, Prasad KDV Yarlagadda and Wen Fenu Lu, "A Collaborative Engine for Enterprise Application Integration", Int. Journal of Computers in Industry, 57 (7), 2006, pp.640-652.
- A. Wiliem, V.K. Madasu, W. Boles and P.K.D.V. Yarlagadda, "Detection of commonly occupied regions in video sequences", Proc. of IEEE TENCON, India 2008.

RELEVANT EXPERIENCE:

- Professor Prasad Yarlagadda has made significant contributions to several areas of smart manufacturing for automotive and aerospace applications, image processing and computer vision for various engineering applications. Over the past 3 years Yarlagadda has been very active in the area of Intelligent airports and aviation security and has made, together with his PhD students, several novel contributions to these areas.

Queensland University of Technology
Brisbane Australia

Phone: 07 3138 2416
Fax: 07 3138 1529
Email: bee.enquiries@qut.edu.au

FACULTY OF BUILT ENVIRONMENT AND ENGINEERING
FACULTY OF BUSINESS