



MODULE 8: Enhancing Capability for using Spatial Information

Building capacity to implement natural resources information management systems.

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MODULE 8

Table of Contents

	Guide for managers	ii
	Context	ii
	Actions	ii
	Acknowledgments.....	iii
	Guide to symbols	iv
8.1	Introduction	1
8.2	Train, recruit, or hire a consultant?	1
8.3	Options for training existing staff	2
8.4	Options for recruiting new staff	3
8.5	Choosing a GIS consulting firm	5
	8.5.1 Choosing a GIS consulting firm – How do you know when you need one?.....	5
	8.5.2 Choosing a GIS consulting firm – What to watch out for	7
8.6	Best practice guideline for hiring a GIS consultant	8
8.7	Additional support.....	8

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Guide for managers

Context

One of the prerequisites for natural resources management (NRM) involves the establishment and maintenance of a good database of information in digital format. Access to reliable and up-to-date information reduces the uncertainty in planning and management by helping identify and analyse situations and issues. Strategies to overcome them may then be prepared and implemented, with the impacts monitored as part of an overall system. The value of the information and the effectiveness of the decision-making/planning processes are very closely related to the quality and completeness of the information and the manner in which it is made available. In this respect data access, management, integration, analysis, standards, and communication are key components.

Under current arrangements, funding for NRM projects is increasingly being channelled from government agencies to regional groups, such as catchment management authorities and resource information centres.

Decisions by an NRM regional body to train existing staff in spatial information systems (SIS), hire new staff with existing SIS or hardware skills, or hire a consultant, are no different from any other similar technical issue faced by other organisations, such as local government. SIS software is now in the mainstream of the information technology industry; so SIS expertise (once a very scarce set of skills) is now widespread in Australia. However, as with specific IT skills, they may generally be more difficult to obtain in rural and regional Australia than in metropolitan centres.

It is acknowledged that each local government may have its own initiatives related to data collection and information management, including governance guidelines and protocols related to the implementation of information technology initiatives. These may include a list of recommended consulting firms and panel contracts. There are also likely to be constraints on local government procurement resulting from state/territory requirements.

Module 8: Enhancing capability for using spatial information addresses the options available to raise the capability for using SIS technology in NRM regional groups. In particular this module focuses on staff development, recruitment and the issues surrounding the hiring of SIS consultants.

This module links closely with many other modules in the Toolkit, given that the issues with the collection, storage and dissemination of spatial information focus on raising the overall SIS organisational capacity of NRM regional bodies.

Actions

In many cases an organisation or NRM regional body may need to raise their SIS capacity by training present staff, recruiting new staff, or hiring specialist consulting firms to provide guidance, recommendations, specific software development or data analysis tasks.

There is a range of sources of SIS training available, from short courses and training linked to software purchases, through to dedicated courses up to degree level. The number and scope of these educational opportunities has increased rapidly in recent years.







Managers should be aware that best practice guidelines are available to assist in determining when a consulting firm is required and what to look for when choosing one.

Acknowledgments

This module draws heavily on a two-part article by Marshall Payne published on the Directions Magazine website—*Part 1: How Do You Know When You Need One?* and *Part 2: What to Watch Out For* by Marshall Payne. Material has also been sourced from the ANZLIC – Local Government Toolkit. These sources are duly acknowledged.

Guide to symbols

The following symbols are used throughout the Toolkit as a guide to users, and draw attention to important issues and information.

	Information which readers should take particular note of
	Best practice information
	Tips for readers—based on experience and aimed at saving time and resources
	Caution—readers are advised that particular care should be taken or that the subject issue may be complex
	Additional information
	Capability raising—used to show a signpost to a higher capability level
Bold Text	Used to highlight a particular issue
Boxed Text	Highlighting of issues specifically related to ANZLIC or the Audit

8.1 Introduction

This module addresses the options available to raise the capability for using spatial information within an organisation or NRM regional body. In particular this module focuses on staff development, recruitment and the issues surrounding the hiring of SIS consultants.

8.2 Train, recruit, or hire a consultant?

Decisions to train existing staff in SIS software, recruit new staff with existing skills, or hire a consultant are no different from any other similar technical issues within an NRM regional body. GIS and SIS software are now in the mainstream of the information technology industry; so GIS/SIS expertise (once a very scarce set of skills) is now widespread in Australia. However, as with specific IT skills, they may generally be more difficult to obtain in rural and regional Australia than in metropolitan centres.

Consequently, the processes that apply in your organisation or NRM regional group when faced with decisions on staff development, recruitment of new staff or outsourcing, also apply in the case of SIS skills. Factors that influence these options include:

- matching current capability with planned SIS requirements—do you have a thorough understanding of skill needs for both short- and long-term deployment of your SIS?
- consideration of the SIS resources available in your region—is it possible to work with your neighbouring NRM regional body or local government to share resources?
- time constraints—do you need an SIS system urgently or can you progress this more slowly?
- long-term planning—a long-term vision for SIS in your organisation or NRM regional body will require consideration of the sustainability of SIS and how a staff/consultant mix will be maintained.
- budget—whether training, staffing and consultant budgets are consolidated or segmented will affect how the mixture of capacity-raising options is approached.
- linkage with purchasing—there is often a strong linkage between SIS software and hardware purchasing decisions with the provision of training and consultancy services.



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The spatial information management projects of individuals are recognised by your organisation or NRM regional body and are being managed in a systematic manner. Data and information management standards are in place and there exists linkage to some business processes and procedures. Training resources are allocated to individuals and/or departments.



The options presented in this module deal with staffing and procurement issues. To ensure compliance with your organisation's human resource and procurement policies, it is strongly recommended that you discuss the issues with the appropriate senior staff.

8.3 Options for training existing staff

A wide range of SIS staff training options are now available in Australia. These range from full-time university courses to short courses, in-house training, cadetships and mentoring through professional associations and informal networks.

There are a number of industry training courses on SIS available. These are run either by independent training providers or by companies selling SIS software and services. In the latter case, SIS vendors can provide either stand-alone introductory SIS courses—using their own software—or training associated with software purchases. Links to SIS software and hardware products are given in Module 7. In some cases, SIS vendors offer regionally based training courses or provide training through distance education.

The spatial sciences community now has competency standards for both the vocational education and training sector and the professions. The agreement of a competency framework has led to the development of a number of SIS training options including:

- Diploma of Spatial Information Services
- Advanced Diploma of Spatial Information Services
- Certificate III in Spatial Information Services.

These courses are more comprehensive than short courses, but last longer and so require a greater time commitment. Courses are currently offered in all jurisdictions.



For further information contact the National Training Information Service at <http://www.ntis.gov.au/Default.aspx> and enter 'spatial' in the search box.

There are also an increasing number of university programs which incorporate an SIS component. These include geography, town planning, surveying and computer science. As well as providing university courses for training, the lecturers teaching these courses are often available to run short courses for organisations or NRM regional bodies. This can have the advantage of providing training independent of software vendors.

Training can also be obtained through industry professional associations. Currently the association with a large membership within the NRM community is the recently formed Spatial Sciences Institute (SSI) (<http://www.spatialsciences.org.au/>). The SSI was formed through the coalition of five former major spatial-oriented associations, namely:



- Australasian Urban and Regional Information Systems Association (AURISA)
- Institution of Engineering and Mining Surveyors, Australia (IEMSA)
- Institution of Surveyors, Australia (ISA)
- Mapping Sciences Institute of Australia (MSIA)
- Remote Sensing and Photogrammetry Association of Australasia (RSPAA).

Raising staff capacity in SIS does not necessarily need formal training courses or conference attendance. Informal networking between other NRM regional bodies and local or state government staff working in the management of spatial information can be just as effective. This was the thinking behind the GIS section of the City of Swan local government forming its own GIS professional network (<http://gis.swan.wa.gov.au/>). The network meets occasionally to share experiences and also provides a simple online contact list so members can contact their colleagues in other local governments directly. The network is of great support to its members, particularly those outside the Perth metropolitan region, where those involved in GIS can often feel isolated from their peers.

Similar networks exist within the general NRM community (e.g. NRM Discussion Forum <http://www.nrm.gov.au/do/forum.html> and the NRM Talk Newsletter <http://www.nrm.gov.au/publications/newsletters/nrm-talk.html>) though they are not specifically SIS related.

8.4 Options for recruiting new staff

Specialist staff will be required by NRM regional bodies once their requirement for SIS reaches the point when existing staff no longer have the time and/or skills to manage it. Recruitment may also be required when it becomes more cost-effective to hire staff than continually use consultants.

As outlined above, there is now a wide range of specialist SIS training courses available at Diploma, Advanced Diploma, Certificate III and degree levels. The graduates of these courses will have a good grounding in the theory and practice of SIS development and implementation. The mix of practical and theoretical skills will vary between the levels of qualification and from institution to institution.

The criteria for choosing new staff will, of course, depend on the particular requirements of the organisation or NRM regional body. Job descriptions for SIS positions usually specify:

- experience with a particular SIS software package
- understanding geographic databases
- familiarity with SIS operations
- familiarity with maps and mapping conventions
- competence with computing operating systems
- experience with a range of related software products.



The above list is actually a reasonable guide for starting a recruitment process.

An example of a recent staff recruitment process for a Biodiversity Assessment GIS Project Officer is provided by the Audit (www.nlwra.gov.au). The position was advertised in August 2007 as suitable for a person with skills in GIS and spatial data analysis. The advertisement read:

The National Land & Water Resources Audit is looking for a person with skills in GIS and spatial data analysis, to analyse and map the extent and condition of Australia's biodiversity. The production of a range of products (maps, graphs and tables) is required for the 2008 biodiversity assessment, using ESRI ArcGIS software. The project officer would be working with GIS specialists within the Department of the Environment and Water Resources and the Biodiversity Assessment Coordinator. This position will be located at the Department of the Environment and Water Resources.

DUTIES:

1. Working with GIS specialists within the Department and the Biodiversity Assessment Coordinator, interrogate existing spatial data sets relating to biodiversity to produce products required for the 2008 assessment (maps, graphs and tables) using ESRI ArcGIS software.
2. Undertake a range of spatial analysis, data management and mapping tasks, such as mapping changes in native vegetation extent, condition and type, changes in extent and condition of wetlands, estuaries and rivers, threatened species and ecosystems, as well as pressures on biodiversity including land use change, grazing, fire regimes, hydrology, invasive species and climate change. Other tasks may be included.
3. Liaise with data providers within the Department and state agencies to update spatial data holdings, including maintenance of data licensing and metadata.

KNOWLEDGE AND EXPERIENCE REQUIREMENTS:

1. Demonstrated experience in the interrogation of spatial data using ESRI ArcGIS software.
2. Tertiary qualifications (or equivalent experience) in an appropriate field, including a strong spatial component (GIS, biodiversity information, spatial modelling), database development or programming component.
3. Demonstrated ability to deliver outputs alone or as part of a team including the ability to effectively manage tasks of competing priority to ensure the successful delivery of specified outcomes or outputs.
4. Ability to work effectively as a part of a team, recognising the abilities, differences and contributions of all members and fostering co-operation amongst the team.
5. Ability to communicate information effectively with a wide range of people including both technical and non-technical people.
6. Capability to provide technical advice including ability to interpret and advise on technical data related to biodiversity.

Source: Audit Web Site: Tenders and Vacancies

8.5 Choosing a GIS consulting firm

8.5.1 Choosing a GIS consulting firm – How do you know when you need one?

The following material is taken from a two-part article *Choosing a GIS Consulting Firm* by Marshall Payne. It is available online from the *Directions Magazine* website:

Choosing a GIS Consulting Firm: Part 1 - How do you know when you need one? (6 June 2003):
http://www.directionsmag.com/article.php?article_id=358

Choosing a GIS Consulting Firm: Part 2 - What to watch out for (12 June 2003):
http://www.directionsmag.com/article.php?article_id=371

There have been many articles published about how to ensure your GIS project is successful. Typically, these articles focus in particular areas or are provided in a “top 10 style” list. They are authored by consultants and project managers citing personal experiences. Rather than provide tips for a successful project, some articles will provide a list of common mistakes leading to failed projects. Some of the more common reasons for project failures include unplanned budget reductions, poor expectation management, scope creep, inadequate staff, or “flat out” missing the targeted business need. Tips commonly mentioned for successful projects will range from having an influential project champion, realistic expectations, developing a good scope, having an adequate budget and schedule, and one of the more important ingredients; making sure that users are in agreement as a successful application or system is one that gets used. But perhaps the most important factor for a successful project often comes down to choosing a good GIS consultant.

For many GIS projects, people will hire a consultant to implement technology, provide a total solution, or help manage an internal development project. But how do you know when you need a consultant, and more importantly, how do you choose one that is going to help make you and your project successful.

Knowing when you need a GIS consultant

There are many reasons to choose a consultant to help with your GIS projects. Obvious reasons include not having enough staff, the size or complexity of project is one that requires certain expertise not internally available, or specialised technical skills are required to supplement internal staff. However, before hiring a consultant you need to first understand your goals and objectives even if your objective is simply to help determine your needs or direction. Common GIS consulting projects will start out as needs assessment, cost benefit analysis, implementation plan, or an application design.

There are other signs to look for when you may need a GIS consultant. The following describes some scenarios when having a GIS consultant can help make all the difference and at the same time make you and your organisation successful even during the worst of times.

1. You have a particularly challenging or large application project where a consultant can provide the necessary specialised programming skills and direction. This could include a project where GIS needs to be integrated with other enterprise business systems. Using a

consultant that has extensive experience with both GIS and other systems can help expedite projects and provide diversity of skills that will be needed on large complex projects.

2. You simply need data development, conversion, or mapping services. Consultants specialising in these areas that are more tedious or laborious can often provide very cost effective solutions and deliver results in a much more timely fashion.
3. The growth of GIS in your organisation has stagnated. Often after a GIS program has been established the organisation is unable to move beyond data maintenance and map production work resulting in failing to capture or realise the return on investment. A consultant can help move things forward to achieve the full potential and benefits of GIS. A good GIS consultant can help overcome political barriers, build consensus, has outside perspectives, and knows what has worked and failed in other organisations. A good consultant will have lots of diverse experience and can bring many ideas to the table to help jump-start your GIS program.
4. Your organisation is at risk of losing its GIS program because management or elected officials consider a GIS as a project rather than an on-going system. A consultant can help provide education to officials and lay out a plan to make GIS an integral component to an organisation's overall information infrastructure
5. Your budget and staff have been cut and you need to work smarter and be more efficient in order to sustain your GIS program. Consider project based contracted services as a solution to help with loss of staff.
6. You are preparing to undergo organisational change where consolidation of your GIS department or departments with the Information Technology (IT) department will occur. A consultant with experience in this area as well as has the technical expertise in both the GIS and IT areas can assist in the reorganisation. A good consultant with experience in GIS, IT, organisation development, and communications can act as "translator" providing education, etc. to help overcome the cultural differences.
7. GIS technology is rapidly changing and becoming more complex and has more dependencies on system resources and infrastructure. A consultant can help with selecting, migrating to or implementing this new technology. A consultant can introduce the technology in a way that is both practical and implemented at a pace that's conducive to the organisation.
8. You are tired of building applications in-house only to have the application programmer quit before the project is completed or documented. Sometimes it may seem like a good idea to build your applications in-house but it can be difficult finding the time to maintain and support them. It can also be difficult turning GIS Analysts into Visual Basic programmers. Using a consultant to help develop and maintain applications may save you time, money, and could be less risky.

So I need a consultant...now what?

If you are a private company seeking services the decision of when and who to choose is much easier than if you are a government organisation bound by procurement policies. For government entities there are many ways to hire a consultant. Some examples are described below.

1. If you have purchased software and need consulting services for implementation, customisation, or training it is typically a simple decision and services can be purchased in conjunction with the software procurement.
2. The most common way for a public entity to hire a consultant is to develop a scope of services and initiate a Request for Proposals or RFP. In some cases, typically with larger projects, a Request for Information or Qualifications (RFI and RFQ) will be completed as an initial step before conducting a RFP. With a RFP, consultants will provide proposals describing themselves, services, experience, and costs. From the proposals, a short list is determined and interviews are conducted to determine the consultant with the most appropriate qualifications and cost-effective solution.
3. An increasingly common approach is to hire a pool of preferred consultants for a 2–3 year contract period. This is typically done also using a RFP process where experience, services, and rates are evaluated to select top firms. Once contracts are signed, it greatly simplifies and streamlines the public organisation's ability to procure services or products. The organisation can choose amongst the firms on services and estimates provided using a task order process.

As previously mentioned there are many types of consultants to choose from and selecting the one that fits your needs best will partly depend on the type of service you are seeking and partly on the type of relationship you want to have with your consultant. This sounds funny but it's true. Once you determine the “what” and “how” you need to determine the “who.”

8.5.2 Choosing a GIS consulting firm – What to watch out for

There is literally a sea of GIS consultants and consulting firms out there, so how do you choose the “right” one? Well first you need to understand the many types of consultants and services they provide. Consulting firms will range from a person working out of their house to small firms to large corporations. Some consulting firms are more traditional while others only offer outsourcing services. Some firms specialise while others offer diverse services. Some are software vendors that offer consulting services centred on their products.

So how do you choose? Well there are the obvious things to look for such as the depth and diversity of skills, years of experience, costs or rates, and references. But what about things that aren't so easy to describe like ‘does it feel right?’ or are they ‘trustworthy,’ ‘dedicated,’ ‘creative,’ ‘fair,’ ‘honest,’ and ‘hard working’. Keep in mind that when you hire a consultant you are not only entering into a contract but also a relationship. Often time consultants are ‘fired’ not because of their

skills or qualifications are lacking but simply because there is too much friction or because 'it didn't feel right'. There are countless situations where firms far superior on qualifications and experience, competitive on cost, etc. have lost projects because they did not have a previous relationship with the client or failed to create the right 'spark' with the client.



When hiring a consultant, make sure that they have what it takes to be in a relationship with your organisation. Will the consultant's staff mesh well with your staff? Will the consultant be responsive and understanding yet fair? Is the consultant dedicated to seeing your organisation successful? These are all important questions to consider when choosing a consultant.

When selecting a GIS consultant you should choose one that has the breadth and depth to meet your organisation's needs. These days GIS is being elevated in organisations and now plays more of an integral part in enterprise and mission critical business systems. Having a consultant that not only has excellent GIS experience but also has experience with database and internet applications as well as network and security skills will be invaluable. Many firms are specialised and don't have these skills so it is important to choose wisely depending on your needs.

8.6 Best practice guideline for hiring a GIS consultant



Rule of thumb

- Similar to choosing software—decide what is required and not what is offered by potential clients.
- Where possible develop a matrix or scorecard on what the consultants offer and what your requirements are.
- Leave room for evaluating intangibles—factors to consider include:
 - Potential for an ongoing relationship and support
 - Skill—does the consultant have the breadth and depth to meet your needs?
 - Distance—are they available at close call and is this important for your decision?
- Ensure your council's procurement processes are followed.

8.7 Additional support

A wide range of consultants servicing the spatial industry is available throughout Australia. The following web sources are presented as a starting point for local governments to find out additional information about the spatial information industry and consulting firms in Australia.

Industry publications and services

Position Magazine: <http://www.positionmag.com.au>

Spatial Business Online: http://www.positionmag.com.au/SBN/sbn_frame.html

Associations and groups

Spatial Sciences Institute (SSI): <http://www.spatialsciences.org.au/>

Australian Spatial Industry Business Association: <http://www.asiba.com.au/>

Geospatial Information and Technology Association: <http://www.gita.org.au/>