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A proactive approach to transport needs a large organisation

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Abstract:

The aim of this paper is to provide a case study of the efforts of the University of New South Wales (UNSW), as a large organisation and a major trip generator, to adopt a proactive and strategic approach to transport planning and services.

The paper describes the activities that have been undertaken by UNSW in the last 2.5 years since committing to an Environment Policy. These activities include:

- the development of a transport information system consisting of substantial transport data base about travel characteristics of UNSW staff and students and a geographical information system (GIS) to map these travel characteristics
- the establishment of inhouse management commitment to support a proactive approach to secure better transport outcomes for UNSW and for environment protection
- liaison with transport providers to address transport problems
- the development of the UNSW Integrated Transport Strategy to implement the information systems, administrative framework and cooperative partnerships with transport providers to allow for continuous improvement in transport access and continuous reduction in transport-related pollution, considering all modes to and from UNSW.

This paper will provide useful information to guide and encourage other large organisations and transport providers to meet the users' needs by capturing the benefits of working together to ensure efficient, effective and environmentally preferred transport services

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Introduction

The University of New South Wales' (UNSW) Kensington campus is located approximately 10 km south of the City of Sydney, in a densely populated suburb. It has a population of 31686, of which 26894 are students and 4792 are staff members. UNSW is a significant trip generator. The travel mode choices made by this population have been largely determined by a number of transport access problems, missed opportunities and costing structures favouring car use. Unpleasant overcrowding at main bus stops, dangerous conditions for cyclists wishing to ride to UNSW, increasing parking restrictions in streets surrounding the University and a campus parking cost structure that provides an economic advantage for single occupant vehicles over public transport users have all served to define UNSW's current transport profile.

This situation had arisen due to the nature of the relationship which existed between UNSW and transport providers. UNSW had remained fairly passive in the process of securing transport access to its core centre of operation, failing to secure the necessary involvement of transport providers and finding that its general requests were consistently ignored, forgotten or given the lowest priority by relevant transport planning bodies. UNSW's passive approach to managing transport is typical to large organisations.

A new approach to old problems began in 1995 when UNSW adopted the UNSW Environment Policy, committing to the implementation of environmental best practice in all areas of its operations. To achieve this end the UNSW Environment Management Program (EMP) was established. Through the EMP, a transport information system was developed to allow for the clear identification and articulation of UNSW's transport needs and opportunities for improvement. The transport information was used to generate support for a proactive transport approach for UNSW. The transport information was also utilised to identify the core barriers to UNSW securing optimum transport access for all modes other than single occupant vehicles. The result of this work was the development of the UNSW Integrated Transport Strategy which is now being implemented. This paper will discuss the work undertaken to establish a proactive and strategic transport approach for UNSW.

Establishing the UNSW transport information system

Effective transport planning and management often begins with the establishment of a reliable and detailed source of transport information on which decisions can be made. Standard transport information (such as street layouts, traffic volumes and emissions rating) is usually available from the relevant authorities, such as state transit authorities, motorist associations, the state environmental protection authorities and national statistics bureaus (such as the Australian Bureau of Statistics). However, access to this information rarely provides more than a superficial overview of the transport profile of a single organisation. To gain a useful insight into an organisation's unique needs and situation, this information can be combined with data specific to the organisation itself and can provide a useful context. Information specific to the organisation can include modal splits, journey times, attitudes of the people travelling to the organisation as well as other target parameters. What follows is a discussion of UNSW's efforts to establish a transport information system to collect, format and analyse transport information relating to UNSW staff and students transport characteristics. The essence of this information system is the transport survey and the geographical information system.

Recognising a need for organisation-specific data, a transport survey was designed in early 1996 to capture enough information to allow for the clear identification of both UNSW's current transport problems and its future transport opportunities. The entire survey process, including the design process, printing, distribution, sorting, coding, and data entry was organised by the UNSW Environmental Project Manager and two honours students conducting this work as their theses. Funding to the amount of $18,000 was successfully sought from the Roads and Traffic Authority to cover printing and data entry costs. The survey was piloted four times, to ensure the best possible design before being distributed and completed by 1084 (20%) staff and 2538 (10%) students in mid 1996.

The survey was conducted in two parts, one for the staff and another for the students since the activity patterns of staff and students provided distinctly different opportunities for surveying. Staff members could be reached via the internal mailing system. This was the preferred survey channel because it was the most direct and resource efficient means of contacting staff. Other methods such as direct interviewing, point of entry interviewing and surveying via e-mail were considered but these methods tended to increase resources (in terms of labour, time and equipment) and reduce the quantity and quality of data collected. Students however, did not belong to this internal mailing system, and had to be contacted by

other means. Options included surveying at points of entry, external mail outs, direct interviewing at food outlets, phone surveys, mail back surveys distributed via university papers and in-lecture surveys. In-lecture distribution and collection of surveys were chosen, because it was the least resource intensive option and because the necessary management approvals were successfully obtained (under the banner of being an important environmental initiative in line with the UNSW Environment Policy).

The in-lecture surveys required careful planning beforehand, including the choice of target lecture groups and prior approvals from all lecturers involved. For the purposes of this survey, lecturers were asked to donate 15-20 minutes of their lecture time. The UNSW transport survey necessarily involved intrusive means of collecting data (especially from the student population), primarily because transport data collection mechanisms were not built into the university's internal data collection system. Work is currently underway to include strategic transport questions in the student enrolment process.

Both staff and students were given the same survey with minor adjustments to the questions to make them more relevant to the target group - for example, asking staff about staff car pooling schemes and asking students about student car pooling schemes The response rates were almost 95% from the students (who were required to fill in the survey), and 30% from staff members.

The survey included questions on respondent journey characteristics (origin, journey time, mode of travel), attitudes towards various modes (bus and trains, car, bicycle, light rail and walking), attitudes towards possible transport management initiatives (carpooling, bike paths and teleworking) and general demographic information. The availability of attitudinal data on travel modes and transport initiatives provided much needed information to support projects such as local bike paths, car-pools and timetable readjustments.

Some highlights of the analysis of the survey data are summarised as follows:

Table 1 : Transport mode and Average weekly cost for UNSW staff and students, 1996

Travel Mode	**Public Transport**	**Car**	**Bicycle**	**Pedestrians**
	Modal Split (Average Weekly Travel Cost)			
Staff	24% ($24.85)	63%($19.30)	3%	10%
Students	59% ($15.11)	21% ($24.65)	2%	18%
Combined	52% ($16.58)	29.4% ($23.84)	2.1%	16.3%
Total Population	*16477*	*9316*	*665*	*5165*

Some other information arising from the survey which was immediately useful included :

- 30% or (8900) UNSW staff and students live within a 4km radius of UNSW. Of this group, 6920 are students and 827 drive their single occupant vehicle to and from UNSW everyday.
- 66% or (8073) students and staff catch a bus from Central Station (at Eddy Ave) to UNSW and of this group 80% considered that overcrowding, long travel and waiting times were a major disincentive.
- one third of all staff and one half of all students who ride their bike to and from UNSW have had an accident. Bike accidents were most commonly attributed to lack of space on roads and traffic dangers.

Information on modal splits were compared with previous studies done in 1989 by Stapleton and Hallam, which showed a significant shift away from car use (71% in 1989 to 64% in 1996) and towards public transport (18% in 1989 to 24% in 1996). This is primarily attributed to the fact that students are more likely to catch public transport than staff and the student population growth rate has been much greater than the staff population growth rate over this period. It is also because there was no corresponding growth in parking availability. Discrepancies in the figures were made up for by increases in walking and cycling.

Frequency charts of all the data collected were produced so the results could be used as soon as possible after surveying. These frequency charts confirmed the suspected population distribution of staff and students, their arrival times and the general demographic make-up of the university.

While the available data had contributed immensely to the understanding of the university's transport profile there was still a need to further analyse its spatial components and to provide the information in an easily digestible format for decision makers at all levels inside and outside UNSW. In 1997, the survey data was analysed and incorporated into a MapInfo based geographical information system (GIS) along with a database of all staff and students addresses, supplied by the University administration. A detailed street level map for Sydney, a number of boundary definitions (such as the suburb boundaries for Sydney) and some main service routes (such as the railways) were incorporated into the GIS. This allowed for the geocoding and spatial analysis of the extensive survey data as well as the UNSW staff and student records, in a matter of weeks, despite having limited prior experience with operating a GIS.

Geocoding of the survey data was hindered because street number information had not been record by the survey. However, by matching street names, suburbs, postcodes and demographic information with those available form Staff and Student records, it was possible to infer probable street numbers for 80% of the survey respondents, with the remaining 20% coded to the middle of a street. Although there were cases where the geocoded address differed from the possible exact point of origin of a respondent, the differences in most cases amounted to only a few hundred meters, and only in a very few cases were the errors more than a few kilometres. This level of error was deemed acceptable for most transport planning purposes.

The GIS allowed the Transport Research Program to map transport characteristics from the 3622 survey respondents. Maps of journey times, travel modes, travel attitudes, potential support for various transport initiatives and environmental emissions were produced, mostly at the suburb-boundary level.

Extrapolating the data to the entire university population involved looking at the transport characteristics of nearby surveyed points and the distribution of these characteristics within a defined area, such as a suburb boundary. For example, assigning a mode to unsurveyed points in a suburb would involve distributing modes according to the surveyed modal split of that particular suburb.

Capabilities of the UNSW transport information system.

During 1997, the transport GIS was utilised to assist with various university related transport initiatives such as developing proposals for new university bus routes, developing the Randwick City Bike Plan, feasibility assessment for light rail, and the development of the UNSW transport greenhouse gas emission profile. What follows is a discussion of six examples of how the information system has been utilised by UNSW to analyse data to identify problems and solutions. The capabilities of the system to assist with some elements of solution implementation are also discussed.

The first example relates to efforts to fix overcrowding at the UNSW express bus stop at Eddy Avenue, Central Station. The information system assisted in establishing a number of key parameters regarding the problem of Eddy Avenue. For example it was found, from the survey, that an average of 3824 UNSW members pass through Eddy Avenue between the times of 8 am and 9 am on weekdays. The average waiting time at Eddy Avenue was 10 minutes but some University members experienced waiting period of up to 20 minutes. It was also found that overcrowding was the greatest concern for public transport users, a key factor in the decision made by many people to drive rather than catch public transport. For many years UNSW has complained to transport providers about dangerous overcrowding at Eddy Avenue. Complaining changed to proactive facilitation using this new information base to argue in terms of the real costs, in dollars, time and to the environment, rather than the general feeling that students and staff were suffering. Utilising its new transport information base, UNSW has become involved in the development of strategies aimed at reducing overcrowding by liaising with appropriate transport bodies to determine the scope and limitations of related issues, and the further provision of quantitative data to support proposed strategies. UNSW is currently conducting a further survey of student and staff waiting and travel times from Eddy Avenue, to design a new ticketing, queuing, boarding and bus stop configuration to reduce overcrowding. The key factor to note in this example is the change in the role being taken by UNSW from passive complainant to active participant in the redesign of aspects of the service utilising its new transport information system.

One of the Eddy Avenue solutions investigated by the EMP involved a timetable management strategy to reduce peak loads on regional transport systems. Data from the times of arrival for students and staff members showed a large number of students arriving around 9:00 am by public transport. It was found that 1st year students are by far the greatest users of public transport and that by moving 1st year lecture start times from 9:00 to 10:00am, a one third

reduction of crowding at Eddy Avenue could be achieved. The benefits of reducing the peak include reducing crowds at the bus stops, spreading out demand for buses, reducing the number of buses needed to take students to UNSW in the morning and providing incentive for car drivers to leave their cars at home. These figures provoked considerable discussion by University management about such a timetable management strategy. While in the immediate future UNSW is not yet prepared to shift its timetable, it is certain that there will be a new level of consideration given to the transport implications of future timetable design.

The transport data and the transport GIS has allowed us to provide useful assistance in the development of the Randwick City Bike Plan. This included the provision of transport profile data such as data about expected patronage for the bike plan, potential reduction in greenhouse emissions, and assistance with mapping and data analysis. Over 20% of staff and students who currently drive said they would prefer to ride to UNSW if there was a good network of bike paths in place. It was also found that 5500 University members live within 1.5km of Anzac Pde and that Anzac Pde is the most utilised and the most dangerous route for cyclists travelling to UNSW. However, the Randwick City Bike Plan does not include bike paths for Anzac Pde therefore it has been left to UNSW to ensure that the redesign of Anzac Pde (in time for the Olympics) includes appropriate bike paths. On the basis of its new understanding of the strategic relevance of an adequate bike path network, UNSW will actively pursue funding for the implementation of the bike plan and will provide follow up studies on the success of the plan. UNSW is also in a position to undertake effective transport information dissemination programs (such as direct mail) targeting strategic groups who may utilise local transport initiatives, such as a new bike path network.

Data on attitudes and potential patronage of carpooling programs indicates support for this initiative. Identification of the transport characteristics of small groups within suburb sized regions with the transport GIS has revealed certain opportunity areas for the establishment of carpooling schemes for staff and students. Survey data confirm the need to establish two separate carpooling matchup groups, one for students and one for staff. The transport GIS will be used to identify and match groups and then to conduct direct mailouts to potential carpoolers. This will be done on a yearly basis, utilising information gained from the student enrolment process (which will include a question asking the student's mode of travel to and from UNSW) and via an internal mail or e-mail questionnaire for staff.

An example of bus route design involves removing a mode change that is currently necessary for staff and students catching a bus from Coogee or Maroubra (up to 3km from UNSW). It

has been found that around 7% of UNSW's population (1604 people) live in Maroubra and Coogee and that considering how close they are to UNSW, an alarming number still drive their car. Note the high density of car trips generated from Coogee and Maroubra in Figure 1 below.

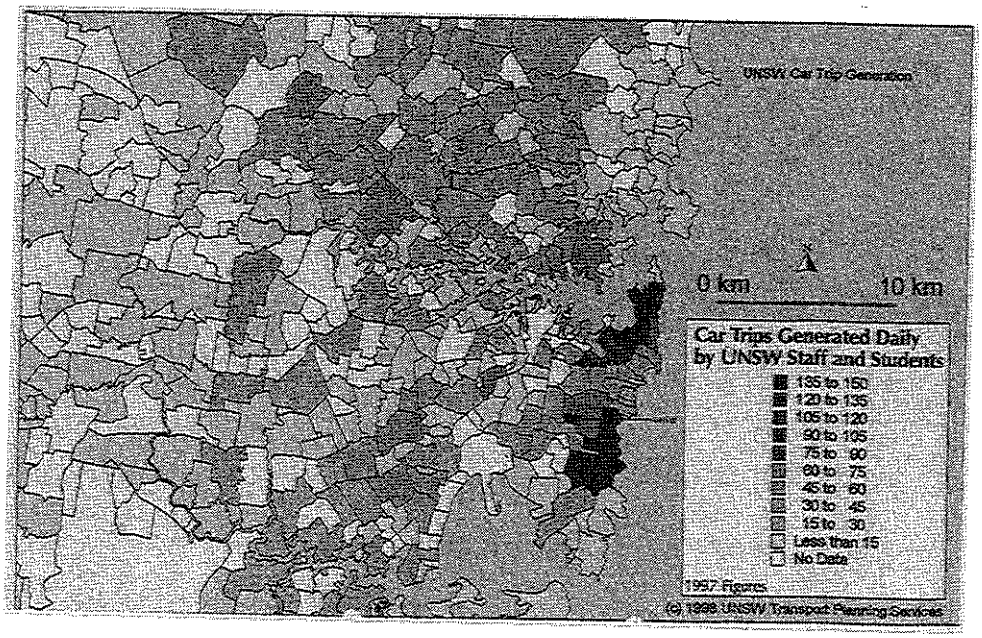

Figure 1: UNSW car trip generation.

When asked to cite the key disincentives for catching public transport, respondents from these areas identified that the mode change and overcrowding are the key disincentives for using current bus services in the area. The mode change occurs because all services from Coogee and most from Maroubra drop University members at Randwick Junction, a walk of 1km from the centre of campus. The overcrowding occurs because the bus services are full of commuters heading into the city. Clearly, a University service running directly past UNSW would remove both of these disincentives. Currently 562 people drive from these two suburbs and 57% are staff. This means a significant potential customership for a direct UNSW service. This gives strong indication that a bus service running from these places directly past UNSW would be capable of attracting the necessary patronage. If such a route were established, UNSW would be able to conduct a direct mail out targeting strategic groups who may utilise this new service. It is worth noting that the potential greenhouse emission

reduction would be significant because of the polluting nature of the many short car trips being undertaken from Coogee and Maroubra to UNSW. (See Figure 2)

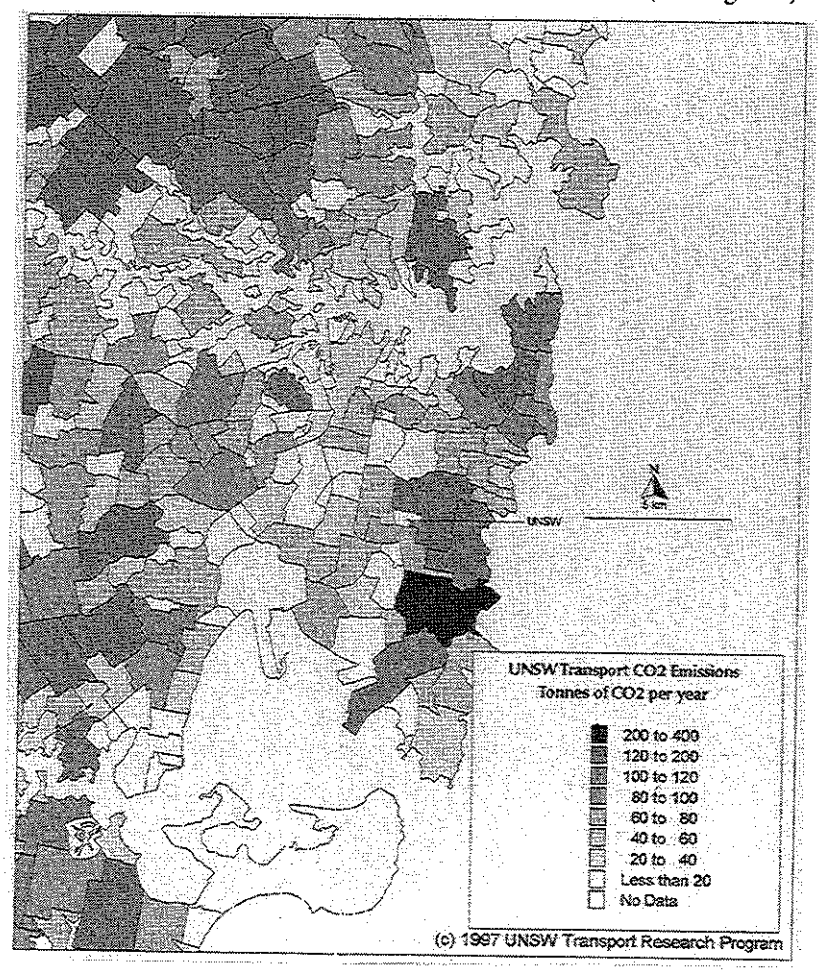

Figure 2 : Current UNSW transport CO2 emissions Total annual emissions by source suburb.

The transport GIS has also allowed for the development of a transport greenhouse profile (see figure 2) which will be used as a basis to measure and monitor UNSW's environmental performance in relation to transport, as part of the university's commitment under a Commonwealth Greenhouse Challenge Agreement. The transport emission profile allows for clear evaluation of transport initiatives according to their potential emission reductions. For example we have been able to see that the implementation of a bike path network around a

4km radius of UNSW would have a significant reduction of greenhouse emission (over 36% in some local suburbs). Transport emission benchmark figures and yearly surveys will allow all transport initiatives to be gauged in terms of their proposed and realised environmental performance.

Opportunities for improvements to the UNSW transport information system

UNSW is currently streamlining the information collection process. In 1999 information regarding home address, course and year of study, sex and mode of transport to and from UNSW will be obtained for all students via the student enrolment process. The introduction of transport elements into existing processes significantly reduces the resources required to regularly collect up-to-date data, as well as allowing the data to be easily matched with other information collected about the respondent.

Modifications to existing administrative processes to fully utilise the new data can involve high initial implementation costs, since forms will need to be redesigned, data entry methods and programs need to be modified and new reporting procedures need to be followed. In order to make the modifications financially and administratively viable, it is suggested that these modifications be made during major administrative upgrades, along with other planned changes. Collecting transport information as part of a regular process may require a reduction in the quantity of data to be collected. For UNSW, it was decided that only the mode of travel of a student would be collected, to minimise overall enrolment times.

Transport data collected through the enrolment process is aimed at providing basic information about the university's transport profile, response to future transport initiatives and provide early indication of potential transport problems in the future.

The role of detailed surveying has shifted more towards the characterisation of specific transport issues, such as measuring travel times from the local railway station to the campus. These studies will benefit from the availability of a regularly updated transport profile, which covers the entire university population.

Information regarding the mode of travel by all staff and students will be mapped on the transport GIS avoiding the need to extrapolate. Once this information is mapped the GIS's capabilities will expand, opening up opportunities for the design and implementation of

initiatives such as carpooling programs for staff and students and the design and direct marketing of new bus routes.

Generating participation in a proactive and strategic transport approach for UNSW

The analysis of the information and presentation of results to staff and students had a significant effect on generating the necessary inhouse management support for a new proactive approach to UNSW's transport problems. Carefully formatted transport information (utilising full colour graphics to allow for simple representation of significant volumes of complex transport data) was used to activate and unite all levels of management within the University around the significance and requirements of addressing UNSW's transport issues. As a result, it was recognised by the highest level of management that UNSW's very core business was being effected by poor transport access and that there were numerous opportunities for improvement. It was this realisation that produced the funding and management support to invest the necessary resources to maintain the transport information system and to establish effective planning partnerships with transport providers to ensure optimum transport access for UNSW.

The analysis of the information and presentation of results to various transport providers revealed the current constraints relating to planning partnerships between transport providers and UNSW. From UNSW's perspective, it was found that the action of presenting detailed information and preferred solutions was not enough to overcome current blockages in the planning processes of transport providers. The experience revealed the need to embark on a long term strategic approach to tackle the remaining core barriers which limited UNSW's capacity to contribute towards improving transport access. The core barriers experienced were a lack of planning processes embracing UNSW's participation and a lack of coordination between and within transport providers regarding UNSW's transport issues. This situation lead to the development of the UNSW Integrated Transport Strategy.

Integrated transport strategy

The Integrated Transport Strategy was designed through the Environment Management Program, and championed by the newly established Transport Committee, as the means of taking UNSW into a proactive participation with transport providers to ensure optimum transport access for UNSW staff and students.

In early April 1998 the UNSW Vice-Chancellor agreed to fund the UNSW Integrated Transport Strategy (ITS). See http//:ies.web.unsw.edu.au/AUEMN/gen_trans.htm for the full ITS. The ITS has been designed to improve transport access by all modes of transport to and from UNSW and to reduce environmental impacts of transport by reducing private motor vehicle usage and encouraging low impact means of transport. The implementation of the ITS will see UNSW pro-actively pursuing better transport planning through the development of effective information and reporting processes and the development of cooperative planning partnerships between UNSW and the major transport planning bodies. What follows is a discussion of the five core elements of the ITS.

The ITS will guide UNSW to the establishment of inhouse administration and implementation resources and structures to ensure that continuous improvement in transport planning is achieved. The ITS will ensure that UNSW has the human resource capabilities to respond to new transport initiatives, externally or internally imposed, thereby ensuring that UNSW's needs are clearly and actively represented. Figure 3 details the management framework developed to ensure the success of the ITS.

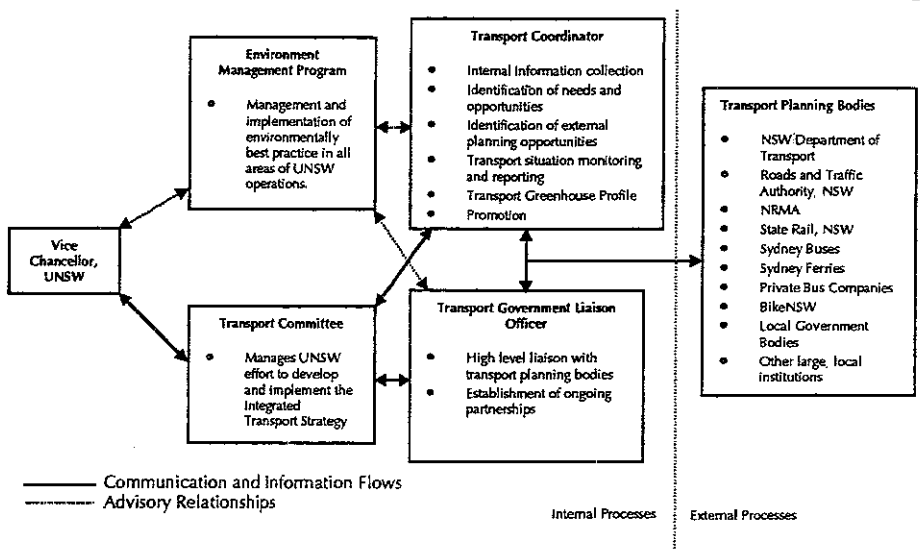

Figure 3: UNSW Integrated Transport Strategy - Management Framework 1998

The implementation process is to be guided by the UNSW Transport Committee and the Environment Management Program. To undertake the implementation work, UNSW has employed a Transport Coordinator and a Government Transport Liaison Officer. The role of the Transport Coordinator is to build on the work done so far to collect, analyse, format and report information, effectively identifying staff and student transport needs and strategic opportunities for continuous improvement. This position will also be responsible for maintaining a transport greenhouse profile and disseminating transport information to staff and students. The role of the Government Transport Liaison Officer will be to develop ongoing reporting and planning relationships with all relevant transport planning bodies to ensure that UNSW's needs are considered and opportunities for service improvements are pursued.

The ITS will utilise and further develop the transport information system to ensure staff and student transport needs and opportunities are regularly identified and reported. The commitment has been made in the ITS to ensure the regular collection, analysis and reporting of transport data which meets the transport planning requirements of UNSW and other organisations. These include addressing transport issues such as: bus service planning and timetabling, pedestrian safety at bus stops, carpooling initiatives, parking policy, internal and external pedestrian access, regional bike path development, greenhouse emission monitoring and various other transport initiatives.

The process of transport planning normally resides within the scope of external transport organisations, such as Sydney Buses, the Department of Transport, the Roads and Traffic Authority and Local Government. The ITS recognises that to 'get it right', decisions made by external transport organisations which affect UNSW need to be made with the representation and consultation of UNSW. Through the ITS, UNSW aims to position itself to influence external development through clear identification of stakeholder involvement and formulation of ongoing relationships with key transport planning bodies at the state and local levels. These ongoing relationships will allow for the effective exchange of transport information regarding all transport modes, the collaborative generation of transport improvements and the provision of assistance from UNSW for local and regional transport planning initiatives.

Another element of the ITS is the establishment of information dissemination systems to effectively inform users and potential users of their transport options to and from UNSW. Strategies are under development to allow for the promotion of current and new services directly to potential users. Transport information distributed to the University community is

to include route details, financial cost, environmental load, and travel time for all available travel options, to allow users to make the most informed choice possible. Interactive transport information websites, direct mail, leaflets, posters, articles; signage at public transport stops; and information to prospective and enrolling/re-enrolling students will be used to disseminate transport information to staff and students.

Finally, the ITS includes a commitment to utilise greenhouse emissions as the foremost environmental criteria for transport strategy prioritisation and evaluation. The two core reasons for this are the general complexity of transport related environmental impacts and the University's recent commitment under a Commonwealth Greenhouse Challenge Agreement. The greenhouse load associated with all transport options are to be assessed and included in all information and data flows as well as communications and planning processes involving internal bodies, external bodies and transport users. The Greenhouse Challenge Framework, as defined by the Federal Government, is to be utilised to ensure continuous improvement in the area of transport emission reduction through the provision of targets, reduction strategies, performance criteria, monitoring and reporting (including an annual greenhouse inventory).

Conclusion

This paper has outlined the transport situation faced by one large organisation and its core response to the current transport planning environment in Sydney. UNSW's experience in collecting, analysing, modelling and formatting transport information may be of value in answering the question - How do we know what is right? The work done by UNSW to establish a new type of partnership with transport planners to generate a cooperative and effective response to transport issues will contribute to help 'get it right'.

While significant gains are being made through UNSW's proactive approach as a large organisation, some very significant gains can be made if transport providers and other large organisations undertook similar strategic efforts to work more closely with each other to overcome the challenge of transport planning in Sydney. From the UNSW experience it has become evident that in order to capture this opportunity, both large organisations and transport providers must make a number of changes. From UNSW's experience, as a large organisation, the necessary core changes have been: the development of a new management commitment to secure optimum transport access for members; accountability for the provision of information to transport providers (through the establishment of the transport information system); and resourcing ongoing participation in planning partnerships with transport

providers. The necessary core changes to be adopted by transport providers include: establishment of planning frameworks to allow for the effective ongoing participation of large organisations; adoption of an integrated planning approach to ensure adequate response to the transport issues of large organisations by all relevant transport providers. Such a shared investment by transport providers and large organisations will make a significant contribution towards better transport planning for Sydney.

Acknowledgments

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