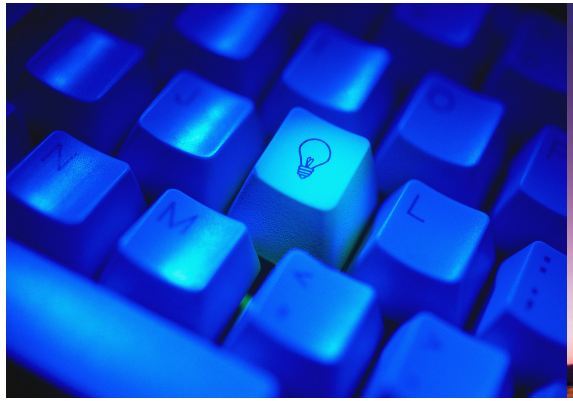
Career Pathways and Building Skills

for the

Spatial Information Industry



This report was prepared by Performance Growth Pty Ltd on behalf of SEAC. The report has been prepared with the support and input of the industry but the views remain those of the author.

Performance Growth would particularly like to thank the project manager and coordinator, Mr Paul Kelly, the members of the project steering committee and all industry leaders who kindly gave their time and ideas during the consultation phase.

Contact:

Georgie Cane

Director

Performance Growth Pty Ltd

T: 03 6225 1444

F: 03 6225 1555

E: gcane@performancegrowth.com.au

PO Box 2030 Lower Sandy Bay TAS 7005

www.performancegrowth.com.au

Contents

Context

The Spatial Information industry contains a wide range of job roles that span technical specialists, para-professionals, administrative support staff and business managers.

The pathways to work are equally diverse. Individuals can enter the industry with the intent of pursuing a career in a government agency or a private sector firm or they can look towards starting their own business. The industry has workplaces that span all sizes of enterprises ranging from large government agencies to sole traders with a concentration in small to medium sized enterprises.

The concept of a spatial information industry is relatively new. It reflects a converging of a range of technologies, such as navigation using Global Positioning Systems, earth sensing satellites, information and communications and new mobile technologies to service many application areas, from land administration, through asset management to climate change. The industry encompasses and builds on some traditional discipline areas like surveying, mapping, aerial photography, hydrography, remote sensing and aspects of engineering. It also includes new areas such as application of spatial technologies in environmental management, social and economic infrastructure. It is an industry with strong growth potential over the next decade.

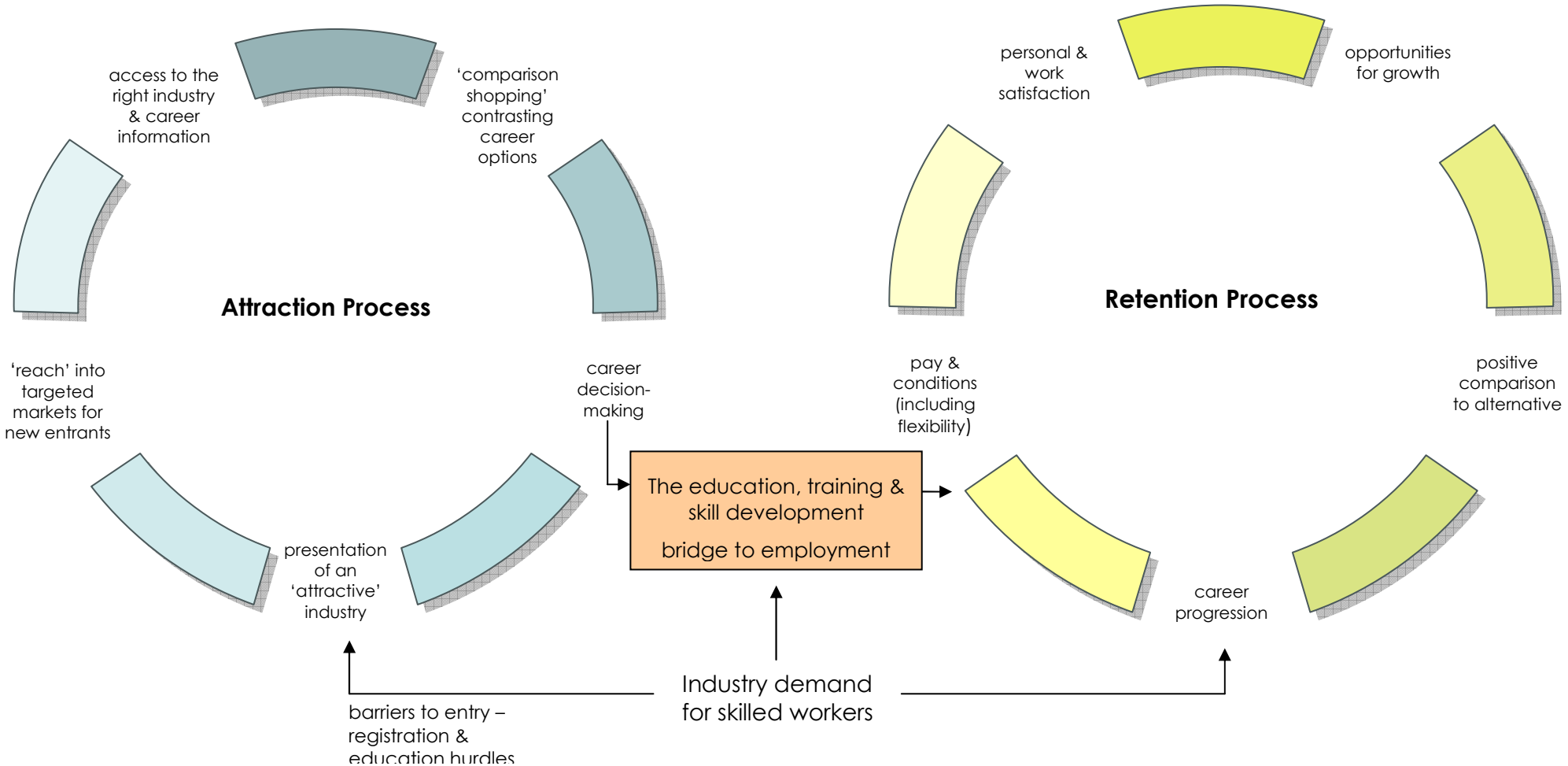
Informing the project's development

In discussions with industry practitioners and leaders a smorgasbord of issues were raised to identify the current 'shape' of the Spatial Information industry workforce and the nature of career pathways into and within it. It is recognised that this information is anecdotal but the consistency of the viewpoints do help to illuminate the challenges ahead for the industry. While it is without doubt clear that the industry is experiencing significant skill and personnel shortages, and that this situation will worsen before the problem is ameliorated, the situation is complex and requires a response that goes beyond simply attracting new people to the industry (although this is of course a central goal). The industry is concerned to build its understanding of the broad career development process. Its focus on developing career pathways is a direct response to the very real need to ensure this growing and diverse industry has access to the workforce required in the medium and longer term.

If the industry's skill shortages cannot simply be overcome by recruiting new entrants it is recognised that other approaches must also be pursued as part of an integrated strategy such as retaining older and more experienced people in the industry, reskilling and upskilling those already in and committed to the industry and managing the 'leakage' of younger professionals to other related industries. It is also recognised that attraction and retention strategies and processes are multi-faceted and must address the needs of

individuals. The attraction and retention strategies and processes are also equally weighted. The industry cannot, for example, seek success and place all its effort into attracting more school leavers if it does not address other facets such as ensuring competitive pay and conditions or ensuring sound career progression opportunities in order to retain its existing workers. A means of demonstrating the interlinked components of the attraction and retention processes and their importance in ensuring adequate **skill supply** is shown below:

Chart 1: industry attraction and retention processes



An imbalance or ineffectiveness in the attraction and retention strategies leads to demand for skills exceeding supply.

The dimensions and impacts of the skill shortages have been previously well documented in work commissioned by SEAC. The 2007 *Spatial Information Industry Workforce Plan*[1] identified a range of interlinked and multifaceted attraction and retention strategies that are aimed at ensuring the industry has access to the required skill base. The need for action by all stakeholders including employers, government and education & training providers was identified in the report with the intent of harnessing effort in the cause of developing the Spatial Industry's workforce. Issues related to the current and projected skill shortages identified in the Workforce Plan include:

- the lack of school leavers entering post-secondary education programs
- graduates of spatial programs not taking up work in the industry but electing to move into related disciplines and industries
- geographic skill shortages resulting from workers unwillingness to move to take up work
- low levels of participation rates in the industry by some groups including women and migrants
- an inability to retain older workers
- poor utilisation of the skills of the existing workforce
- the need to upskill existing workers to address emerging needs and opportunities

It is necessary to understand the factors related to the skill attraction and retention processes in order to build career pathways that will be useful, successful and sustainable.

An analysis of spatial career pathways also must recognise the enormous variety of work and industry settings in which spatial skills are used. Spatial skills are employed in many settings by practitioners who closely identify with the Spatial Information industry. These core areas include surveying, cartography, remote sensing, geographic information, town planning, engineering and land and resource management. The potential of career pathways into and out of the spatial information industry also extends well beyond these core areas and into virtually all other industries where spatial skills are used to enrich the work of professionals who may have a lower level of identification and connection with the Spatial Information industry. The fact that career pathways can be built between and across almost all industries challenges the notion of building traditional career pathways. The options available to individuals to either grow within the 'core disciplines' or to take their skills into other 'host' industries (ranging from government to business services to health and utilities) provides a multiplicity of options. These options are broadened further when pathways into the industry by professionals from other industries who bring valuable skills into the Spatial Information industry are considered.

---

[1] P. Kelly. *Spatial Information Industry Workforce Plan, SEAC, 2007*

Industry environment and impact of careers and skill shortages

In order to explore more fully the industry environment and the issues surrounding workforce growth and career progression in-depth interviews were held with leading industry practitioners. These interviews were designed to explore individuals', very diverse, career pathways and also more generally issues related to the attraction and retention of staff in a broadly based industry.

Seven key themes emerged from this consultation phase that will inform the development of job profiles and career pathways and inform strategy development. The themes, which will also influence individuals' choices regarding career selection, are explored below:

1. Skill shortages are not only experienced at the entry level

While it is immediately attractive to think that skill shortages can be fully addressed by attracting more young people to enter the industry there is evidence to suggest that in some core professional areas, most notably surveying, that the industry structure has been significantly affected by a 'hollowing out' of the workforce during the 1980s and 1990s when the property industry experienced a significant downturn. This led to many practitioners exiting the industry leaving insufficient numbers of professionals who would now be in their late 30s and 40s and who would be able to assume senior management roles and/or purchase functioning businesses so that the older principals can retire.

Australian Bureau of Statistics data, below, demonstrates that there are fewer surveyors in the 30-39 years and 40-49 years categories than other occupations identified in an earlier SEAC study[2] as comprising the wider spatial industry workforce. Fewer than 25% of surveyors are aged 30-39 years in contrast to more than 32% for the wider spatial workforce – a percentage that is even lower than the comparison of 40-49 year old workers. This indicates that surveying will continue to face critical challenges in succession planning and skill shortages in the middle and senior ranks of the workforce during the coming 10 to15 years and that these shortages will be even more significant than those currently being experienced.

	Less than 20 years	20-29 years	30-39 years	40-49 years	50-59 years	60 years and over	Total	**% 30-39 years**	**%40-49 years**
212313 Surveyor	163	1555	1769	1548	1565	553	7153	24.73%	21.64%
312115 Surveying and Cartographic Associate	31	285	290	295	324	71	1296	22.38%	22.76%
991411 Survey Hand	252	641	370	326	263	117	1969	18.79%	16.56%
Total all spatial related occupations	**2,478**	**63,510**	**85,130**	**64,411**	**39,196**	**10,395**	**265,120**	**32.11%**	**24.30%**

Table 1. Occupation by Age. ABS, 2006 Census of Housing and Population

[2] G. Cane. *The spatial information industry in Australia: profile, education & training and skill demand*. SEAC 2007

In order to address this challenge the industry will have to adopt significant staff retention strategies, including fostering interesting and rewarding career paths, while also upskilling existing workers and attracting new entrants including those who may not have followed a traditional or 'linear' career path in an industry sector.

In addition to the pressures of skill shortages, the changing nature of the technologies and the opening of new business opportunities within the industry are also driving the need to attract new skills, and people, into the industry to supplement the building of the core and entry level workforce.

Encouraging the development, use and industry acceptance of shorter, more 'fleet of foot', education & training courses and continuing professional development will be essential if flexible entry to the industry and the upskilling and reskilling of workers are to be facilitated.

2. Occupations can become 'silos' rather than pathways

The concept of a career pathway brings with it an assumption that there are ways to build a career that is other than linear. In short, a pathway assumes that a worker can start in one part, sector or discipline within the industry and move sideways as well as in a single track from entry level worker to senior manager within the one area. While this undoubtedly does occur it must also be recognised that the flexibility of career development and transferability of skills is less common in some parts of the industry than others.

There is evidence from industry practitioners that entrants with quite broadly based GIS or geomatics qualifications can and do take their skills into a number of differing arenas and, similarly, that people from differing backgrounds come to work in this spatial field. On the other hand it is more difficult for an experienced, but more generally educated spatial professional, to follow a pathway *into* surveying as this typically requires 'starting at the bottom' again and undertaking specified undergraduate qualifications to meet licensing requirements. While it is understood that there are opportunities for para-professionals in surveying to upskill and attain full professional qualifications and licensing (following a more linear pathway) it must also be recognised that there are significant barriers to the creation of flexible entry points to some discipline areas which have licensing requirements that inherently limit career pathway opportunities. This is a significant challenge and one that will require resolution by industry and the regulators.

The narrow versus more open pathways into the industry and discipline are shown below.

Because of the requirements of the regulated surveying discipline pathways are narrow with only one entry point, a surveying degree, followed by progression through the registration process. Surveyors can and do, however, subsequently branch out into other more diverse careers. This is in contrast with the newer spatial science disciplines that, without the registration hurdle, see entrants come from a number of university pathways as well as from other industries. It is likely that the greater flexibility of entry to generalist GIS careers will see the number of workers in this area grow and thrive.

Narrow, single entry, pathway

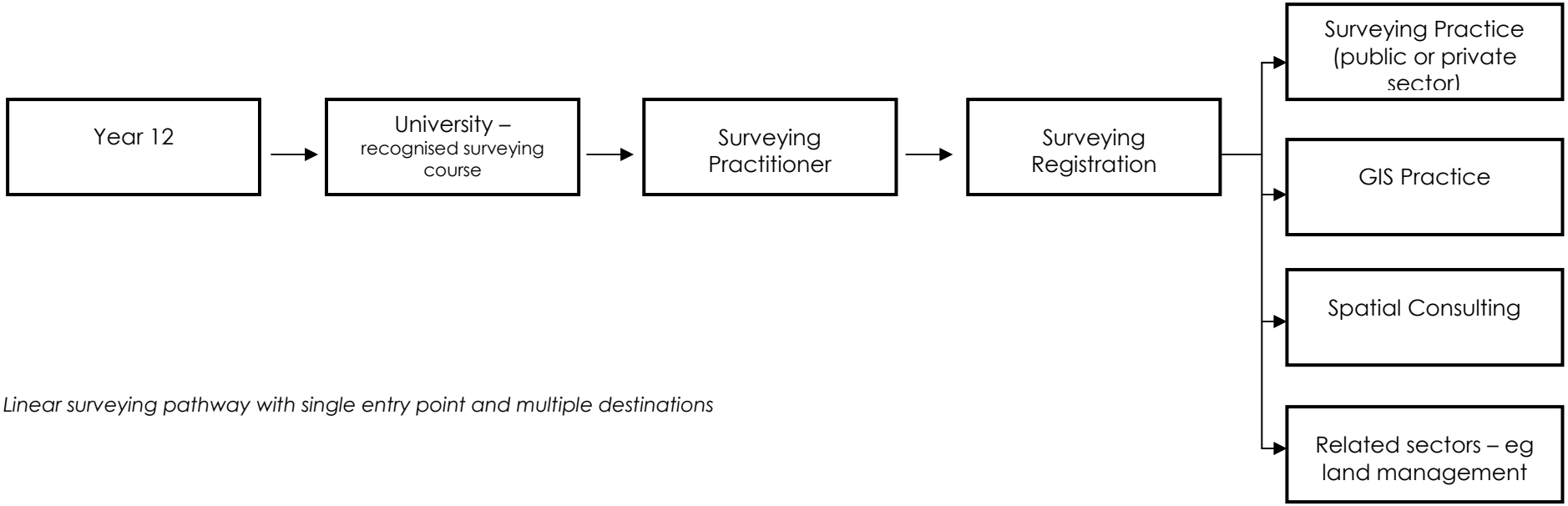


Chart 2: Linear surveying pathway with single entry point and multiple destinations

Open, diverse entry, pathway

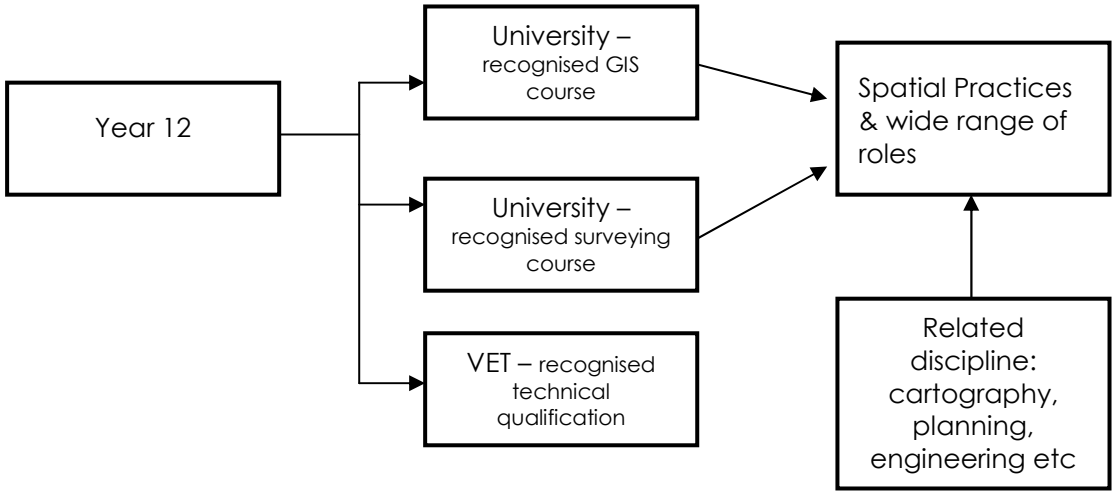


Chart 3: Multi- pathway general spatial career

Understanding the impact of a narrow linear pathway contrasted to the multi-pathways of more generalist roles is of fundamental importance to the Spatial Information industry. Surveying and GIS qualifications are the two chief pathways into core Spatial Information roles. The interview and consultation phase of this project clearly identified that surveying has been a sound foundation, and launching pad, for many of the current industry leaders who have subsequently moved into interesting and challenging roles. This linear pathway serves its key purpose of developing highly skilled practitioners. Over time these skilled surveying practitioners may also branch out and take their skills into other more generalist and related spatial areas. Their skills are not lost to the industry but the capacity of the industry to replenish the specialist surveying skills that are required from within the existing industry workforce is limited. In short it is easy to get out of the surveying specialism but difficult to get into it.

3. Education & Training barriers and flexibility

An issue related to the creation of 'career silos', where pathways into particular discipline areas are limited, is the role of education and training strategies and their capacity to both encourage new entrants into the industry and support their career progression. In commencing this discussion it must be acknowledged that the Spatial Information industry is supported by high quality and dedicated education providers. It is, however, also timely that the industry extends its discussions with education and training providers to ensure strategies are in place to meet the emerging and growing needs of the industry.

Within this complex area several issues are raised for consideration:

- The traditional surveying discipline will continue to struggle to attract the number of new entrants it is seeking into university courses where the entry requirement for high level or advanced mathematics is present and fewer students in secondary schools are undertaking these courses. In short, the industry has a small pool of potential new entrants from which to draw and these candidates have, because of their talents, many career choices. This is not intended to in anyway diminish the need for particular levels of skills and knowledge required for effective performance in the discipline. What is raised for consideration, however, is that industry should actively encourage strategies successfully adopted in some university faculties to set a lower level maths entry requirement and then to offer both surveying and other GIS candidates appropriate introductory and intensive courses to ensure they have the appropriate underpinning of skill and knowledge. By opening entry requirements the pool of candidates will increase.
- Industry should also encourage, support and actively foster the delivery of 'top up', shorter course, education and training that encourages career pathways across the 'silos'. Such as a program, for example, may enable an experienced 'generalist' geo-spatial officer to fast track into and through a surveying or cartography course without undertaking a full three or four year undergraduate degree.

- The integration and recognition of workplace learning should also be a priority for industry and its education and training providers. It is a given that all practitioners build skill and experience on-the-job and that career progression is typically enhanced by being exposed to rich workplace experience and the support of employers who provide the opportunity to learn while working. The Spatial Information industry, in common with many other industries, would benefit from an increased focus on the recognition of workplace based learning. This can be supported in a number of ways including the use of industry association post-nominals and awards (such as certified practitioner status; 'fellowships' or other forms of advanced standing) for experienced practitioners and, importantly, by the increased focus of education and training providers on the offering of action, project and workplace-based learning rather than classroom-based or more rigid distance learning programs.

The industry will also benefit from driving a national discussion with education and training providers regarding the nomenclature of qualifications and the need for clarity regarding the 'pitching' of certain qualifications with particular roles.

An online search of qualifications within the higher education sector identifies a wide range of terminology for comparable programs. While it is understood that the education industry is a competitive marketplace where each provider is seeking differentiation the use of seemingly synonymous terms can be confusing and does not encourage the building of a common community-wide understanding of the industry. The use of synonymous terms such as GIS, spatial information services, spatial information science, geographic information science, geographic information systems, geospatial information science, geographical sciences, geospatial information, spatial science and geomatics will do little to help the industry to promote itself clearly or to communicate its purpose and nature to the community and future workers.

There are relevant courses offered across the Australian Qualification Framework (AQF) spectrum. The AQF is a national tool that is designed to ensure qualifications across all education sectors are properly defined and aligned to a set of criteria that describe the outcomes broadly achieved at each level. It can be seen from the diagram below that there is overlap. For example, the Vocational Education & Training (VET) sector and the Higher Education sector both have graduate certificate and graduate diploma level qualifications.

While the education industry is competitive, there is considerable scope for the Spatial Information industry to clarify and define the roles that are played within the industry and how they can be aligned to the AQF. While this occurs within the VET sector because the qualifications are nationally developed and delivery at the local level is designed to reflect the national outcomes the same cannot be said for the higher education sector. In a rapidly growing and emerging industry higher education courses have been developed with an understandably local focus. The audiences for particular programs are not, however, immediately clear and nor is there obvious delineation between the scope and content of, for example, a degree or graduate diploma in a particular area.

Greater clarity from industry about the outcomes that are sought to support particular job roles will also benefit education providers who are seeking to maximise the benefit to the industry from the programs that are delivered.

AQF Qualification by Sector of Accreditation

Schools Sector Accreditation	Vocational Education and Training Sector Accreditation	Higher Education Sector Accreditation
		Doctoral Degree
		Masters Degree
	Vocational Graduate Diploma	Graduate Diploma
	Vocational Graduate Certificate	Graduate Certificate
		Bachelor Degree
	Advanced Diploma	Associate Degree, Advanced Diploma
	Diploma	Diploma
Senior Secondary Certificate of Education	Certificate IV	
	Certificate III	
	Certificate II	
	Certificate I	

Understanding and using the AQF to define work roles and the education and training to support them will create a climate that will facilitate articulation between qualifications and the building of career pathways for individuals.

Industry will also benefit from a proper and wide spread availability of recognition of prior learning (RPL) that means individuals do not have to undertake training in an area where they already have demonstrable competence. Industry must be active in moving towards establishing relationships and 'preferred supplier' arrangements with education and training providers that offer RPL and streamline access to programs.

4. Education & Training to support business and management pathways requires an increased focus

The Spatial Information industry is at its heart a scientific and technically based one. It is, however, an industry engaged in the market place and the industry and its practitioners would benefit from a more structured approach and pathways into management and business ownership. Although there is a plethora of generic management education and training offerings available it would be beneficial to the industry to drive the design and delivery of management and business training in much the same way as the scientific and technical education and training are supported and driven by the industry.

Sound industry orientation should be given to the many practitioners who join the industry from other spheres and provide the needed business or management skills. As one industry leader noted: "give me someone with the right skills, drive and attitude and I'll go to

great lengths to teach them about the industry – or I'll partner them with someone who has the technical industry skills." While this in-house development of staff can be successful it is dependent upon the skills, time and energy of the individual employer and a more structured approach through recognised education and training pathways would benefit the industry as a whole.

5. Spatial professionals seeking to pursue a 'technical' career can reach an early 'career ceiling'

The Spatial Information industry, in common with many other technically based sectors, experiences inherent career pathway barriers for practitioners. Many of the most talented and valuable members of the industry were initially attracted to undertake the education and training needed to enter the field because of their inherent interest in the underpinning technical skills and science.

The Spatial Information industry has many very positive and attractive attributes for those with the competence and interest to enter the field – the technology is powerful, the problems to which spatial analysis can be applied are interesting and the commercial and public benefits are undeniable. A practitioner with strong technical competence can progress in the industry quickly particularly at a time of skill shortages where the employee is in a powerful position and can change jobs and employers readily in order to advance his or her career. This can lead to an experienced, young and skilled professional in his or her early 30s being in a well paid and senior role with challenging work. This positive situation can, however, also create a dilemma for the practitioner when deciding on the next career step to take. If the practitioner wishes to advance and receive greater remuneration the only option may be to pursue a management role that can mean leaving the technical work behind. Alternatively, to continue in a technical role may mean either accepting a 'ceiling' on the level of remuneration and position or moving laterally into other related technical roles.

Those seeking to extend a technically-based career and achieve reward and recognition may also benefit from high level training to build both their career options and recognition within their industry and amongst their peers. In addition to training and providing challenging work the industry can also play a role in creating mechanisms to recognise technical excellence. The offering of fellowships and 'advanced' or 'master practitioner' status has been used effectively in many industries and their leading associations to recognise skilled practitioners.

6. Rethinking roles and responsibilities

The Spatial Information industry is inherently one of change. The advent of new technologies has driven new ways of work and new business opportunities. Rapid growth and change also challenges industries that are seeking to build an appropriately skilled workforce. One element of addressing skill shortages and making effective use of the talent that is available is to ensure that there is a close match between the job and the level of qualification and skill required of the workers. There is also a tendency, in many industries, for employers to seek the *most qualified* candidates that can be found rather than the *most appropriately qualified* candidates.

A key opportunity that is now available to the industry as a result of the creation of new and higher level Australian Apprenticeships (often call traineeships) is to revisit the structure of jobs and consider which roles are best undertaken by professionally and university

qualified personnel and which tasks are better undertaken by para-professional and support staff who are more likely to be trained within the vocational education and training sector. This latter group may also be employed and trained under the apprenticeship system that brings significant financial incentives to employers.

Ensuring a better alignment between the qualifications held by staff and the work that is undertaken has multiple benefits. It means employers are able to draw from a larger pool of candidates, it enables a better tailoring of remuneration to the work undertaken and it ensures workers are more fully utilising their skills which is a key driver of job satisfaction. It also provides scope for both employer and employee to target specific skill development opportunities to improve productivity and deliver rewarding career growth. During the consultations conducted for this project there were indications of employers seeking university graduate staff to undertake entry-level data capture work. This had a two-fold impact. It meant the cost to the employer for doing the work was potentially inappropriately high and, critically, it can lead to poor levels of work satisfaction for the employees who felt they were being underutilised.

The industry will also benefit from strengthening its focus on the role of para-professionals and in providing opportunities for motivated employees to build satisfying career paths. Education and training providers do offer, in varying ways, credits or advanced standing for VET graduates seeking entry into professional degree qualifications. This trend should receive ongoing and enhanced support from industry with scholarships and bursaries being offered by employers of mature para-professionals seeking to extend their qualifications in much the same way as employers are currently actively seeking to attract new professional entrants from first degree courses.

Flexible approaches to education and training coupled with a review of the way work is structured will also encourage currently under-represented groups within the Spatial Information industry workforce to participate. In particular, women who may be seeking flexible approaches to the design of jobs and upskilling to re-enter the workplace may be encouraged to consider the industry as an attractive career.

Rethinking roles and responsibilities and encouraging career progression from within the existing workforce also will build a strong core workforce that will support the industry's need for succession planning and the replacement of the middle and senior level roles that will be required as an older workforce moves towards retirement.

7. Competition for workers across industries is a potential short term threat and also an opportunity

The benefits of attracting people to enter the Spatial Information industry from related disciplines is an attractive proposition and one that must be actively pursued by the industry and represented in career pathway maps and strategies. The converse situation also applies with skilled spatial information professionals having the opportunity to take their skills into other industries – particularly at times of low levels of unemployment and nation-wide skill shortages. This should be viewed as a negative situation as the creation of an understanding that the spatial information industry has a matrix structure supporting and intersecting with other industries has the potential to grow the pool of potential spatial information workers in the medium to long term.

The trend of schools and universities embedding spatial training in the courses of other disciplines will, in the long term, also serve to build a community-wide spatial skill base that will be of benefit to the industry. The challenge for the industry will be in building a connection with this pool of workers who may only see themselves as being tangentially attached to the Spatial Information industry. This is a matter for branding and for the careful communication of career opportunities to this potentially valuable workforce cohort.

Discussions with industry leaders has also highlighted the difficulties the industry has in competing for skilled spatial workers at a time of low levels of unemployment and, particularly, a mining boom that can offer levels of remuneration to highly valued spatial workers that cannot be met by 'core' spatial information businesses. These short-term aberrations in the job market should not deflect the industry from pursuing sustainable growth strategies that build a solid base of skills to meet future user needs.

Building a career map

The emerging and dynamic nature of the Spatial Information industry, coupled with the issues outlined above, means that the career pathways and the skill sets that are identified to support them must be flexible and broadly based. There must be multiple education pathways to arrive at the same point. For example, a surveying assistant with a TAFE qualification may over time, and with experience, build his or her skills and then seek to enrol in a suitable undergraduate degree and achieve a bachelor qualification that will set him or her on a path to professional recognition. Alternatively, a person with appropriate entry requirements can leave year 12 and immediately enrol in the same undergraduate surveying degree.

Similarly, a person may become a specialist GIS analyst through an initial undergraduate degree, post graduate qualifications or following time working in local government planning and then seeking to 'top up' with a graduate certificate to enrich career prospects with spatial skills.

Just some of the Spatial Information career opportunities mapped against educational pathways are shown below. **Following this overview or generic career pathways map a number of specific and indicative career pathways are presented:**

	Entry may be via: • School • Previous post-school qualification				Entry may be via: • undergraduate education pathways in spatial information (including double degrees) • initial qualifications in other disciplines – engineering, environmental studies, agriculture, mining, commerce (including double degrees combined with spatial)			
	Cert III	**Cert IV**	**Diploma**	**Advanced Diploma**	**Bachelor Degree**	**Grad Cert /Dip**	**Master Degree**	**PhD**
Para-professional role	Surveying field hand	Surveyor's assistant GIS assistant Town Planning Assistant						
Early-career Professional role			Survey technician GIS Officer	Surveyor GIS Data manager	Cartographer Surveyor GIS Officer/Analyst	→	→	→
Technical specialist					Photogrammetrist Remote sensing specialist Specialist surveyor (eg Geodetic)	→	→	→
Senior professional					Senior Cartographer Senior Surveyors Senior GIS Analyst Senior Photogrammetrist Remote sensing specialist Spatial consultant	→	→	→
Business manager/owner		Role not qualification dependent Multiple pathways and multiple areas of specialisation						

Chart 4: general career pathways chart

Career Maps and Progression

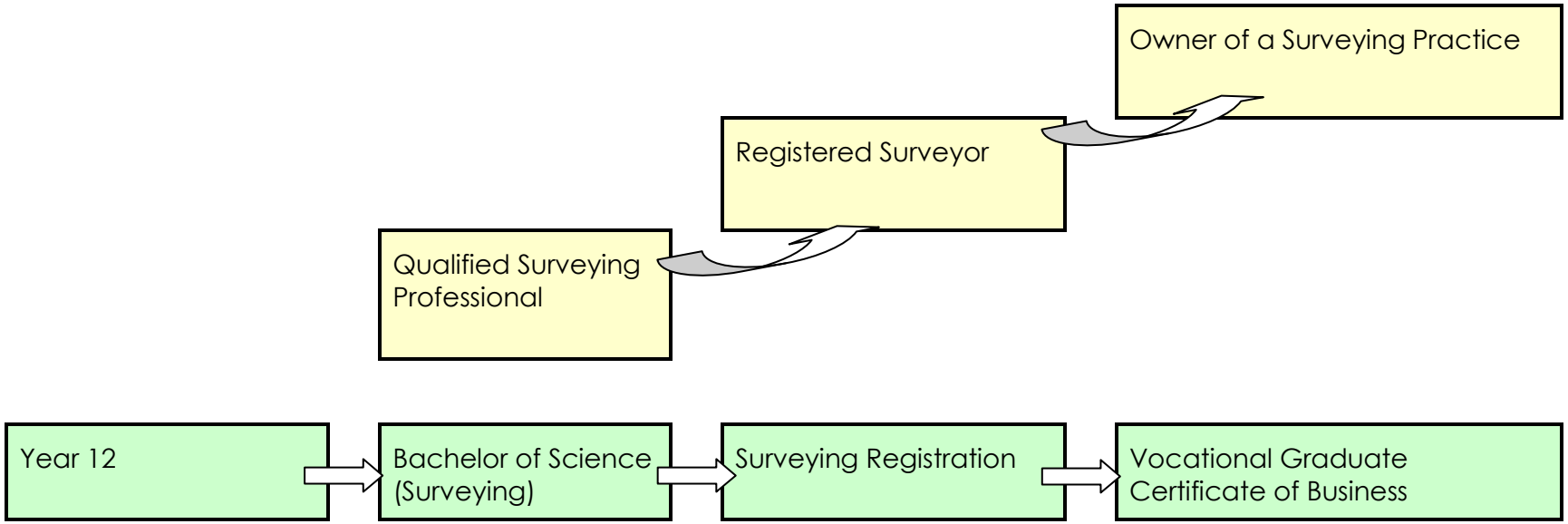
The diversity of the careers available within the Spatial Information industry means that there is no single pathway that is followed. This is an inherent strength of the industry – offering choice to individuals and the opportunities to pursue their interests and passions. It also means that individuals must be supported and mentored within the industry in order for them to navigate successfully the complex pathways that are available. The following pathways are grouped into a series of commonly pursued forms and show the career pathway underpinned by a representative qualification pathway. At least one example of a particular career pathway within each form is also provided.. It is intended that by understanding these general forms that the inherent complexity (perhaps confusion) that is presented by the almost limitless potential individual career pathways can be avoided. Understanding the different forms of career pathways that can be pursued can help the individual to make choices and industry and education & training providers to design responsive strategies and programs. The five general pathway forms are shown below:

1. The linear pathway within a discipline

The linear career pathway, historically, represented the 'typical' career path of a 'job for life'. The challenge, but also opportunity, for the spatial industry is that younger practitioners are less likely to commit to any one field for the duration of their careers.

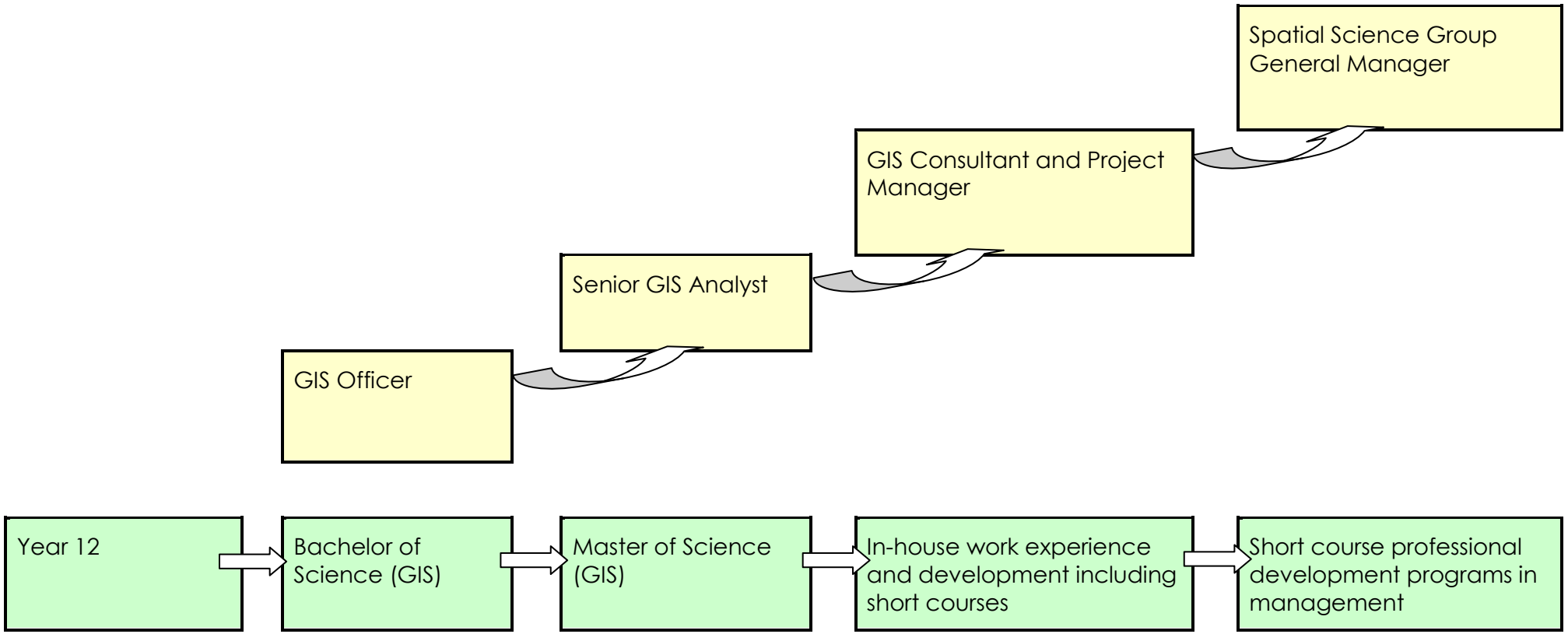
1.1 Surveying and practice ownership

This pathway represents a typical surveying career and one that represents the building of expertise within a field and culminating in business ownership.



1.2 GIS Specialist

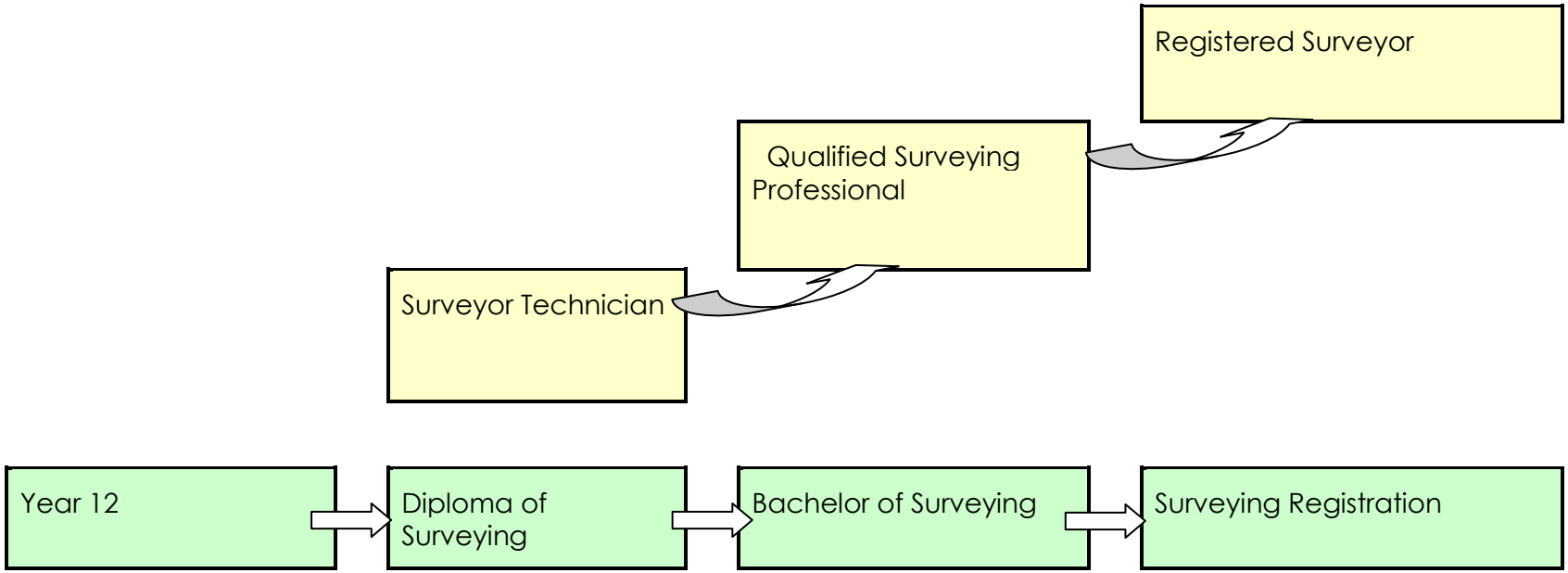
Linear pathways within a discipline do not have to culminate in business ownership but can also be pursued with a focus on building a depth of technical expertise leading to management roles.



2. The linear pathway from para-professional to professional

2.1 Surveying Technician to Surveyor

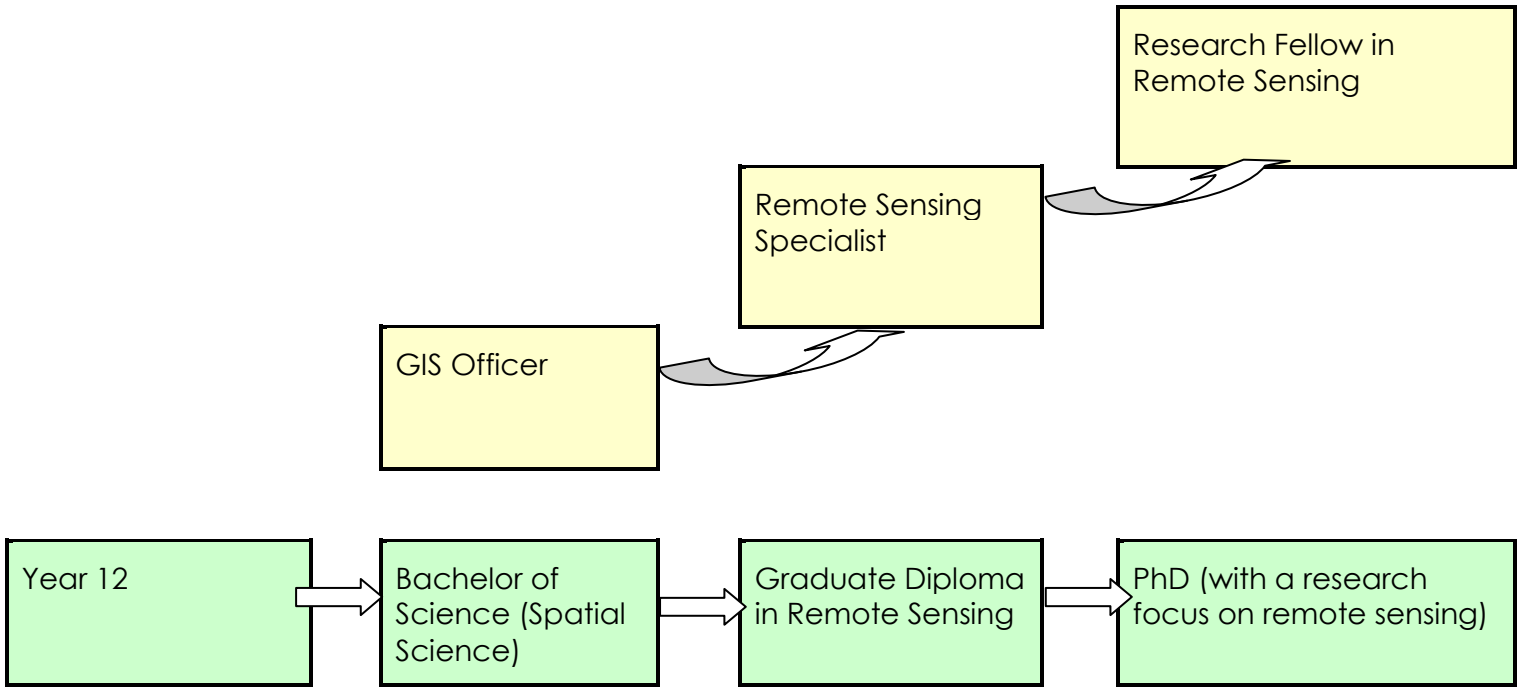
Pathways can be pursued within a discipline field but where the individual commenced work in the industry in a support or technician role and, over time, undertook further study to open career options.



3. From generalist to specialist across disciplines pathway

3.1 GIS Officer to Remote Sensing Specialist

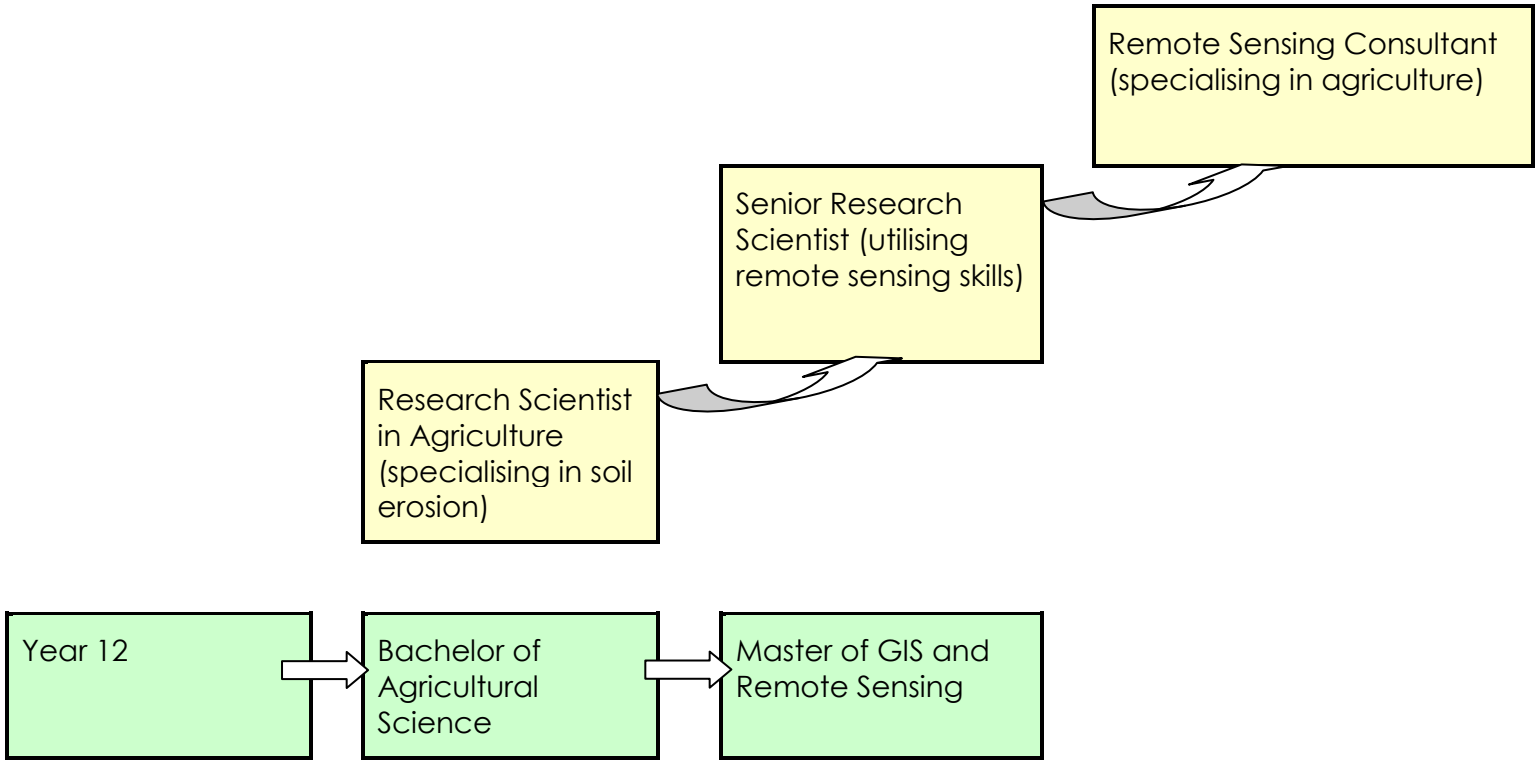
Career pathways can also take individuals from more generalist roles to that of a specialist in a related field.



4. Entry from other disciplines and industries

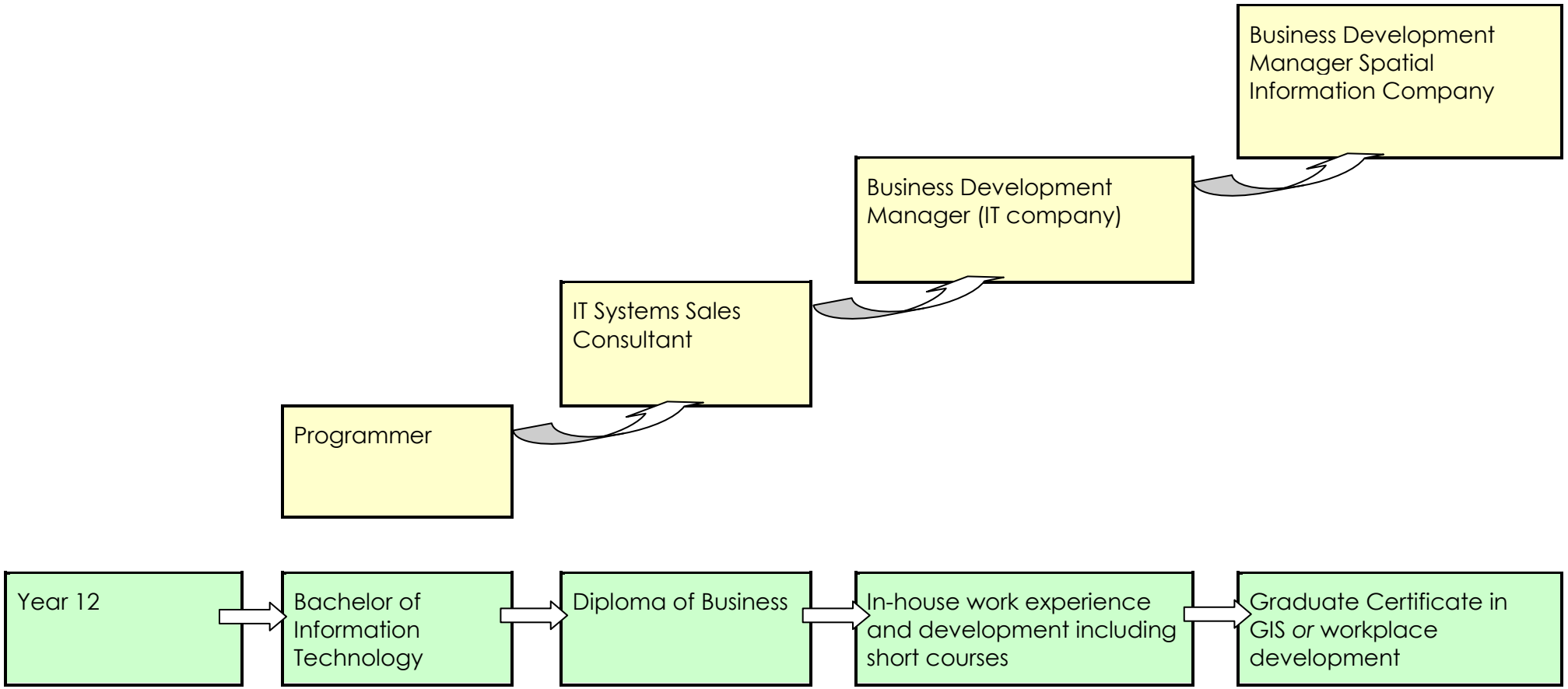
4.1 Agricultural Scientist to GIS & Remote Sensing Specialist

"Horizontal" career pathways are also a feature of an industry where the skills have application and add-value to other disciplines and industries. In this example a graduate in another field 'tops up' his or her education with spatial skills in order to extend career opportunities.



4.2 Business Development Manager

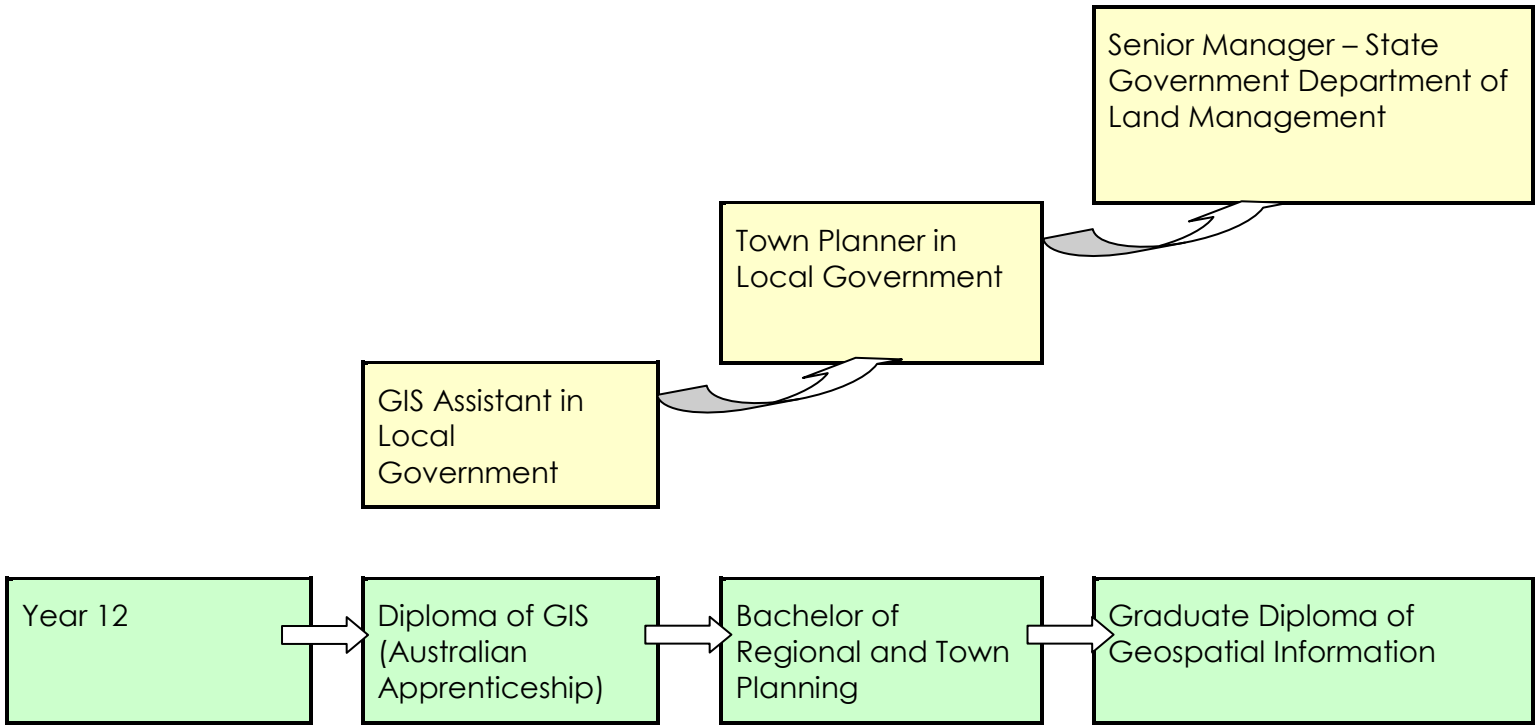
Entry to the Spatial Information industry from another industry can also occur with a common pathway being from a career that began in IT. In this case a programmer who had already moved into customer relationships and business development before entering the spatial industry.



5. Pathway from spatial information to related disciplines

5.1 From a GIS officer to Town Planner

The Spatial Information industry can also see individuals who commenced their career within the industry take their skills into related disciplines. The challenge for the industry is to retain connection with these practitioners. The opportunity for further 'career convergence' also occurs.



Job Functions and Skill Sets

While it is important to understand how qualifications can lead a potential new entrant into the Spatial Information industry it is also of great importance in assisting people to make career choices and to identify the type of functions that are required by industry.

This project has built on the earlier work commissioned by SEAC and seeks to align the broad functions that are undertaken in the industry with the skill sets required to support them. Once the skill sets are identified the process of mapping career and educational pathways into and through the industry can be undertaken by individuals.

The following categorisation recognises that many spatial practitioners have to make the decision about whether they will continue to pursue a career in their technical area of choice or seek advancement through management or a combination of the two approaches.

There are three broad 'job function' domains containing clusters of broad skill sets. The job functions reflect both technical and non-technical areas of work that are required and performed within the industry. The job function domains are then aligned to skill sets. The domains and their skill sets are:

- **core technical domain** – the skill sets associated with the capture, management and analysis of spatial data noting that these basic skill sets can be applied in differing contexts within the industry. Much of this work forms the core or basic technical work of the Spatial Information industry.
- **strategy, policy development and advanced technical domain** – the skill sets represent the higher level application of technical competency to advanced problem solving and the development of strategy and policy. This is also the domain where advanced or highly specialised technical spatial skills will be found such as geodetic surveying or remote sensing. It is also at this point in career development that highly skilled specialists may take their skills in vibrant and challenging areas across industry sectors.
- **business applications domain** – the skill sets that are found in this domain represent those non-technical, but still critical, aspects which are required to operate a spatial business. This domain also plays a key role or turning point in career development. Technical specialists may opt to pursue management or business roles (including business ownership) and workers from outside the industry with other skill sets may also use this domain to enter the spatial industry.

The following chart shows the domains and skill sets aligned to the qualifications found in the AQF. This shows that while there are courses founded across most levels of the AQF (and both VET and Higher Education sectors) in the *core technical domain* that the *strategy, policy development and advanced technical domain* sees a concentration of higher level post graduate qualifications while the *business application domain* has a particular need for short (CPD) courses and shorter vocational and graduate certificates and diplomas to top-up existing skills. This reflects the fact that individuals who pursue increasingly specialised and complex technical roles require in-depth and lengthier educational options. Post-graduate programs also provide bridges into the industry for those already

possessing degrees in other disciplines. The shorter and more focussed courses provide appropriate pathways for practitioners seeking to strengthen their management and business skills.

Note: the shaded boxes against the skill sets represent the range of **spatial** qualifications that most typically support the function and skill set.

		Cert III (school based)	Cert IV	Diploma	Adv. Diploma	Bachelor Degree	Grad Cert /Dip	Master Degree	PhD	Short Course / CPD/		
Core Technical Domain Applying specialist technical spatial skills	Data Capture – Collection and Measurement										Specialists from related technical disciplines	Entry from multiple points including pathways from within the Spatial Industry and….
	Data Handling -Processing and Manipulation											
	Data Presentation											
	Data Analysis and Interpretation											
	Data Management											
	Spatial Systems Development and Programming											
Strategy, policy development and advanced technical domain Applying high level spatial skill to problem solving, policy and strategic decision making	Advanced and specialist technical operations											
	Problem solving											
	Strategy and Policy Development											
Business and Management Domain Applying business and management skills to facilitate spatial businesses	Project Management										Generalist Business & Management practitioners	
	Contract Management											
	Customer Relationship Management											
	Business Development											
	Business Management											
	Business Planning											

Chart 5: job domains, skill sets & qualification pathways

These job functions, and the skill sets that comprise them, reflect the diversity of skills used in the Spatial Information industry. The career pathways described earlier in this report can be mapped against the blend of technical and non-technical skill sets. Several example are shown below:

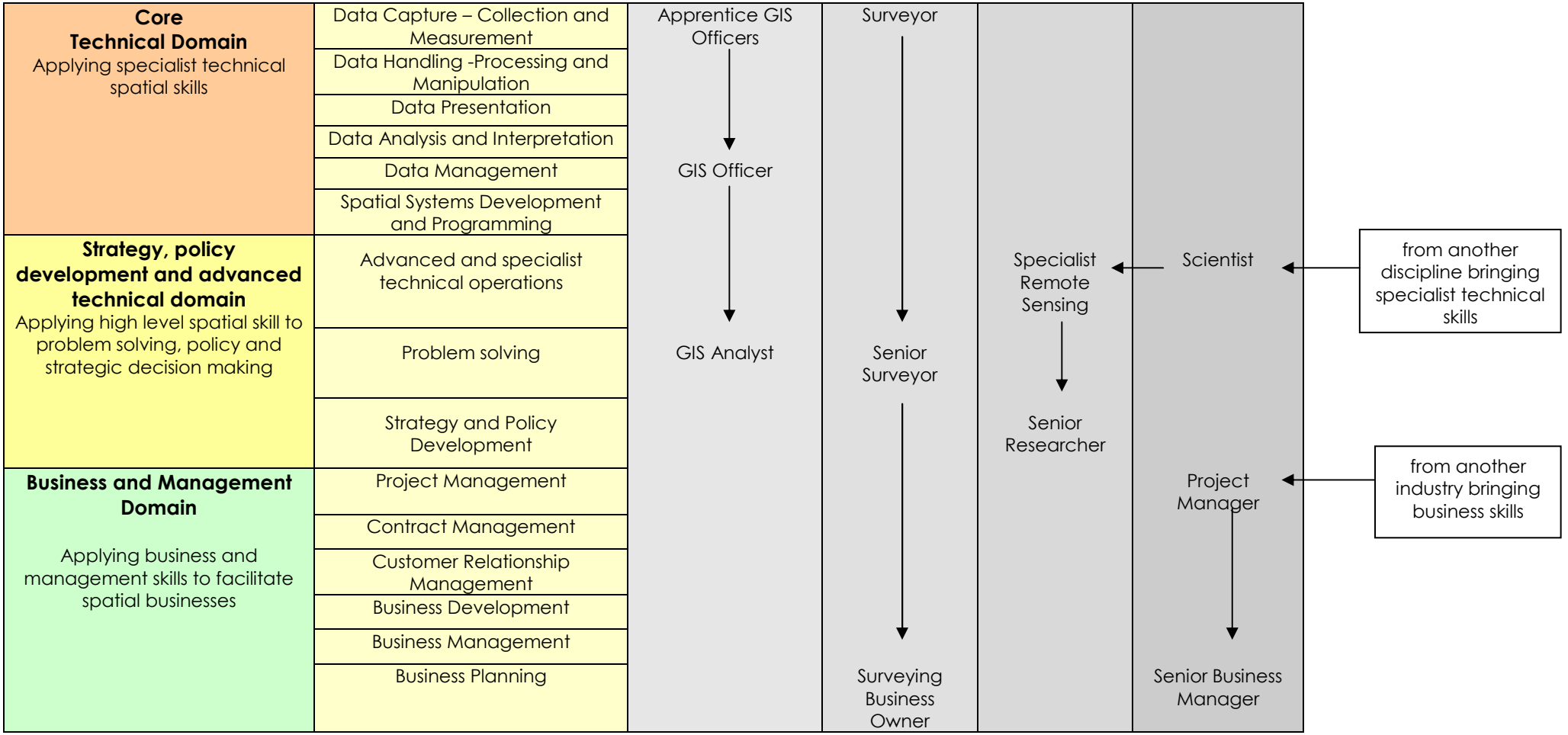
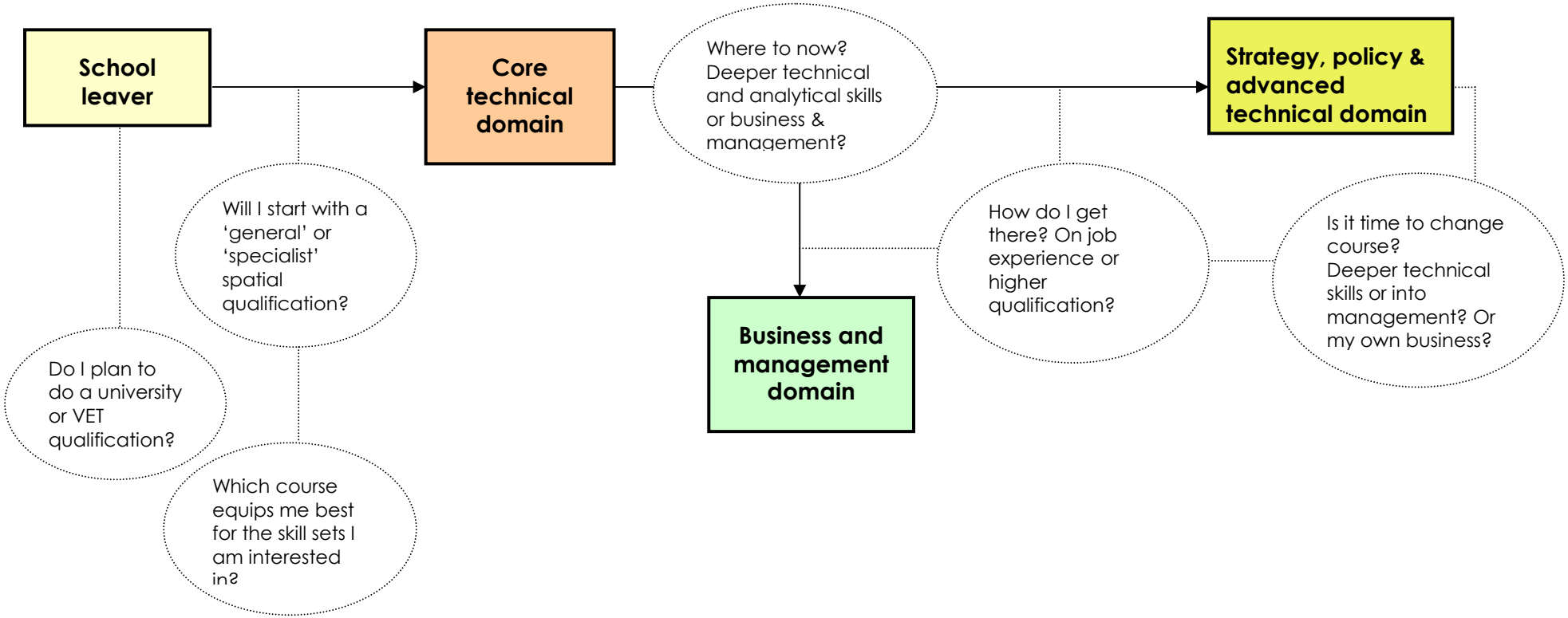


Chart 6: job domains, skill sets and sample career pathways

It is clear that the Spatial Information industry offers diverse work choices and the opportunity to build satisfying and rewarding careers with **great depth of skill** in a specialist technical area or **great breadth of skill** across technical and non-technical areas.

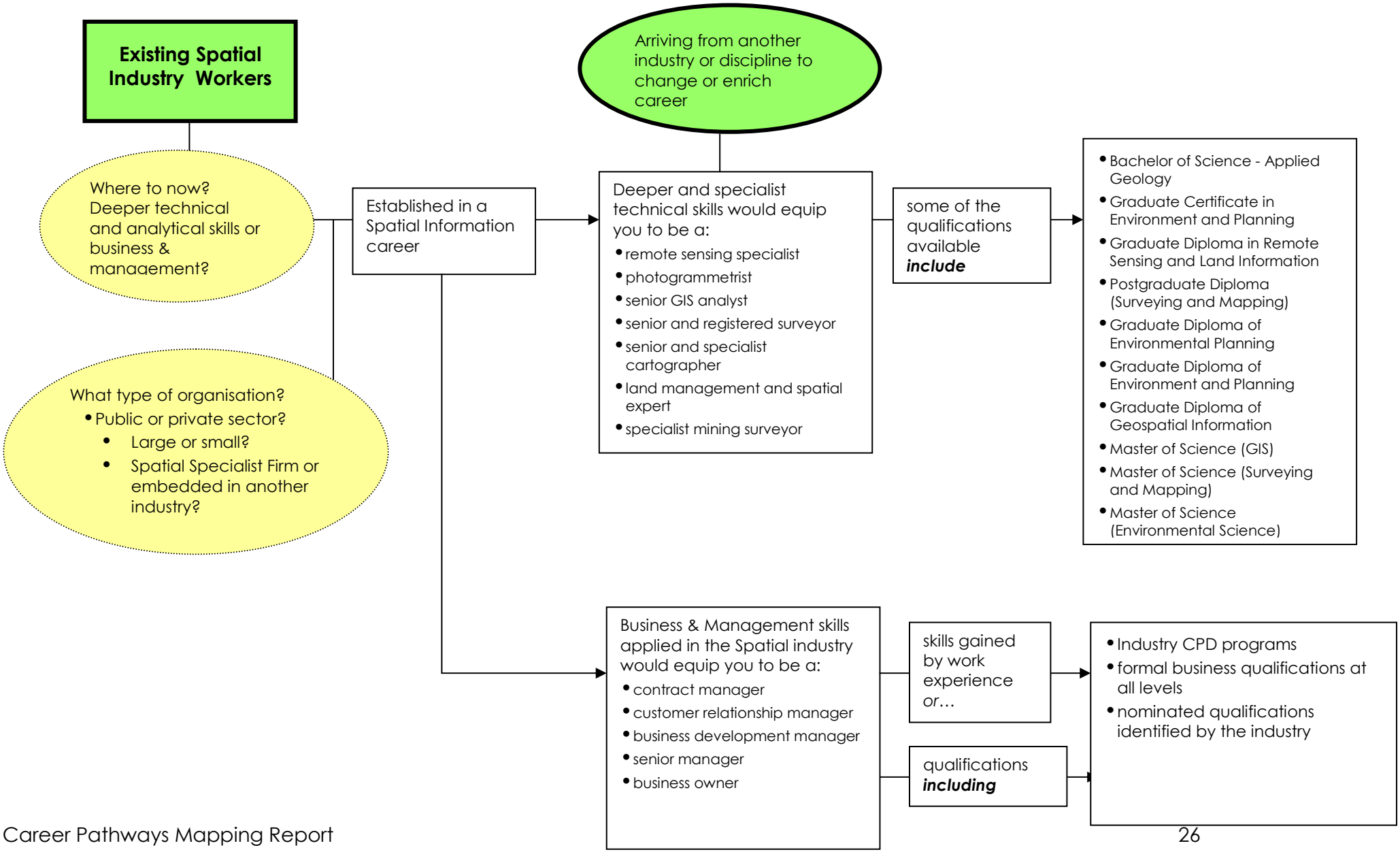
Navigating the pathways

Individuals seeking to enter the Spatial Information industry or developing their careers must make decisions about the type of work (the job functions) and roles they are interested in pursuing and then choose the best development pathway to reach their destination. People seeking to navigate their way into and through the industry can use the following **decision pathway** – this example traces a new entrant making decisions to enter the Spatial Information industry from school.



Note: please see appendix for generic pathway navigation map that can be used by employers, associations and education & training providers.

The following decision pathway can be used by existing workers from within the Spatial Information industry or a related field when considering their career development and workplace options.



Building strength from diversity

In common with many industries, such as Information Management & Communication Technology, the Spatial Information industry must build strength from its diversity. On the one hand it is undoubtedly difficult to define the boundaries of the industry or communicate simply the career opportunities that it offers. In contrast to law or medicine or teaching the Spatial Information industry may appear to lack clarity or simple description. But, on the other hand, it is the sheer **variety and reach** of the industry that will enable many workers and potential workers to see a place for himself or herself within the broad umbrella of the Spatial Information industry.

The fact that the Spatial Information industry is a 'matrix' industry that intersects with many other industries is canvassed earlier in this report. The technical skills that are at the heart of the Spatial Information industry are to be found and used (to varying degrees of depth) by workers in industries ranging from mining, retail and agriculture to town planning. The challenge for the Spatial Information industry is, through branding and communication, to encourage a sense of connection with the industry by practitioners who are inherently linked and identified with these other related industries.

The building of robust spatial skills by other industry practitioners both works to reduce the call on 'core' spatial specialists, and thus reduces the impact of skill shortages, and also provides a larger pool of potential Spatial Information workers who may be attracted to the Spatial Information industry in the future. It is, for example, likely that at some stage in the medium term that the mining industry will experience a cyclical change in its fortune that could see a significant number of professionals with spatial skills and training seeking work in the Spatial Information industry – assuming they see themselves as having a connection with the industry.

Skill Development Approaches

Consultations for this project identified many creative approaches to the development of spatial skills and the design of education and training offerings to the industry. The Spatial Information industry has open communications with the providers of education and training that provides a firm base for further collaborative work.

Although a number of education and training providers do provide shorter post-graduate programs, such as graduate certificates, the major focus is on the provision of lengthier bachelor and higher degrees. While these in-depth programs are essential to the industry there is also a need for increased opportunities to be offered to practitioners who are seeking to upskill or to move from, for example, one career path or specialism to another. Shorter programs that provide 'bridges' across the diverse sectors of the industry without requiring candidates to undertake another lengthy initial degree would increase workforce flexibility and reinforce the opportunities for practitioners to upgrade their skills in a rapidly changing industry.

Shorter and targeting bridging courses would also facilitate entry into the industry by experienced professionals from other industries and disciplines. By offering accessible 'top up' qualifications the pool of skilled workers from which the industry can draw would be expanded.

The offering of shorter and targeted programs would also facilitate partnerships with industry associations and the mapping of industry-led continuing professional development programs to recognised qualifications.

The challenges of providing education and training programs to a workforce that is often geographically very dispersed are not underestimated. These challenges can be summarised by an enhanced focus on the provision of:

- integrated first year surveying and other spatial information courses that open pathways and options between the sectors
- distance and self-paced programs that encourage upskilling and reskilling of practitioners who are already working and for whom attendance at traditional classroom based programs is problematic
- more short course programs and shorter graduate programs (such as Graduate Certificates and Vocational Graduate Certificates) to provide 'bridges' between industry specialisms allowing, for example, a person who already holds an initial spatial qualification to upskill quickly rather than commence with another lengthy entry-level degree in order to change career paths
- well structured and robust workplace development programs that can be linked to the awarding of recognised qualifications
- robust articulation and pathways between VET and Higher Education – and noting that these pathways can be 'two way' with entry to high level VET qualifications and short courses by university graduates as well as articulation into university qualifications by VET graduates. The strong application of the principles of RPL are also essential to facilitate and streamline the articulation process
- well structured, industry-led, continuing professional development programs that may lead to the awarding of recognised qualifications.

These points are related to the provision of greater choice and flexibility in the development and recognition of skills. Many of these options bring with them significant costs and the need for a close partnership between industry and education and training providers.

It is challenging for training provides to invest in flexible (eg on line) delivery when the market for the programs may be relatively small. Similarly, it is time consuming and complex for industry to provide the level of workplace involvement and on-the-job development that is necessary if learning is to be fostered outside the traditional campus setting.

Great strides have been made in these areas and strong partnerships already exist between training providers and industry in some jurisdictions. Taking this path nationally will enable further advances to be made.

Strategy and Recommendations

The Spatial Information industry is well served by the coordinated and strategic program of work identified by SEAC – of which this report is one part.

The industry must continue to ensure that the resources are available to:

- actively promote the career opportunities within the Spatial Information industry and the nature of the work performed
- work with education and training providers, in depth and over time, to ensure the programs that are developed are truly flexible and embrace multiple learning and assessment modes

The challenge for all players in the industry is to **enable** career pathways, through refining, documenting and communicating existing pathways and creating new pathways where needed.

A series of recommendations targeted to different audiences is provided.

The industry agenda led by SEAC

It is recommended that SEAC:

- **facilitate a multi-pronged communications strategy geared towards informing and encouraging new entrants to the industry.** This communications program should address the equally important needs of different market segments, namely:
    - **school students**, and in particular Years 10, 11 and 12 students, who are making career choices. This communication should focus on both university and vocational education & training pathways into the industry. This recommendation acknowledges that great advances are being made in this area and the work to share outcomes and resources should be encouraged and promoted nationally
    - **university students** studying in 'related fields' (such as: engineering, town planning, the sciences, agriculture) to inform them of the opportunities the spatial information offers and seeking to establish a long term connection with the broad church that is the Spatial Information industry
    - **existing workers** in related and complementary fields (such as IT and business) with the intent of actively encouraging their take-up of top-up education and training in specific but targeted and short spatial programs that will build skills and grow the pool of potential new workers

- **facilitate a multi-pronged communications strategy geared towards the existing spatial workforce**. This communications program will be aimed at encouraging existing workers inside the spatial industry who are seeking career change and progression opportunities. This communication strategy should focus on:
    - **para-professional and support staff** who are committed to the industry and who will be open to career progression and upskilling
    - **professional staff**, particularly in mid-career, who may provide the next generation of business and industry leaders if mentoring and appropriate top-up shorter program training are available
- **work to coordinate and harness the existing career pathway and career promotion resources** that are currently developed by many parties across the nation by implementing the E&SF resource clearinghouse advocated in the Workforce Plan. This recognises that there are many ways of communicating and that by making available the material that has been developed nationally the pool of resources from which individuals and groups can draw will be increased. The clearinghouse and associated portal should provide a high profile "front-door" with links between websites and building a repository of resources that can be used by the industry, existing workers and potential new entrants.
- **work with education and training providers to improve:**
    - **the simplification and consistency of course nomenclature** with industry job functions and language to improve community understanding of the role of courses in supporting the work of the industry
    - **access to shorter bridging programs** to facilitate career progression for existing workers
    - **the articulation between the VET and Higher Education sectors and between individual courses**. This will include increasing industry awareness of RPL and how it may be accessed
    - **access to relevant and targeted management and business programs** for workers seeking to pursue business ownership or a specialist management function within a spatial organisation.
- **request associations and providers to use the generic model shown in Appendix 1** to map their existing courses and place this material in the clearinghouse as a resource for potential students, perhaps made available through some form of interactive tool.
- **work with, and facilitate, spatial business leaders and owners to re-think and review the structuring of work** to empower para-professionals and better use their talents and skills in order to ensure the most highly skilled professionals are used optimally within the workplace. This strategy is analogous to that undertaken in the medical field to free doctors' time by the creative use and support of nurses and other health care professionals
- **work with industry regulators to reduce the barriers to entry** to surveying and facilitate entry to the profession by other trained professionals

- **continue its work to clarify the definition of the spatial information industry and develop, brand and promote the industry to the community at large.**

The Industry Association Agenda

It is recommended that the Spatial Information industry's associations:

- **develop and actively promote industry recognition schemes**, such as association post-nominals and industry certification processes, to support and reward industry professionals as a means of building their connection with the industry and rewarding excellence
- **work with employers to build career pathways and development opportunities for potential and emerging managers** and business owners. The strategy should be developed in conjunction with and to take advantage of formal education and training offerings. The strategy should also be linked to association mentoring programs and succession planning strategies.
- **map Continuing Professional Development (CPD) programs** that are offered and promoted to members to recognised qualifications with the intent of providing additional incentives and benefits to participants. The CPD programs, and their related qualifications, should also be mapped to an identified career pathway to maximise value
- **make available through their websites the database of education and training providers.** Education and Training providers should also be encouraged to validate and update the information to ensure potential candidates have access to all program options. The database could also contain additional information added by education and training providers that inform candidates of, for example, the key target audience for the program, the number of students enrolled and particular program strengths and flexible delivery options. It is also proposed that associations make available, through the website(s) or portal, the opportunity for individuals to record their own career pathways. The provision of personal stories (in a common format) that detail the career decisions and opportunities taken up by practitioners would inform and inspire potential entrants and those seeking career change. Such a website could also have links to the database of education and training providers.

The Education & Training Provider Agenda

In conjunction with industry, it is recommended that Spatial Information Education & Training Providers:

- **streamline entry to undergraduate degrees** including use of common first year programs across all spatial discipline streams and the reduction of entry pre-requisites
- work with SEAC and industry associations to **streamline the nomenclature of programs** and make clear the target audience and AQF level of each program so that pathways and articulation opportunities are clarified and strengthened

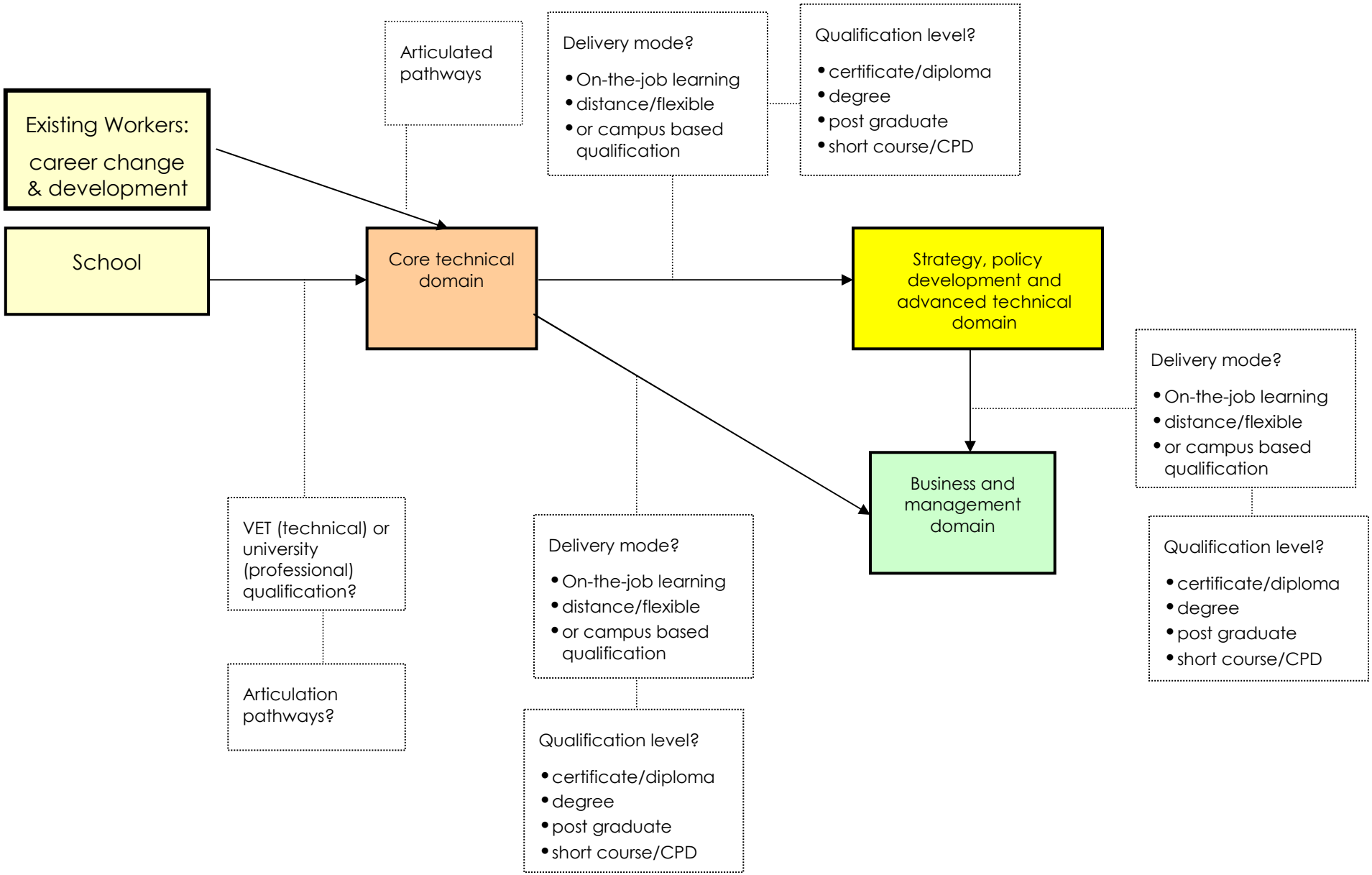
- **increase the availability of short courses, continuing professional development programs and bridging courses** that are geared towards facilitating career pathways *between* specialisms within the industry and providing 'top up' training for skilled and experienced professionals from other industries and disciplines. Key examples of the required programs are:
    - fast track entry to and through surveying for experienced practitioners
    - 'spatial industry context' courses for entrants from other industries and disciplines
    - tailored management and business programs to support spatial business owners and specialist managers with a focus on workplace development and flexible delivery modes
- **provide support and recognition for workplace development programs to support existing workers**
- **actively foster and promote RPL processes**
- partner with industry and, potentially, other providers to **make available flexible learning models** including online learning and assessment
- **partner with industry associations to maximise the mapping of industry CPD programs to recognised qualifications.**

APPENDICES

1. Career Pathway Mapping Model

The following generic career pathway map is provided as a tool for employers, associations and education & training providers who are seeking to align their programs or program choices with the outcomes of this project. It enables the following questions to be answered:

- Does the program offer a para-professional/technical or professional pathway (and is there progression or articulation possibilities between these options)?
- Does the program address the skill sets identified in the:
    - core technical domain
    - strategy, policy development and advanced technical domain
    - business and management domain?
- Are flexible and appropriate delivery options offered that facilitate a variety of modes of learning and assessment including action, workplace-based and distance modes?
- Are 'bridges' between career pathways facilitated in order to maximise the upskilling and reskilling of the current workforce and potential new entrants.


Existing Workers:
career change
& development
School
Articulated pathways
Delivery mode?
• On-the-job learning
• distance/flexible
• or campus based qualification
Qualification level?
• certificate/diploma
• degree
• post graduate
• short course/CPD
Core technical domain
Strategy, policy development and advanced technical domain
Business and management domain
Delivery mode?
• On-the-job learning
• distance/flexible
• or campus based qualification
Qualification level?
• certificate/diploma
• degree
• post graduate
• short course/CPD
VET (technical) or university (professional) qualification?
Articulation pathways?
Delivery mode?
• On-the-job learning
• distance/flexible
• or campus based qualification
Qualification level?
• certificate/diploma
• degree
• post graduate
• short course/CPD

2. Consultations

Performance Growth would like to acknowledge and thank industry leaders who gave their time to participate in in-depth interviews and consultations:

Name	**Representing**
Paul Kelly	SEAC
Noel Hamey	SEAC, TAFE
Frank Blanchfield	SEAC
Nick Littlewood	PSMA
Dan Paull	PSMA
Dennis Puniard	SSI
John Meyer	ANZLIC
Ben Searle	ICSM
Steve Lloyd	GA
David Hocking	ASIBA
Bill Hirst	ICSM, ACT Govt
Meegan Maguire	Qld Govt
Mike Ridout	CRCSI

Bert Veenendaal	Curtin University
Chris Bellman	ASIERA, RMIT
George Havakis	ASIBA
Penny Baldock	Chair Young Professionals, SA Govt
Renee Bartolo	Pres, SSI