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**Australian Government**

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**Department of Education,  
Science and Training**

**Industry Study Report – Spatial Information Skills**

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## Executive summary

This report presents the findings of the *Industry Study of Demand for Spatial Information Skills*. The industry study was conducted by the Department of Education, Science and Training between July 2005 and February 2006.

The main aim of the industry study was to gain a better understanding of the *current* and *future* science, engineering and technology skills needs in the spatial information industry. This is one of a series of industry studies undertaken to support the Science, Engineering and Technology (SET) skills audit.

The industry study was informed by a survey of randomly selected members of the Australian Spatial Information Business Association who participated in a questionnaire on demand trends as well as an extensive consultation process.

The industry study involved the return of a questionnaire which was developed by Departmental staff in consultation with stakeholders. Members of the Australian Spatial Information Business Association were randomly selected to participate in the questionnaire. The industry study questionnaires were sent out to 46 organisations. Thirty-three responses were received representing a 72 per cent response rate.

The key findings of *current* spatial science skills needs are as follows:

- Seven out of ten participants indicated that they had current vacancies in spatial science-related occupations where 55 occupations were listed.
- Almost half (49 per cent) of those current vacancies were for engineering positions, 22 per cent were for science-related positions, and 29 per cent were for positions not categorised into either science or engineering (unspecified).
- Over half (69 per cent) of the participants indicated that they had vacancies in spatial science-related occupations and rated those vacancies as 'difficult' to fill, with 24 per cent and 7 per cent of the organisations rating them as being of 'moderate' and 'minor' difficulty to fill respectively.
- More than half (62 per cent) of the respondents spent more than 3 months filling their current vacancies, 29 per cent spent 1 to 3 months, 7 per cent spent up to 1 month, and 2 per cent spent up to a fortnight.
- The top three main sources of employees in spatial science related occupations were 'Upgrading skills of existing employees' (46 per cent based on 24 responses), 'Local university' (40 per cent based on 25 responses), and 'Other employers' (31 per cent based on 29 responses).
- The main means by which organisations were advertising vacancies was newspapers (46 per cent), followed by private recruitment agencies (24 per cent), and word of mouth (12 per cent).

The key findings of *future* spatial science skills needs are:

- That the future demands for spatial science skills in the next 5 years and in the next 10 years were very similar, as outlined below.
- Almost one-third (32 per cent in the next 5 years and in the next 10 years) of the organisations indicated that they would require engineering skills including structural engineering and surveying skills.
- Around one-quarter (26 per cent in the next 5 years; 27 per cent in the next 10 years) of respondents indicated that they would require science-related skills such as Geographic Information System (GIS), spatial science and environmental science skills.
- Non-specified skills (e.g. project management, land development and urban design skills) would be required by 21 per cent of organisations in the next 5 years and 27 per cent of organisations in the next 10 years.
- Business or computing skills would be required by around one in five (21 per cent) organisations in the next 5 years and by 15 per cent of the organisations in the next 10 years.

The industry study participants considered the following economic factors as 'important/very important' for their organisations' future skills needs:

- technological change (93 per cent of respondents);
- ageing of the workforce (60 per cent);
- potential changes in business products (also 60 per cent);
- labour cost issues (57 per cent); and
- potential changes in production processes (47 per cent).

Around 36 per cent of the participant organisations listed conceptual/technical skills as the key attribute sought after in spatial science employees, followed by 'miscellaneous skills' (26 per cent), behavioural attitude (20 per cent) and communication skills (19 per cent).

Participants noted that there is the potential for current recruitment and retention problems to be aggravated by the anticipated growth of the spatial information industry unless the supply of suitably qualified staff increases.

## Introduction

This report presents the findings of the *Industry Study of Demand for Spatial Information Skills*. This is one of several industry studies undertaken as part of the Science, Engineering and Technology (SET) skills audit.

The industry study sought to gain a better understanding of the SET skills needs in the spatial information industry. Specifically, it addressed the following issues:

- current and future spatial science skill needs;
- sources of spatial science skills supply and methods by which participants fill vacancies;
- spatial science employee losses and gains;
- recruitment difficulties in spatial science -related occupations and recruiting periods;
- factors likely influence demand for spatial science skills in next five to ten years; and
- key attributes of spatial science employees.

The industry study was informed by a survey of randomly selected members of the Australian Spatial Information Business Association who participated in a questionnaire on demand trends as well as an extensive consultation process. Forty-six organisations were approached to participate with 33 valid responses received.

The Department of Education, Science and Training would like to express its appreciation to the Australian Spatial Information Business Association and those organisations and individuals who participated in the industry study.

## Background

Spatial information describes the physical location of objects and the metric relationships between objects<sup>1</sup>.

The spatial information industry is a specialised component of the broader information technology sector and has scientific and technical links to many other disciplines such as environmental science, engineering, computer science, health delivery, logistics, planning, resource management and electronics<sup>2</sup>.

The spatial information industry includes businesses which provide surveying, mapping, remote sensing, geographic information systems and related products and services such as hardware

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<sup>1</sup> From the Cooperative Research Centre for Spatial Information website <http://www.crcsi.com.au/index.aspx>, 'About Spatial Information' page.

<sup>2</sup> Ibid.

and software development and supply, data brokerage and integration, and management and training<sup>3</sup>.

Examples of spatial information applications are:

- satellite images which bring daily weather reports;
- GIS information provided to farmers to improve agricultural land use planning;
- airborne infrared scanners to track bushfires;
- global positioning systems that monitor the location of thousands of trucks and taxis;
- GIS applications for use by real estate agents in property sales
- maps used by commercial and government organisations are produced, displayed and analysed using spatial information technology; and
- three-dimensional real-time maps and forecasting<sup>4</sup>.used by insurance companies to accurately define areas and property damaged in storms and other natural disasters.

Global expenditure on spatial information is in the order of \$A34 billion a year and Australian spatial information industry has a turnover of \$A1 billion<sup>5</sup>.

The recent report on the *Victorian Spatial Information Industry Census*<sup>6</sup> estimated that there are 223 spatial information businesses with total revenue of \$A410 million and employing 5,570 full time equivalent staff in Victoria alone.

The industry study was informed by the audit consultation process that included an open session and meetings with interested stakeholders, and written submissions. The industry study was also informed by discussions with the representatives of the Australian Spatial Information Business Association, the Spatial Sciences Institute, and the Cooperative Research Centre for Spatial Information.

During the discussions the following issues were raised:

- spatial information skills where recruitment difficulties currently exist;
- replacement demand for spatial information skills;
- staff retention strategies; and
- recruitment strategies, including graduate and international recruitments.

Details of the discussions are in **Part 2** of this report.

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<sup>3</sup> From the Australian Spatial Information Business Association website [www.asiba.com.au](http://www.asiba.com.au), 'About us' page.

<sup>4</sup> Cooperative Research Centre for Spatial Information (2004), *Leading the way for all Australians*, is available from its website <http://www.crcsi.com.au/pages/publications.aspx>.

<sup>5</sup> Ibid.

<sup>6</sup> Fivenines Consulting (2005), *Victorian Spatial Information Industry Census*, is available from the Australian Spatial Information Business Association website [www.asiba.com.au](http://www.asiba.com.au).

## **Part 1 – Survey**

### **Methodology and response rate**

The survey of the spatial information sector was conducted by the Department of Education, Science and Training between July 2005 and February 2006. The survey involved the return of a questionnaire which was developed by Departmental staff in consultation with the Australian Spatial Information Business Association and other stakeholders. A copy of the questionnaire is included at **Attachment A**.

The questionnaires were sent out to 46 organisations that were selected at random from the Australian Spatial Information Business Association members' list. The industry study received responses from 33 members representing a 72 per cent response rate.

During the course of the survey, a considerable effort was provided by the Australian Spatial Information Business Association to maximise the response rate, including follow-up telephone calls to non-respondents to encourage participation.

A toll-free 1800 number, a fax number and an email address were set up for the survey to assist the potential respondents' queries.

### **Characteristics of participants**

The survey sought information on the participating organisations' main location, employment size and markets for their products and services.

Twenty-one of the 33 organisations indicated that their organisations' main industry was 'Property and Business Services', with eight indicating that their main industry was 'Construction'. The remaining four participants indicated that their main industry was 'Mining', 'Manufacturing', 'Electricity, Gas and Water Supply', or 'Government Administration and Defence'.

Twelve of the organisations were mainly located in New South Wales and seven were mainly located in Victoria. South Australia and Western Australia were the main locations for four organisations each. The remaining six organisations had their main locations in Queensland, Tasmania, and the Australian Capital Territory.

Organisations were classified into three groups depending on their size – 'Small' for those employing 0 to 19 people, 'Medium' for those employing 20 to 99 people, and 'Large' for those employing 100 or more people.

According to these size classifications, almost half (45.5 per cent) of participant organisations were 'Medium' in size, 42.4 per cent were 'Small' in size, and 12.1 per cent were 'Large' in size.

The minimum and maximum numbers of employees were 3 and 1,874 people, respectively. The average number of employees was 97 people, with a standard error of 56 people.

The average numbers of employees in each State/Territory of the participant's organisation are listed in Table 1.

**Table 1. Average number of employees in each State/Territory**

<b>State/Territory</b>	<b>Mean</b>	<b>Standard Error of Mean</b>	<b>Number of responses</b>
NSW	52	28	16
VIC	87	51	12
QLD	44	27	10
SA	27	8	8
WA	50	38	8
TAS	36	17	5 or less
NT	23	23	5 or less
ACT	13	5	6
Other locations (including overseas locations)	5	3	5 or less

The participant organisations' products and services were sold in both domestic and overseas markets. Over half of the participants indicated that their organisations' products and services were sold in a domestic market only. Some 46 per cent responded that their products and services were sold in both Australian and overseas markets. One organisation indicated that their products and services were sold in overseas markets only.

### **Current employment in spatial science-related occupations**

The survey sought information on the occupations, number of employees, and the minimum required qualification level for spatial science-related occupations currently offered by the participant organisations.

All respondents indicated that their organisations were offering employment in spatial science-related occupations and listed some 177 occupations. Of those occupations, 37 per cent were engineering-related occupations, 24 per cent were science-related occupations, and 20 per cent each were unspecified occupations and/or support positions, including administrators and managers. A total of 905 people were employed, with between 1 and 59 people employed per occupation listed. On average, 5 people were employed in each of the 177 spatial science-related occupations listed, with a standard error of less than one person.

Examples of the engineering-related occupations were:

- civil engineers;
- environmental engineers;
- engineering designers;
- quantity/land/mining/registered/graduate surveyors; and
- survey technicians/assistants/draftsperson.

Examples of the science-related occupations were:

- environmental scientists/field supervisor;
- geographer;
- photogrammetrist;
- cartographer;
- remote sensing specialist;
- spatial information analyst/manager;
- spatial scientists/technician; and
- geographic Information System (GIS) analyst/consultant/developer/technician/manager.

Examples of the miscellaneous occupations were:

- accountants;
- finance director/manager/controller;
- business analyst/developer;
- property economist;
- information and technology professionals, including database administrators & designers, programmer, and software developers;
- architectural/landscape resource strategist;
- commercial pilot;
- town planner; and
- tradesperson.

The majority (60 per cent) of occupations were made up of employees with a degree or higher qualifications, 30 per cent had paraprofessional qualifications, and 10 per cent had qualifications at the secondary school level or experience only.

## Current vacancies in spatial science-related occupations

The survey also sought responses on vacancies (both permanent and temporary) in spatial science-related occupations, the level of recruitment difficulty, and the typical length of time spent on recruiting employees.

The descriptions of the level of recruitment difficulty were:

- none - no problem with attracting a strong pool of candidates;
- minor - managed to fill vacancies, but dissatisfied with the pool of candidates overall (with respect to size of pool, qualifications of candidates, etc);
- moderate - able to fill vacancies only after extensive effort (e.g. after re-advertising a position); and
- difficult - unable to fill a vacancy satisfactorily.

The typical length of time spent on recruitment was rated using a one to four scale, where:

- '1' indicated up to a fortnight spent on recruitment;
- '2' indicated up to 1 month spent on recruitment;
- '3' indicated from 1 to 3 months spent on recruitment; and
- '4' indicated over 3 months spent on recruitment.

Seven out of ten participants indicated that they had current vacancies in spatial science-related occupations for some 55 occupations.

Almost half (49 per cent) of current vacancies were for engineering positions and 22 per cent were for science-related positions (see Table 2).

**Table 2. Current vacancies in spatial science-related occupations (Per cent)**

<b>Occupation</b>	<b>Per cent</b>
Engineering-related	49.1
Science-related	21.8
Miscellaneous	29.1

Examples of the engineering-related vacancies were:

- civil/structural engineers;
- senior software engineer;
- surveyors; and
- survey draftsman.

Examples of the science-related vacancies were:

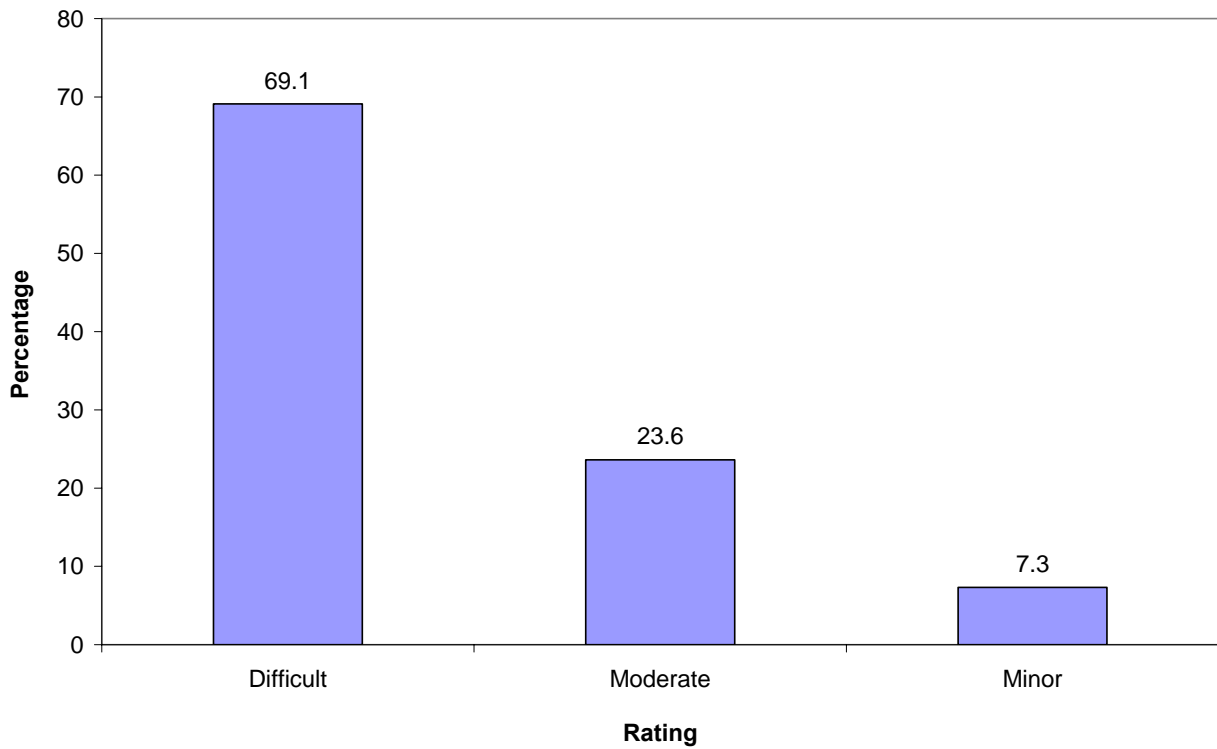
- cartographer;
- environmental scientists;
- photogrammetrist;
- spatial information analyst and resource strategist; and
- Geographic Information System (GIS) system architect/consultant/specialist.

Examples of the miscellaneous vacancies were:

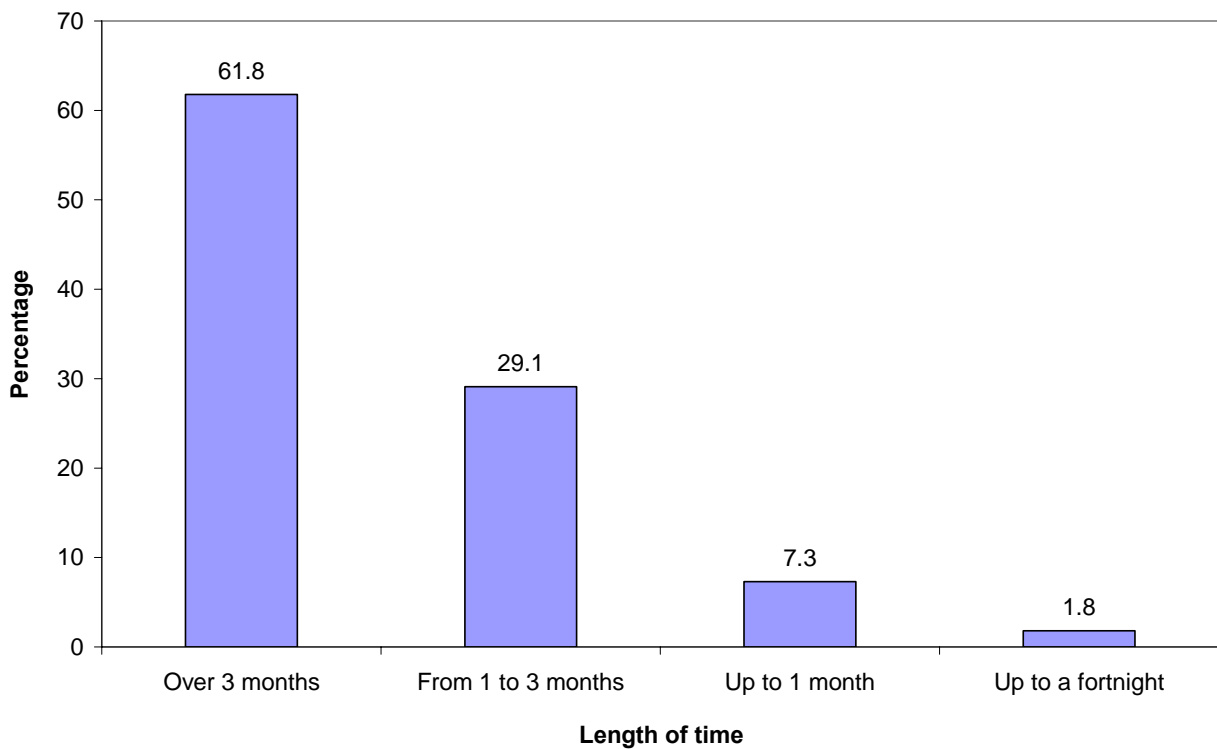
- project managers;
- camera operators;
- navigator;
- application developers;
- technical assistant;
- software developer/application officer; and
- Geographic Information System (GIS) business developer/sales.

Around 77 per cent of engineering-related vacancies were for professionals, 20 per cent were for associate professionals and 3 per cent were for managerial positions. In contrast, 56 per cent of the science-related vacancies were for professionals, with associate professional and managerial positions occupying 27 and 17 per cent of the vacancies respectively.

Chart 1 shows that nearly seven out of ten (69 per cent) of the participants who indicated that they had vacancies in spatial science-related occupations rated those vacancies as 'difficult' to fill, with 24 per cent and 7 per cent of the organisations rating them as being of 'moderate' and 'minor' difficulty to fill respectively.

**Chart 1. Rating for level of recruitment difficulty (Per cent)**

Nearly 62 per cent of the respondents spent more than 3 months filling their current vacancies, 29 per cent spent 1 to 3 months, 7 per cent spent up to 1 month, and 2 per cent spent up to a fortnight filling these vacancies (Chart 2).

**Chart 2. Typical length of time spent on recruitment (Per cent)**

## Main sources of employees

The participants were asked to identify the source of supply for employees on a scale of 1 to 5, where 1 represented their main source.

The top three main sources of employees in spatial science related occupations were:

- ‘Upgrading skills of existing employees’ (46 per cent based on 24 responses);
- ‘Local university’ (40 per cent based on 25 responses); and
- ‘Other employers’ (31 per cent based on 29 responses).

Other main sources of employees were ‘Local TAFE’, ‘Other TAFE’, ‘Migration’, and ‘Other sources’ (all attracted 5 or fewer responses). Examples of the ‘other sources’ were ‘overseas universities’ and ‘employment agencies’.

## Main methods of advertising vacancies

The participant organisations were asked about the main means by which they advertised their vacant positions.

The top three methods of advertising vacancies were:

- newspaper advertisements – 46 per cent;
- private recruitment agencies – 24 per cent; and
- word of mouth – 12 per cent.

## Employee losses and gains

The survey sought information on the participating organisations’ employee losses to overseas job markets and gains from immigration.

Less than a quarter (21 per cent) of the participants indicated that their organisation *lost* employees to overseas job markets for the following 8 occupations:

- surveyors;
- planning resource strategist;
- senior Geographic Information System (GIS) consultant;
- survey drafter; and
- non-specified professional.

The total number of employees lost to overseas job markets was 13 people.

About the same proportion (24 per cent) of participants indicated that their organisation *gained* employees through immigration over 9 occupations. These employees filled jobs in the following occupations:

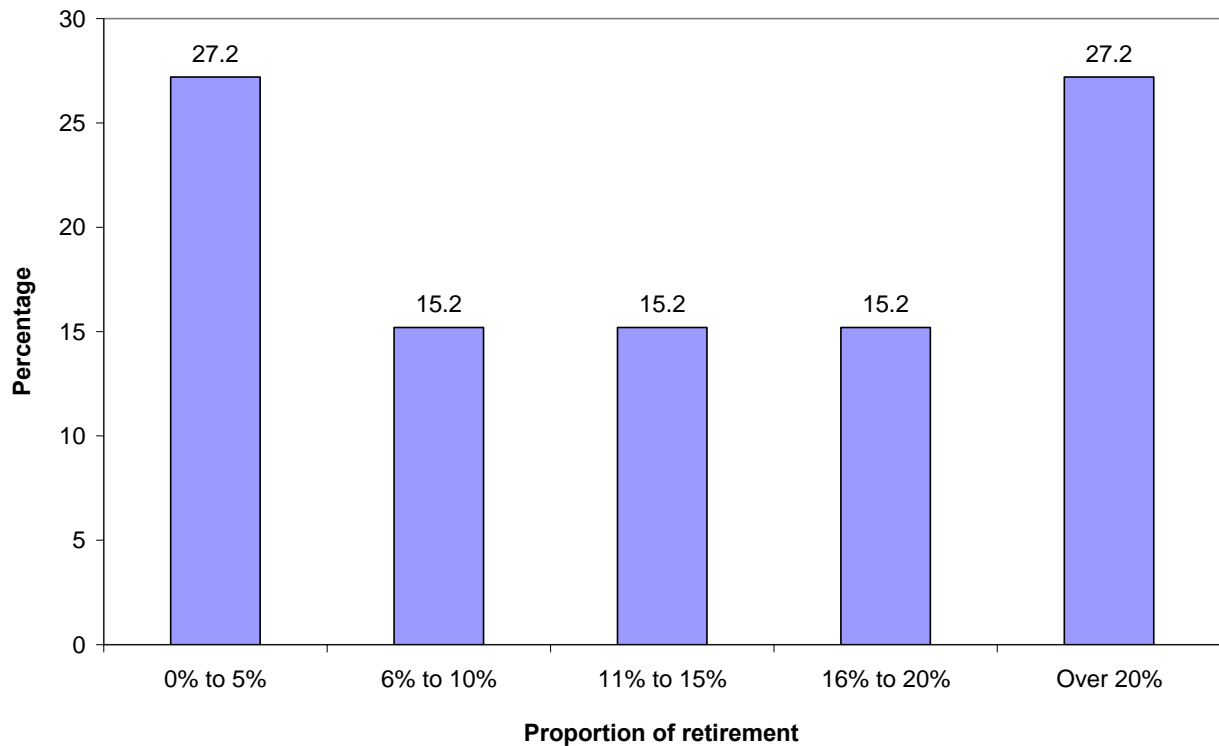
- surveyors;
- engineering design drafter;
- senior Geographic Information System (GIS) consultant;
- mathematician;
- software developer;
- tradesperson; and
- urban design/architect.

The survey sought the opinions of participants on the training standards of overseas recruits compared to Australian-trained staff. One-third of participants considered their overseas recruits 'as good as Australian-qualified employees' and another third rated them 'better than Australian-qualified employees'. Around one-fifth (22 per cent) rated them 'not as good as Australian-qualified employees', and a tenth (11 per cent) did not know.

### **Expected employee losses through retirement**

Participants were also asked to approximate the proportion of their employees likely to retire in the next ten years.

Around 42 per cent of the participants indicated that 0 to 10 per cent of their employees were likely to retire in the next ten years, 30 per cent responded 11 to 20 per cent, and 27 per cent responded that over 20 per cent of their employees were likely to retire in the next ten years (Chart 3).

**Chart 3. Proportion of employees likely to retire in next 10 years (Per cent)**

### **Future demand for spatial science skills**

The survey included questions about the participating organisations' future spatial science skills needs in terms of employee qualifications over the next 5 to 10 years.

The future demands for spatial science skills in the next 5 years and in the next 10 years were very similar (Chart 4). Almost one-third of the organisations participating in the survey indicated that they would require engineering skills, with an emphasis on structural engineering and surveying skills.

Around one-quarter of respondents indicated that they would require science-related skills such as Geographic Information System (GIS), spatial science and environmental science skills.

Unspecified skills (e.g. project management, land development and urban design skills) would be required by 21 per cent of organisations in the next 5 years and 27 per cent of organisations in the next 10 years.

Business or computing skills would be required by around one in five (21 per cent) organisations in the next 5 years and by 15 per cent of organisations in the next 10 years.

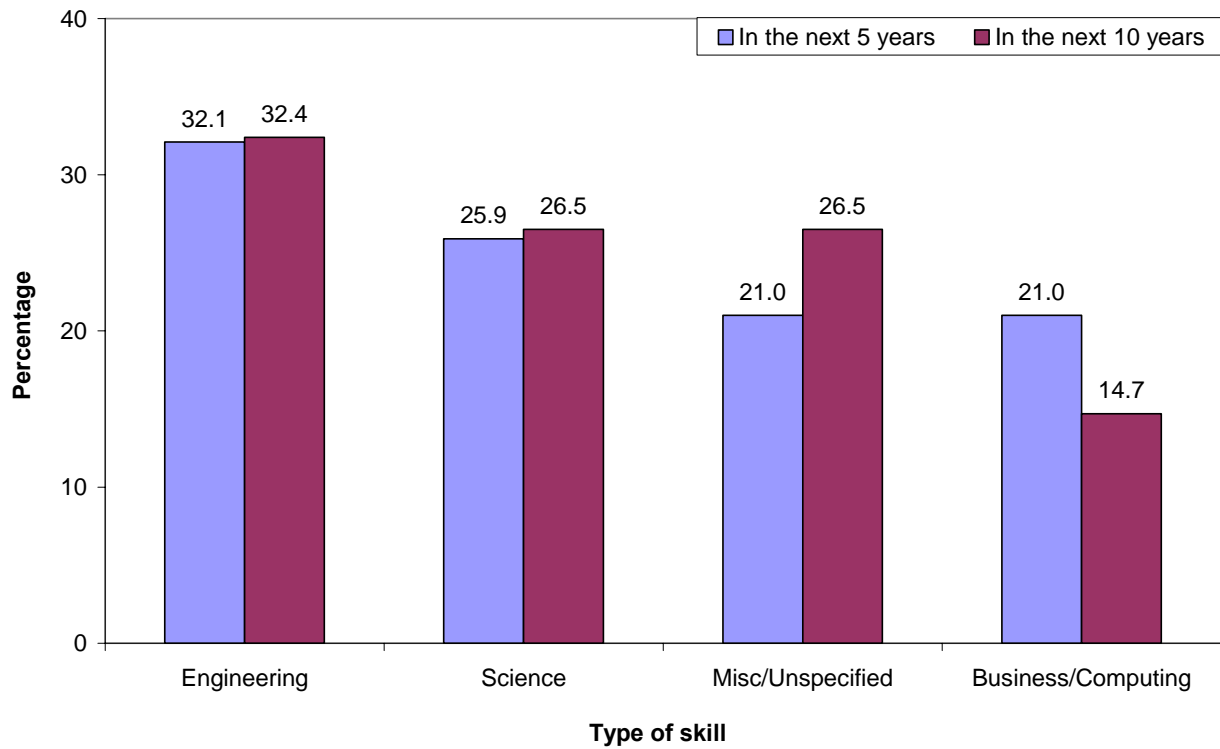
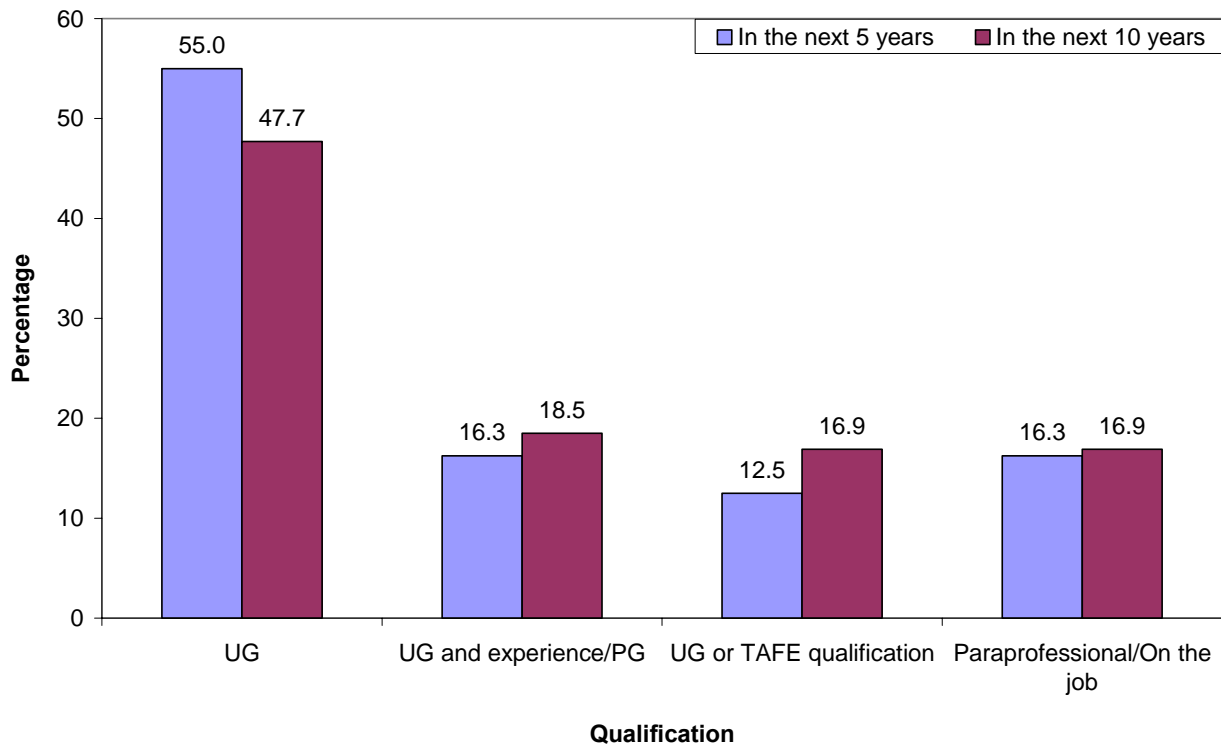
**Chart 4. Future skills needs in next 5 to 10 years (Per cent)**

Chart 5 shows that around half (55 per cent for the next 5 years; 48 per cent for the 10 years) of organisations would require undergraduate degree qualifications for their future spatial science skills needs.

Undergraduate degree plus some experience and postgraduate degree qualifications made up around 16 per cent of future skill requirements in next 5 years and 19 per cent in the next 10 years.

Around 16 per cent of organisations indicated that they would require paraprofessional qualifications in the next 5 to 10 years, and some organisations (13 per cent for the next 5 years; 17 per cent for the next 10 years) indicated they would require either undergraduate level or TAFE level qualifications.

**Chart 5. Qualification level of future skills needs in next 5 to 10 years (Per cent)**

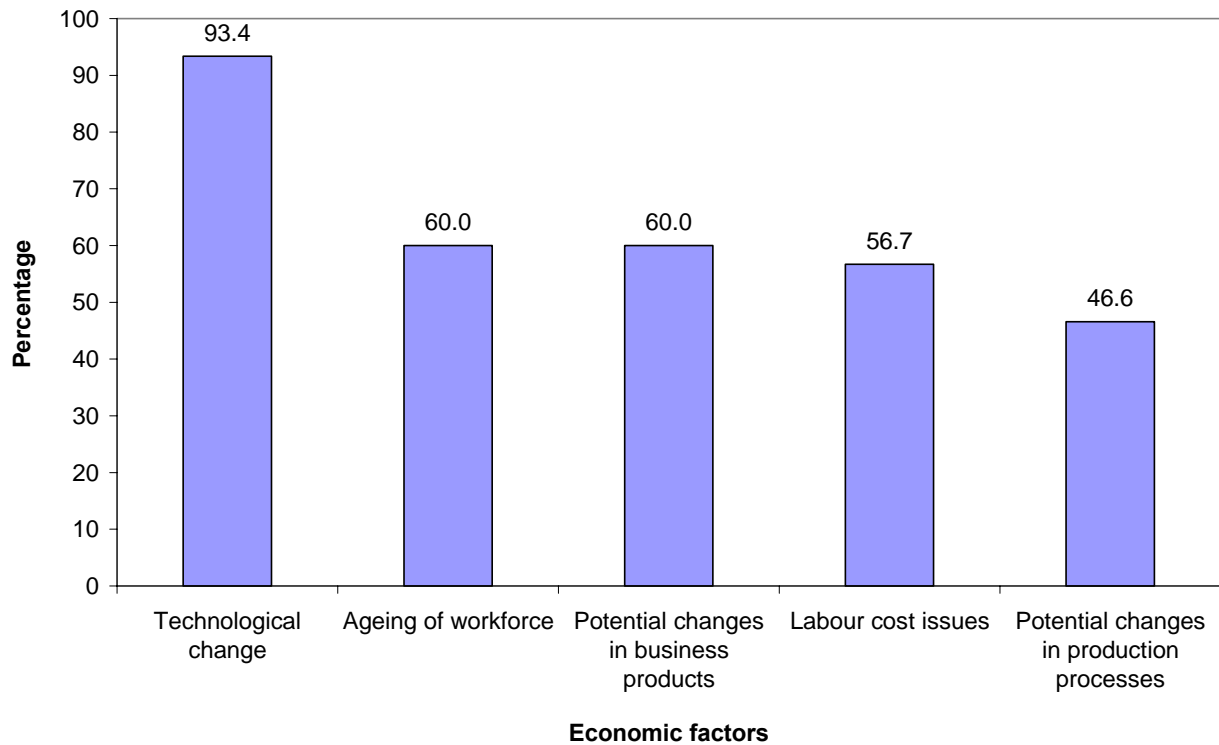
### **Economic factors affecting organisations' future skills needs**

The organisations were asked a series of questions about economic factors that were important to their organisations' future skills needs (e.g. technological change; ageing of the workforce; labour cost issues; and potential changes in business products and production processes). The organisations were also asked to rate the importance of these factors on a scale of 1 to 5, where 1 meant that the factor was not important and 5 meant that the factor was very important.

The organisations considered the following issues as 'important/very important' for their organisations' future skills needs, listed in order of importance (Chart 6):

- technological change (93 per cent of respondents);
- ageing of the workforce (60 per cent);
- potential changes in business products (also 60 per cent);
- labour cost issues (57 per cent); and
- potential changes in production processes (47 per cent).

**Chart 6. Economic factors that were 'important' or 'very important' to organisations' future skills needs (Per cent)**



### **Key factors influencing organisations' demand for spatial science skills**

Participants were also asked to identify the key factors influencing their organisations' demand for spatial science skills in the next 3 to 5 years.

Chart 7 shows that one-third (33 per cent) of the participants considered 'technological change' as the key factor affecting their skills demand over this period and slightly less (30 per cent) indicated that 'demand for services' was the key factor. Other factors affecting spatial science skills demand were 'changes to products' (13 per cent), 'staffing' (12 per cent) and 'legislative/environmental issues' (12 per cent).

Examples of 'technological change' were:

- adoption of new surveying technologies;
- changes in production techniques; and
- web services increasing ease of access to spatial information.

Examples of the 'demand for services' were:

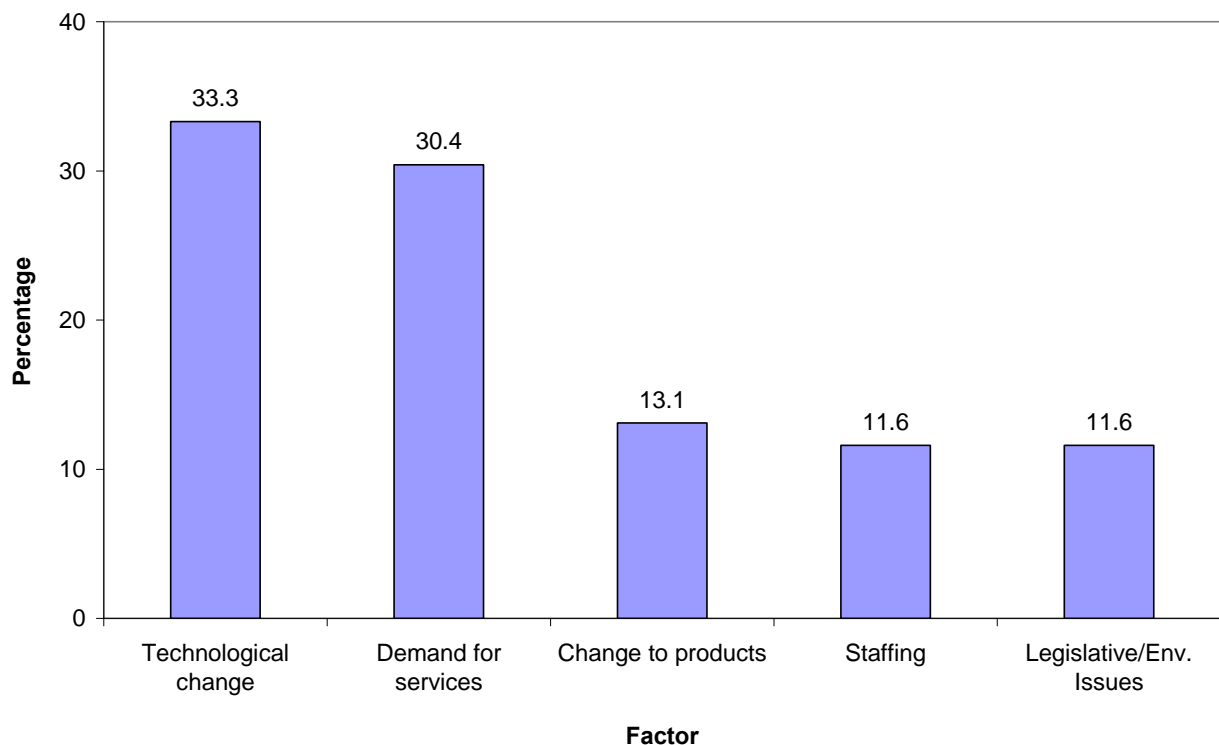
- broadening the geographical area of practice;
- new markets;
- population growth; and
- business expansion.

'Changes to products' issues listed by the participants included:

- development of a broader range of products; and
- changes in client specifications/needs.

'Staffing' included factors such as the ability to recruit suitable staff and diversification of their skills base, while 'legislative/environmental issues' included the introduction of new environmental legislation and changes to government policy.

**Chart 7. Key factors associated with organisations' demand for spatial science skills (Per cent)**



### **Key attributes of spatial science employees**

The survey sought information about the key attributes most sought after in spatial science employees.

Around 36 per cent of the participants listed 'conceptual/technical skills' as the key attribute of importance for spatial science employees, followed by 'miscellaneous skills' (26 per cent), 'behavioural attitude' (20 per cent) and communication skills (19 per cent) (Chart 8).

Examples of listed conceptual/technical skills were:

- ability to apply technology in the field;
- strong technical skills;

- appropriate qualifications;
- spatial knowledge and expertise; and
- ability to think conceptually / laterally.

Examples of miscellaneous skills were:

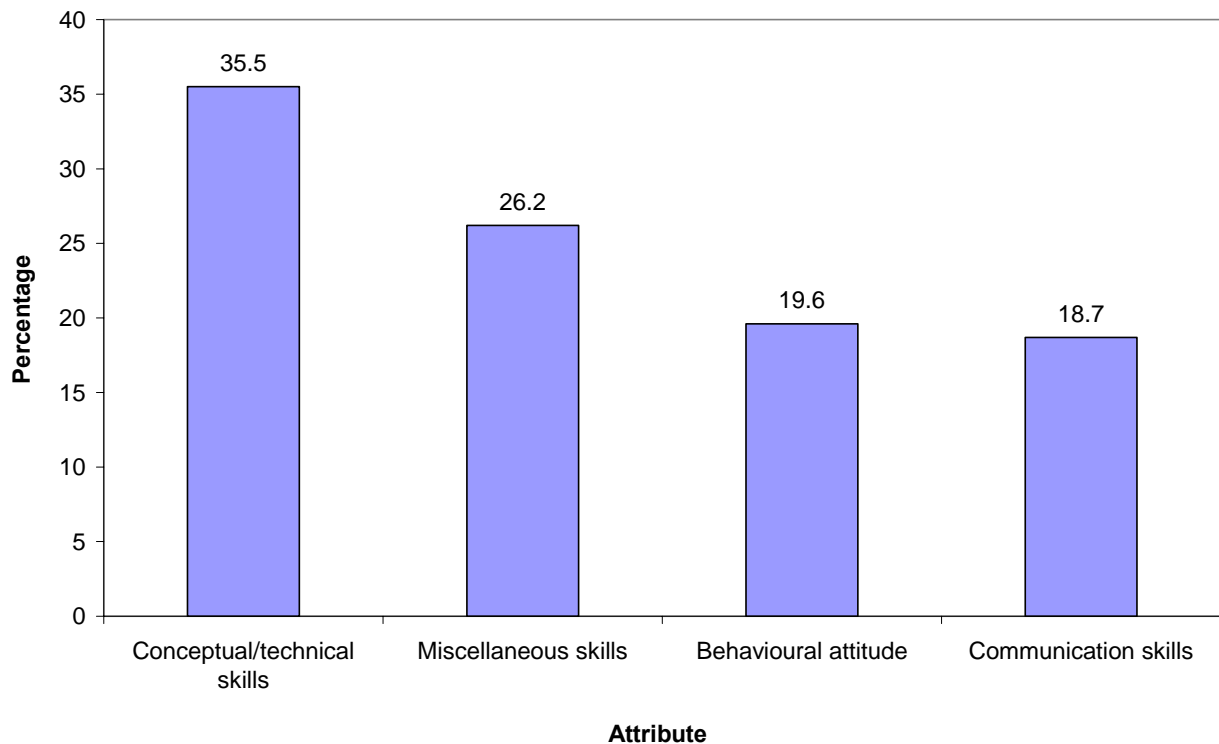
- business acumen;
- creativity and design skills;
- human resource/marketing skills;
- IT skills; and
- project management skills.

Examples of behavioural attitude were:

- ability to adapt;
- dedication and loyalty;
- desire to continue learning; and
- flexibility.

Communication skills included presentation skills, correspondence skills and interpersonal skills.

**Chart 8. Key attributes of importance for spatial science employees (Per cent)**



## General comments on recruiting issues

Participants were asked to make additional comments on recruiting issues in relation to spatial science-related occupations.

Over half (55 per cent) of the participants commented that recruitment difficulties, ageing of workforce, training and salary issues, and their organisations' recruitment strategies were significant issues for their industry.

Participants made the following comments regarding recruitment difficulties and the ageing of workforce:

- *"We have found that there is a lack of available trained professionals, licensed and spatial professionals, and major shortages of graduating students from both university and VET institutes. The ageing of professionals and associate professionals is also of concern."*;
- *"Lack of response from suitable employees from newspaper and internet advertisements and employment agencies is extremely disappointing."*; and
- *"The ability to attract skilled people is becoming more difficult"*.

Recruitment difficulties in the rural and regional areas were also highlighted by the participants:

- *"It is becoming increasingly difficult to find qualified staff (eg. registered surveyors), particularly in regional areas of NSW."*;
- *"Near impossible finding qualified candidates to work in rural areas. More and more people are leaving to work in cities and on the coast."*; and
- *"It is difficult recruiting anyone to rural NSW (west of the Great Dividing Range)"*.

Examples of comments on the training and salary issues were:

- *"Graduates need a balance of discipline qualification and more exposure to business practices."*;
- *"Graduates lack practical information and work skills and therefore require extensive training when employed."*;
- *"Presentation and communication skills are provided through on-the-job training, we would like to see these and other skills taught at university."*;
- *"There are very few graduates coming through local universities or TAFE which is making it difficult to recruit new staff."*;
- *"There needs to be closer liaison between education/university and industry."*;
- *"We have found there is a resource gap at the moment. Salaries are going up dramatically which is not reflected in the rates we can charge."*; and
- *"In WA, it is very difficult to attract suitable candidates away from the mining industry. It is impossible to compete with the salaried positions offered for fly in/fly out mining operations. Many graduates leave university and take up mining positions and therefore lack land development skills later on in their career"*.

Examples of comments on the recruitment strategies were:

- *“I am initiating a traineeship programme through the local TAFE to train persons in surveying who have left school. I am also trying to get part time/night school/in-house training reintroduced and recognised as there is a demand from employees for this sort of education as they can not go back to full time education.”; and*
- *“Shortage of experienced, suitably qualified people. We are therefore not seeking to recruit. We are winding down our business towards retirement. We use qualified contractors to meet any skill requirements”.*

## **Part 2 – Consultations**

Round table discussions were held during September with representatives of the Australian Spatial Information Business Association, the Spatial Sciences Institute, and the Cooperative Research Centre for Spatial Information. During the discussions the following issues were raised

- spatial information skills where recruitment difficulties currently exist;
- replacement demand for spatial information skills;
- staff retention strategies;
- women in spatial information; and
- recruitment strategies, including graduate and international recruitment.

### **Spatial information skills where recruitment difficulties currently exist**

Participants commented on the significant growth of the spatial information industry over the last few years due to factors including improvements in technology and the increasing reliance of infrastructure development, national security, mineral exploration and biosecurity on spatial information systems. Biota exploration, which can potentially lead to the discovery of new pharmaceuticals, materials and food products through surveying the animal and plant life of a particular region, relies on spatial information, and looks to become an important growth industry.

Participants noted increasing demand for expertise in the following areas:

- counterterrorism/defence;
- information knowledge;
- asset management;
- GPS tracking;
- mapping;

- business intelligence; and
- satellite imagery.

Participants indicated that due to significant growth in the industry over the last 3 years, specific skills, including Geographical Information System skills, and specific occupations, including software engineers and computer scientists, are in especially high demand.

### **Replacement demand for spatial information skills**

Participants expressed concern over the shortage of new workers in the spatial information industry. They suggested that the government's reduction in investment in the spatial information sector has led to the industry being largely comprised of small and medium-sized enterprises with a limited capacity to take on trainee staff. As the Australian government used to be the largest employer and trainer of employees in the spatial information industry, the ability of the sector to recruit and train new staff has since been diminished.

### **Staff retention strategies**

Participants noted that retention rates are low in the spatial information industry, and suggested that one of the reasons for poor retention rates is the relatively low salaries of spatial information employees. It was noted that the starting wage of \$50,000 is half that offered overseas and in areas such as mining. It was generally agreed that spatial information salaries are not competitive compared to other industries.

### **Recruitment strategies, including graduate and international recruitments**

Participants expressed concern at the fact that the numbers of students taking up spatial information courses at the university level is declining. In particular, it was noted that surveying places are not being filled in universities, which has resulted in graduates at all levels being in high demand. It was suggested that 'smarter' firms are approaching graduates in their 3<sup>rd</sup> to 4<sup>th</sup> year.

Participants also commented that international recruitment is impeded by the fact that overseas qualifications are not readily recognised in Australia.

One of the participants suggested that the industry suffers from a poor public image and that increasing community awareness through marketing could raise the profile of the spatial information sector. However, it was argued that the employment arena is already saturated with marketing campaigns, and that this avenue is costly and competitive. Although public knowledge of the spatial information industry has improved (e.g. via Google Earth), it was submitted that the industry's image problem negatively impacts on the industry's appeal to potential recruits.

### **Conclusion**

The survey questionnaire results and feedback from the consultation meetings indicate that current recruitment difficulties within the spatial information industry are expected to be exacerbated by the anticipated growth of the sector itself.

Participants expressed concern regarding the shortage of trained professionals and lack of graduating students available for recruitment. This has led to high demand for certain occupations within the industry, especially those requiring engineering skills. It was noted that there is upwards pressure on salaries as a result of the increased demand for skills, with other industries competing for the same graduates and professionals. Organisations involved in the study suggested that the relatively small size of the majority of spatial information businesses has led to difficulties in meeting these costs as well as the costs associated with training. This has led to low retention rates within the sector.

As technology continues to develop rapidly, the spatial information industry is set to grow to keep pace with these changes. Participants noted that there is the potential for current recruitment and retention problems to be aggravated by such growth unless the supply of suitably qualified staff increases.

**Attachment A****Industry Study of Demand for Spatial Information Skills****Introduction**

On 16 August 2004, the Australian Government announced a national audit of science, engineering and technology skills. As part of the audit, the Department of Education, Science and Training is conducting an industry study in industries where these skills are concentrated.

Our aim is to gain a better understanding of where spatial science skills are utilised by Australian industry, how employers recruit people with spatial science skills, which occupations employers are recruiting for and what degree of difficulty employers are having in recruiting people with spatial science skills.

In addition, we seek your organisation's views on the likely level and nature of future demand for spatial science skills and factors likely to influence demand for spatial science skills.

**Confidentiality of information**

This industry study is being conducted in accordance with the requirements of the Commonwealth Privacy Act. Information collected and stored by this Department during the industry study will be used solely for the purpose of the national audit of science engineering and technology skills, and no organisational level data will be published. Any information that your organisation provides to this Department will be treated as confidential.

**Reporting**

The results of the industry study will be used in preparing an Australian Government Report on science, engineering and technology skills issues.

**Due Date**

Please respond to the industry study by **Friday 8 July 2005**, using the attached reply paid envelope or by faxing your response to us.

Mail: Skills Analysis Section  
Location 242  
Department of Education, Science and Training  
GPO Box 9880  
CANBERRA ACT 2601

Fax: (02) 6123 7909

**Help available**

If you have any queries about any aspect of the industry study or require assistance to complete the questionnaire before the due date, please contact us on **1800 113 149**, by fax **(02) 6123 7909** or by email at [saegindustrysurvey@dest.gov.au](mailto:saegindustrysurvey@dest.gov.au)

**How to answer**

- For each question, please mark your responses with a tick (✓), unless otherwise indicated.
- For **other** questions, provide a brief response.
- If you **are not sure** about an answer, give your best approximation.
- If you need more room to write your response, please use an Attachment page at the end of this survey. Please write the question number and your response.

**Q1. What is the name of your organisation?**


**Q2. What is your organisation's head office postcode?**

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**Q3. What is the main industry in which your organisation operates?**  
(please tick  one box only)

Agriculture, Forestry and Fishing	<input type="checkbox"/>
Mining	<input type="checkbox"/>
Manufacturing	<input type="checkbox"/>
Electricity, Gas and Water Supply	<input type="checkbox"/>
Construction	<input type="checkbox"/>
Wholesale Trade	<input type="checkbox"/>
Retail Trade	<input type="checkbox"/>
Accommodation, Cafes and Restaurants	<input type="checkbox"/>
Transport and Storage	<input type="checkbox"/>
Communication Services	<input type="checkbox"/>
Finance and Insurance	<input type="checkbox"/>
Property and Business services	<input type="checkbox"/>
Government administration and Defence	<input type="checkbox"/>
Education	<input type="checkbox"/>
Health and Community services	<input type="checkbox"/>
Cultural and Recreational services	<input type="checkbox"/>
Personal Services	<input type="checkbox"/>
Other (please specify)	<input type="checkbox"/>

**Q4. In which State/Territory is your organisation mainly located?**(please tick  one box only)

NSW	
VIC	
QLD	
SA	
WA	
TAS	
NT	
ACT	
Other (including overseas location) (please specify)	

**Q5. How many people does your business employ in each State/Territory?**

<b>State/Territory</b>	<b>Number of employee(s) as at 26 May 2005</b>
	<i>Employee including:</i> <ul style="list-style-type: none"> <li>• Person paid a retainer, wage or salary</li> <li>• Working proprietors and partners</li> <li>• Contract miners paid through the payroll (mining only)</li> </ul> <i>Excluding:</i> <ul style="list-style-type: none"> <li>• Persons paid by commission only</li> <li>• Non-salaried directors</li> <li>• Self employed persons such as a consultants and contractors</li> <li>• Volunteers</li> </ul>
NSW	
VIC	
QLD	
SA	
WA	
TAS	
NT	
ACT	
Other	
<b>Total number of employees</b>	

**Q6. What proportion of your products or services do you sell:**

	Per cent
In Australia?	
Overseas?	

**Q7. Does your organisation offer employment in spatial science related occupations?**(See below Additional Information box for more details)

Yes		Continue at Q8
No		Continue at Q10

**Additional Information****Science, engineering and technology (SET) related occupations**

The SET related occupations to be included at the lowest level are too numerous to list here. However, they include occupations in the Managerial, Professional, Associate Professional and Trades occupations.

- Example of Managerial occupations - Engineering Managers, Production Managers, Finance Managers, Health Services Manager, etc.
- Example of Professional occupations – Surveyors, Cartographers, Chemists, Geologists & Geophysicists, Life Scientists, Environmental & Agricultural Professionals, Medical Scientists, Quantity Surveyors, Engineers, Mathematicians, Statisticians, Actuaries, Pharmacists, Psychologists, Occupational & Environmental Health Professionals, etc.
- Example of Associate Professional occupations - Medical/Science Technical Officers, Building, Architect & Survey Associate Professionals, Civil/Electrical/Electronic/Mechanical Engineering Associate Professionals, etc.
- Example of Trades occupations - Mechanical/Fabrication Engineering Tradespersons, Automotive Tradespersons, Electrical/Electronics Tradespersons, Construction Tradespersons, Food Tradespersons, Skilled Agricultural & Horticultural Workers, etc.

**Qualification level classification**

- Postgraduate degree level (incl. Doctoral & Master)
- Graduate diploma & certificate level
- Bachelor degree level
- Advanced diploma & diploma level
- Certificate level
- Secondary education
- Primary education
- Pre-primary education
- Other

**Q8.** If you answered Yes at Q7:

**How many persons are employed in spatial science related occupations and what minimum required level of qualification do your employees in these occupations hold?**

<u>Occupation</u> <ul style="list-style-type: none"> <li>• Refer to <b>Additional Information</b> on page 4 for the examples of occupations.</li> <li>• Give full title.</li> </ul>	<u>Number of employee(s) as at 26 May 2005</u> <ul style="list-style-type: none"> <li>• Refer to <b>Q5</b> on page 3 for a definition of employee.</li> </ul>	<u>Minimum required qualification level</u> <ul style="list-style-type: none"> <li>• Refer to <b>Additional Information</b> on page 4 for a qualification level classification.</li> </ul>

*Note: If you need more room to write your response, please use an Attachment page at the end of this survey. Please write the question number and your response.*

**Q9.** If you answered Yes at Q7:

**Of those numbers of employee that you listed in Q8, approximately what percentage is likely to retire in next ten years?**

\_\_\_\_\_ per cent







**Q16. Please rank your main sources of employees in spatial science related occupations (on a scale of 1 to 5, where 1 is your main source).**

Upgrading skills of existing employees	
Private training providers	
Other Employers	
Local TAFE	
Local University	
Other TAFE	
Other Australian Universities	
Migration	
Other (please specify)	

**Q17. How does your organisation most commonly advertise vacant positions for spatial science related occupations? (please tick one box only).**

Newspaper advertisements	
Internet advertisements	
Trade journal advertisements	
Word of mouth	
Private recruitment agencies	
Job Network	
Other (please specify)	

**Q18. Do you wish to make any additional comments on recruiting issues in relation to spatial science related occupations?**

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**Q19. We seek your views on the future skills needs for your organisation. What changes in the type of spatial science skills and at what level, do you see your organisation needing over the next 5 – 10 years?**

**Q19 (1). In the next five years:**

Type of spatial science skills required	Level of qualification required

**Q19 (2). In the next ten years:**

Type of spatial science skills required	Level of qualification required

**Q20. Considering some of the broader economic factors affecting your organisation’s future skills needs, rate the significance of the following issues on a scale of 1 to 5, where 1 means not at all important and 5 means very important.**

	<b>Rating</b>
	1 = Not at all important 2 = Not important 3 = Neither important nor unimportant 4 = Important 5 = Very important (Please select one)
Technological change	
Ageing of your business workforce	
Labour cost issues	
Potential changes in your business products	
Potential changes in your production processes	



Please indicate the approximate time that it has taken to complete the survey.

\_\_\_\_\_ Hours \_\_\_\_\_ Minutes

**To help us clarify any specific issues, please provide a contact name and details.**

- Answering this question is **OPTIONAL**.
- This question will be used to clarify any specific issues related to the questionnaire only.
- See page 1 for the confidentiality note.

Name: \_\_\_\_\_

Phone: ( \_\_\_\_\_ ) \_\_\_\_\_  
                  Area code

Email: \_\_\_\_\_

