8

LOCAL GOVERNMENT SPATIAL INFORMATION MANAGEMENT

→ TOOLKIT VERSION 2.0

Building capacity for integrated spatial information management solutions

JULY 2007

MODULE 8

Raising capability for using spatial information

A joint initiative of the Australian Local Government Association and ANZLIC—the Spatial Information Council

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AUSTRALIAN LOCAL GOVERNMENT ASSOCIATION

ANZLIC the Spatial Information Council

Contents

→ This is Module 8 to the **LOCAL GOVERNMENT SPATIAL INFORMATION MANAGEMENT TOOLKIT**.

Ten detailed modules and essential preliminary matter to the Toolkit are available via: www.alga.asn.au and www.anzlic.org.au.

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Users are directed to the prelims of the Toolkit for essential information, including that addressing copyright and liability matters, and the ISBN.

→ MODULE 8
Raising capability for using spatial information

Guide for managers

Context

Decisions to train existing staff in geographic information systems (GIS), to hire new staff with GIS skills or to hire a consultant are no different from any other similar technical decisions faced by councils. GIS is now in the mainstream of the information technology (IT) industry and GIS expertise, once a very scarce set of skills, is now widespread. However, as with other specific IT skills, GIS skills may be more difficult to obtain in rural and regional Australia than in metropolitan centres.

Each council may have its own initiatives related to data collection and information management, including governance guidelines and protocols for the implementation of IT initiatives. This may include a list of recommended consulting firms and panel contracts. There may also be constraints on local government procurement processes resulting from state or territory requirements.

Module 8: Raising capability for using spatial information addresses the options available for raising GIS capability in councils. In particular, this module focuses on staff development, recruitment and the hiring of GIS consultants.

This module links closely with several other modules in the Toolkit; matters discussed in other modules, such as the collection, storage and dissemination of spatial information, have an impact on the need for GIS capacity in councils.

Actions

In many cases, councils may need to raise their GIS capacity through such activities as training, recruitment of new staff, or the hiring of specialist consulting firms to provide guidance, make recommendations or undertake specific software development or data analysis tasks.

There are many types of GIS training available, ranging from short courses such as those offered by many tertiary institutions and training linked to software purchases, through to undergraduate and postgraduate university degrees. Many of these are available in online and/or distance modes. The number and scope of these educational opportunities has increased rapidly in recent years.

If a council is considering engaging consultants, instead of increasing capacity through training or engaging staff, managers should be aware that leading practice guidelines are available to assist in determining when a consulting firm is required and what to look for when choosing a consultant.

Acknowledgments

This module quotes extensively from 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. This source is duly acknowledged.

Guide to symbols

The following symbols are used throughout the Toolkit to draw attention to important issues and information.

NOTE!	Information of which readers should take particular note
LEADING PRACTICE	Leading practice information
TIP!	Tips for readers, based on experience and aimed at saving time and other resources
CAUTION!	Caution—readers should take particular care, or the issue may be complex
HIGHER CAPABILITY	Capability raising—shows a signpost to a higher capability level
Bold Text	Bold Text—highlights an important issue
Boxed Text	Boxed Text—highlights issues specifically related to ANZLIC or ALGA

8.1 Introduction

This module addresses the options available to raise the capability for using GIS in councils. In particular the module focuses on staff development, recruitment and the hiring of GIS consultants.

8.2 Train, recruit or hire a consultant?

Decisions to train existing staff in GIS, to hire new staff with GIS skills or to hire a consultant are no different from any other similar technical decisions faced by councils. GIS is now in the mainstream of the IT industry and GIS expertise, once a very scarce set of skills, is now widespread. However, as with other specific IT skills, GIS skills may be more difficult to obtain in rural and regional Australia than in metropolitan centres.

Consequently, the processes that a council uses when faced with decisions on staff development, recruitment of new staff or outsourcing apply also in the case of GIS skills. Factors that influence these options may include:

- the need to match current capability with planned GIS requirements—does the council have a thorough understanding of its skill needs for both short- and long-term deployment of its GIS?
- the availability of necessary training courses (including online courses) to increase capability.
- consideration of the GIS resources available in the region—is it possible to work with

neighbouring councils to share resources?
- → identification of the time constraints—does the council need a GIS system quickly or can it progress more slowly?
- → the results of long-term planning—a long-term vision for GIS in the local government area will require consideration of the sustainability of the GIS, what staff–consultant mix will be maintained and how this will be done
- → the potential for partnering with neighbouring councils to increase capability
- → 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 GIS software and hardware purchasing decisions and the provision of training and consultancy services.

HIGHER CAPABILITY 1 → 2

Ensure that the spatial information management projects of individuals are recognised by the council and are being managed in a systematic manner. Data and information management standards should be in place, and there should be linkages to business processes and procedures. Ensure that training resources are allocated to individuals and/or departments.

CAUTION! The options presented in this module deal with staffing and procurement issues. It is strongly recommended that staffing and procurement are discussed with the appropriate senior staff to ensure compliance with the council's human resource and procurement policies.

8.3 Options for training existing staff

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

NOTE! If the council is considering GIS training for its staff, the relevant state or territory local government association may be able to provide assistance or guidance.

There are many industry training courses on GIS, run by independent training providers or by companies selling GIS software and services. In the latter case, GIS vendors can provide either stand-alone introductory GIS courses—using their own software—or training associated with specific software purchases. In some cases, GIS vendors offer regionally based training courses or provide training through distance education.

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

- → Diploma of Spatial Information Services
- → Advanced Diploma of Spatial Information Services
- → Certificate III in Spatial Information Services
- → Graduate Certificate of Geographic Information Science
- → Graduate Diploma of Geographic Information Science
- → Postgraduate Diploma of Geographic Information Science.

These courses are more comprehensive than short courses, run over a longer duration and so require a greater time commitment. Courses are currently offered in New South Wales, Victoria, Tasmania, Western Australia and the Australian Capital Territory. Further information is available from tertiary institutions and from the National Training Information Service at http://www.ntis.gov.au/ (enter 'spatial' into the search box).

An increasing number of university courses now include a GIS component. These include spatial sciences, geography, town planning, surveying and computer science. The lecturers teaching the courses are often available to run short courses for councils. This can have the advantage of providing training independently of software vendors.

Some universities offer GIS courses in distance and online modes. This allows for study to be conducted relatively independently of location[20] and more flexibly. Further, the Cooperative Research Centre for Spatial Information is developing online continuing professional development short courses and has commenced an online Masters degree program that links into Masters degrees at participating universities, thus increasing access to higher awards in online and distance study modes.

Training can also be obtained through industry professional associations. The Spatial Sciences Institute has a large membership drawn from local government; information on the Institute is available at http://www.spatialsciences.org.au/. The Institute represents spatial information professionals from areas such as:

→ GIS
→ cadastral, civil, hydrographic, engineering and mining surveying
→ cartography and mapping
→ remote sensing
→ photogrammetry.

LEADING PRACTICE Raising staff capacity in GIS does not necessarily require formal training courses or conference attendance. Networking between council staff working in the management of spatial information can be effective. This was the thinking behind the GIS section of the City of Swan forming its own GIS professional network (see http://gis.swan.wa.gov.au/ for further information). The network meets occasionally to share experiences. It also provides a simple online contact list so that members can contact their colleagues in other councils directly. The network is a great support for its members, particularly those outside the Perth metropolitan area, who might otherwise feel isolated from their peers.

8.4 Recruiting new staff

Specialist staff will be required by councils once their requirement for GIS reaches the point at which existing staff no longer have the time and/or skills to manage the council's GIS. Specialist staff may also be required when it is clear that it is more cost-effective to hire staff than to continually use consultants.

As outlined in Section 8.3, there is now a wide range of specialist GIS training courses available. The graduates of such courses will have a good grounding in the theory and practice of GIS development and implementation. The mix of practical and theoretical skills will vary with the level of qualification and the institution, and these factors should be considered when recruiting new staff.

20 Internet access will usually be necessary.

The selection criteria used when choosing new staff will depend on the particular requirements of the council. The criteria, and their relative weightings, should be considered carefully and documented clearly before the recruitment process begins.

A survey of an Australian online jobs site reveals the following typical key requirements for GIS job candidates:

- → experience with a particular GIS software package
- → understanding geographic databases
- → familiarity with GIS operations
- → familiarity with maps and mapping conventions
- → competence with computing operating systems
- → experience with a range of related software products
- → excellent communication skills
- → experience with asset management systems
- → ability to improve business processes utilising GIS and IT
- → ability to provide GIS technical leadership
- → work within the MIS (management information systems) team to provide information management expertise to council and its contractors
- → liaison with internal and external customers, data suppliers and other authorities
- → assistance with administration of GIS, including documentation of procedures and metadata
- → assistance with the implementation of new system projects
- → user support and training.

TIP! This list is a useful guide to appropriate selection criteria for recruitment to a council-based GIS position.

8.5 Using a GIS consulting firm

The use of a consultant can be an efficient and cost-effective alternative to hiring staff. The decision to engage a consultant should be reached after a careful and thorough analysis of the probable benefits and costs. The following material will provide some guidance.

8.5.1 How do you know when you need one?

The following material is taken verbatim 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

Choosing a GIS Consulting Firm - Part 1 - How do you know when you need one?

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 specialized 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 organization successful even during the worst of times.

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1 You have a particularly challenging or large application project where a consultant can provide the necessary specialized 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 specializing 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 organization has stagnated. Often after a GIS program has been established the organization in unable to move beyond data maintenance and map production work resulting in failing to capture or realize 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 organizations. 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 organization is at risk of loosing its GIS program because management or elected officials consider GIS as project rather 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 organization'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. Often, consultants can find a way for your organization to work more efficiently to overcome the budget and staff reductions.

6 You are preparing to undergo organizational 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 reorganization. A good consultant with experience in GIS, IT, organization 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 organization.

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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 organization 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, customization, 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 increasing 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 organization's ability to procure services or products. The organization 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'.

What to watch out for

Choosing a GIS Consulting Firm - Part 2 - 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 specialize while others offer diverse services. Some are software vendors that offer consulting services centered on their products.

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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 skill or qualifications 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 organization. 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 organization 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 organization's needs. These days GIS is becoming elevated in organizations and 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 specialized and don't have these skills so it is important to choose wisely depending on your needs.

(Note: the article continues with some detailed information on pitfalls that may be encountered when working with consultants.)

Many government bodies have guidelines for the selection of consultants; see, for example, information available from the Queensland Environmental Protection Agency website at http://www.epa.qld.gov.au/environmental_management/land/contaminated_land/choosing_a_consultant/.

8.5.2 Leading practice guideline for hiring a GIS consultant

LEADING PRACTICE

The approach to be used in engaging a consultant will be similar to that discussed in *Module 7* for selecting software and hardware. Key points include the following:

→ identify the council's requirements
→ develop a matrix or score card, listing the council's requirements
→ leave room for evaluating intangibles; factors to consider include:
  – the potential for an ongoing relationship and support.
  – skill—does the consultant have the breadth and depth to meet the council's needs?
  – distance—are they available on call?
  – if not, is this important for the council's decision?
→ ensure that the council's procurement policies and processes are followed.

8.6 Partnering and shared services

The use of expertise across councils is a relatively new capacity-building method. Sharing specific expertise between councils can offer business benefits through economies of scale and effective specialisation. The City of Kalgoorlie–Boulder in Western Australia uses this approach for its GIS infrastructure management. The City of Swan is contracted to manage the GIS infrastructure of Kalgoorlie–Boulder remotely, leveraging the City of Swan's leading practice systems and methods.

At state government level, shared services across government agencies have become popular. The Queensland Government's *Shared Service Solutions Program* states 'shared services aims to deliver high-quality, cost-effective corporate services across the Queensland Government. This will be achieved through economies of scale and skill, and is underpinned by standardising business processes, consolidating technology, and pooling resources and expertise across Government'. Further information on the Queensland program is available at http://www.governmentict.qld.gov.au/03_contracts/sss.htm. Further information on shared services in Western Australia is available at http://www.dlgrd.wa.gov.au (search on 'shared services').

Additional information may also be available from relevant state and territory agencies and from the state and territory local government associations:

→ New South Wales—www.lgsa.org.au
→ Northern Territory—www.lgant.nt.gov.au
→ South Australia—www.lga.sa.gov.au
→ Queensland—www.lgaq.asn.au
→ Tasmania—www.lgat.tas.gov.au
→ Victoria—www.mav.asn.au
→ Western Australia—www.walga.asn.au.

8.7 Knowledge networks

GIS focus groups or learning circles can provide a very useful knowledge base that taps into existing knowledge within councils and helps disseminate methods of leading practice quickly, cheaply and effectively. These groups can be used for peer networking and can use information tools such as newsletters, group emails and even online bulletin boards. In Western Australia, for example, the Western Australian Local Government GIS (WALGIS) Focus Group brings together GIS staff and other interested personnel from metropolitan and rural councils and shires. They have meetings in which GIS trends, issues and problems are discussed, and produce a newsletter to keep all members informed.

8.8 Additional support

There are many consultants servicing the spatial information industry in Australia; many are associated with specialist spatial technology firms or with engineering firms. The following web sources are presented as a starting point for councils to find out additional information about the spatial information industry and consulting firms in Australia.

8.8.1 Resource material

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: 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/
→ Cooperative Research Centre for Spatial Information: http://www.crcsi.com.au.

8.8.2 Register of local government association training specialists

State or territory local government associations may be able to provide information about GIS training for council staff. The websites for these associations are listed in Section 8.6.

Acronyms

ACRES	Australian Centre for Remote Sensing
ADAC	Asset Design and As Constructed
AGD	Australian Geodetic Datum
ALGA	Australian Local Government Association
ANZLIC	ANZLIC—the Spatial Information Council for Australia and New Zealand
ASDD	Australian Spatial Data Directory
ASDI	Australian Spatial Data Infrastructure
AS/NZS	Australian Standard/New Zealand Standard
CAD	computer assisted design, computer-aided drafting
CPU	central processing unit
DSDB	detail survey database
GDA94	Geocentric Datum of Australia 1994
GIS	geographic information systems
GML	Geography Markup Language, Generalised Markup Language
GPS	global positioning system
GSDI	Global Spatial Data Infrastructure
GUI	graphical user interface
HTTP	Hypertext Transfer Protocol
ICT	information and communications technology
INCIS	Integrated National Crime Information System (New Zealand)
ISO	International Organization for Standardization
IT	information technology

MGA	Map Grid of Australia
OGC	Open Geospatial Consortium
OGC-A	Open Geospatial Consortium—Australasia
PRINCE	Projects IN Controlled Environments
RCSC	Regional Collaboration Steering Committee (Queensland)
RFP	Request for Proposal
RIP	raster image processor
ROC	regional organisation of councils
SDE	spatial database engine
SDI	spatial data infrastructure
SEQ	south east Queensland
SIDP	Spatial Interoperability Demonstrator Project
SLIP	Shared Land Information Platform (Western Australia)
SOAP	Simple Object Access Protocol
URL	Uniform Resource Locator (website address)
VROC	voluntary regional organisation of councils
WALIS	Western Australian Land Information System
W3C	World Wide Web Consortium
XML	Extensible Markup Language

NOTE: A list of several online spatial information system, GIS, cartographic, data and IT glossaries and dictionaries is provided at http://www.gis.com/whatisgis/glossaries.html. An additional online glossary for definitions of many current IT-related words is available at http://whatis.techtarget.com/.