

## Introduction

### Survey of the demand for GISc knowledge and skills in South Africa

You are invited to participate in a joint survey by the Committee for Spatial Information(CSI) and the Geoinformation Society of South Africa (GISSA), [www.gissa.org.za](http://www.gissa.org.za). GISSA represents the geoinformation community of South Africa as a national, unified, representative body to promote and protect the interests of its members on all forums. The CSI, as established by Section 5 of the Spatial Data Infrastructure Act (Act No. 54 of 2003), is mandated to oversee the implementation of the South African Spatial Data Infrastructure (SASDI).

The purpose of the survey is to get a better understanding of the demand for GISc knowledge and skills in South Africa. The results of the survey will inform the development of the South African Geospatial Information Management Strategy to support the implementation of the National Development Plan.

The questionnaire asks for information about demand for GISc knowledge and skills in your organization and/or organizational unit.

This is an anonymous survey, your name will not appear on the questionnaire and the answers you give will be treated as strictly confidential. You cannot be identified in person based on the answers you give. (Note that consent cannot be withdrawn once the questionnaire is submitted, as there is no way to trace the particular questionnaire that has been filled in).

Your participation in this study is very important to us. You may, however, choose not to participate and you may also stop participating at any time without any negative

consequences.

There are four sections in this survey, each with a number of questions:

Section 1 – Characteristics of the organization

Section 2 – Characteristics of the organizational unit

Section 3 – GISc knowledge and skills requirements in your organizational unit

Section 4 – Various

Please answer the questions in the questionnaire as completely and honestly as possible from the perspective of the organization you are representing. Please do not reflect your personal views. Once you have the requested information at hand, it should not take more than 10 minutes to complete the questionnaire

The results of the survey may be published in the media and/or an academic journal. We will provide you with a summary of our findings on request.

Please feel free to contact Prof Serena Coetzee [serena.coetzee@up.ac.za](mailto:serena.coetzee@up.ac.za) from the University of Pretoria, Mr Owen Maswanganye [owen.maswanganye@drdlr.gov.za](mailto:owen.maswanganye@drdlr.gov.za) from the NSIF, or Mr Morena Letsosa [morena.letsosa@ekurhuleni.gov.za](mailto:morena.letsosa@ekurhuleni.gov.za) from GISSA if you have any questions or comments regarding the study.

## **Section 1 – Characteristics of the organization**

### **Section 1 – Characteristics of the organization**

*Please indicate the characteristics of your organization in this section; characteristics of the organizational unit (e.g. directorate, department or company division) will be indicated in Section 2. If your organization does not have different organizational units, please indicate characteristics of the organization in Sections 1 and 2.*

*Example 1: 'Department of Rural Development and Land Reform' is the organization; 'Directorate NSIF' is an organizational unit within the organization.*

*Example 2: Aurecon Consulting Engineers is the organization; 'Asset Management' and 'Environmental Management' are two organizational units within the organization.*

1.1 Indicate the main industries of the business or mandate of your organization. You may check more than one.

Agriculture  
Civil Engineering  
Climate change  
Conservation  
Construction  
Defense and Intelligence  
Disaster and Emergency Management  
Education  
Environmental  
Financial/Business/Marketing  
Health Services  
Heritage management  
Housing  
Land Administration and/or Land information systems  
Law enforcement  
Mining  
Public Utilities (Electricity, and water, wastewater)  
Real Estate/Valuations  
Roads and Stormwater  
Social Welfare  
Statistics  
Surveying  
Telecommunication  
Transport and Traffic  
Urban and regional planning  
Water Resources  
Weather/Meteorology

Other (please specify)

1.2 To what extent are GISc knowledge and skills needed to fulfill the strategic objectives

of your organization? Check only one.

Crucial/critical

Strategically important

Operationally important

Optional

1.3 Indicate the economic sector of your organization. Check only one.

Public sector

Private sector

Non-governmental organization

Research

Academia

State Owned Enterprise, parastatal or statutory body (e.g. ARC, Council for Geoscience, Denel, DBSA, Eskom, HSRC, full list at:

<http://www.gcis.gov.za/content/resourcecentre/contactdirectory/governmentstructuresandparastatals>)

1.4 If your organization is in the private sector, is your company listed on the Johannesburg Stock Exchange (JSE)?

Yes

No

## Section 2 – Characteristics of the organizational unit

### Section 2 – Characteristics of the organizational unit

*Please indicate the characteristics of your organizational unit in this section. Example: Department of Rural Development and Land Reform is the organization; Directorate NSIF is the organizational unit. If your organization does not have different organizational units, please indicate characteristics of the entire organization in this section.*

2.1 If your organization is in the public sector, select the area of jurisdiction of your organizational unit. Check only one.

- Local municipality
- Metropolitan municipality
- District municipality
- Province
- National

2.2 Select the province where the primary office of your organizational unit is situated. Check only one.

- Eastern Cape
- Free State
- Gauteng
- Limpopo
- Mpumalanga
- North West
- Northern Cape
- KwaZulu-Natal
- Western Cape

2.3 Indicate the type of business your organizational unit engages in.

	Not applicable	Partially	Mostly	Only
Consulting (services) to the public sector	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Consulting (services) to the private sector	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Vendor of geospatial data	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Vendor of geospatial software	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Geospatial data acquisition	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Value-added reseller of geospatial data	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Value-added reseller of geospatial products	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
GISc implementations in the public sector	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
GISc implementations in the private sector	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

2.4 Indicate the total number of employees in your organizational unit. Check only one.

- <10
- 10-100
- 101-500
- >500

### Section 3 - GISc knowledge and skills requirements in your organizational unit

#### Section 3 - GISc knowledge and skills requirements in your organizational unit

*Please provide information about the GISc knowledge and skills that are required to fulfil the mandate of your organizational unit (if in the public sector) or to meet the organizational unit's business needs (if in other sectors). If your organization does not have different organizational units, please provide information about the entire organization in this section.*

3.1 Is GISc professional registration compulsory for certain posts or jobs in your organizational unit?

- Yes
- No

3.2 Indicate the total number of posts or positions in your organizational unit for which more than 5 years of experience in GISc knowledge and skills are required.

None

Some, please specify how many:

3.3 Indicate the total number of posts or positions in your organizational unit for which less than 5 years of experience in GISc knowledge and skills are required.

None

Some, please specify how many:

3.4 Indicate the total number of posts or positions in your organizational unit for which GISc knowledge and skills are required.

**GIS Interns**

None

Some, please specify how many:

3.5 Which geospatial platforms are used in your organizational unit?

	Never	Rarely	Occasionally	Frequently	Only
Custom-built application (proprietary)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Custom-built application (open source)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Desktop product (proprietary)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Desktop product (open source)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Server based product (proprietary)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Server based product (open source)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Virtual globes (e.g. Google Earth)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Online maps (e.g. Google Maps, Bing Maps, OpenStreetMap)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other, please specify:

    

Other, please specify:

    

Other, please specify:

    

3.5 How much of the work in your organizational unit, for which GISc knowledge and skills are required, is conducted in the roles listed below?

	None	Some	Much	All
<b>Coordination</b> Inter-organizational facilitation and communication.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Data Acquisition</b> Collect geospatial and related data.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Data Analysis and Interpretation</b> Process data and extract information to create products, drive conclusions, and inform decision-making reports.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Data Management</b> Catalogue, archive, retrieve, and distribute geospatial data.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Database Administration</b> Installation, configuration, upgrade, administration, monitoring and maintenance of spatial databases.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Management</b> Efficiently and effectively apply the company's mission using financial, technical, and intellectual skills and resources to optimize the end products.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Marketing</b> Identify customer requirements and needs, and effectively communicate those needs and requirements to the organization, as well as promote geospatial solutions.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Policy Development / Governance</b> Define and guide appropriate relationships between an organization's owners, its board of directors, and its chief executive.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Project management</b> Effectively oversee activity requirements to produce the described outcomes on time and within budget.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Research</b> Collection and analysis of information to increase the understanding of a topic or issue.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<b>Software Development</b> Development of a software product and refer to computer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



programming or maintenance of software.

**System Analysis**

Assess requirements to produce the desired outcomes on time and within budget.

**System Management/Integration**

Integrate resources and develop additional resources to support spatial and temporal user requirements.

**Training**

Analyse, design, and develop instructional and non-instructional interventions to provide transfer of knowledge and evaluation for performance enhancement

**Visualization/Mapping**

Render data and information into visual geospatial representations.

None                      Some                      Much                      All

**3.6 How relevant are the following GISc knowledge and skills to the business or mandate of your organizational unit?**

Not at all                      Slightly                      Moderately                      Extremely

**Analytical Methods**

Query operations and query languages, Geometric measures, Basic analytical operations, Basic analytical methods, Analysis of surfaces, Spatial statistics, Geostatistics, Spatial regression and econometrics, Data mining, Network analysis, Optimization and locational, location modeling.

**Conceptual Foundations**

Philosophical foundations, Cognitive and social foundations, Domains of geographic information, Elements of geographic information, relationships, Imperfections in geographic information.

**Cartography and Visualization**

History and trends, Data considerations, Principles of map design, Graphic representation techniques, Map production, Map use and evaluation.

**Data Acquisition (Primary and secondary)**

Surveying techniques, digitising, Scanning, Manual input, Photogrammetry, Remote sensing and GPS observations, Types of errors, Accuracy, precision, law of error propagation, Managing the quality of collected data, Quality and their fitness for use in GIS applications, Data needs, Data integration, Data standards, Error modeling and data uncertainty; presentation of spatial data, Data cleaning, migration & manipulation, Metadata collection and capture (sources, national and international standards, use of metadata), Spatial and attribute data transfer formats. Social surveys questionnaire.

**Design Aspects**

The scope of GI S&T system design, Project definition, Resource planning, Database design, Analysis design, Application design, System implementation.

**Data Modeling**

Basic storage and retrieval structures, Database management

systems, Raster (Tessellation) data models, Vector and object data models, modelling 3D, temporal, and uncertain Phenomena.

**Data Manipulation**

Representation transformation, Generalization and aggregation, Transaction management of geospatial data.

**Geocomputation**

Emergence of geocomputation, Computational aspects and neurocomputing, Cellular Automata (CA) models, Heuristics, Genetic algorithms (GA), Agent-based models, Simulation modelling, Uncertainty, Fuzzy sets.

**Geospatial Data**

Earth geometry, Land partitioning systems, georeferencing systems, datums, Map projections, Data quality, Land surveying and GPS, Aerial imaging and photogrammetry, Satellite and shipboard remote sensing, Metadata, standards, and infrastructure.

**GI S&T and Society**

Legal aspects, Economic aspects, Use of geospatial information in the public Sector, Geospatial information as property, Dissemination of geospatial information, Ethical aspects of geospatial information and technology, Critical GIS.

**Organizational and Institutional Aspects**

Origins of GI S&T, Managing the GI system operations and infrastructure, Organizational structures and procedures, GI S&T workforce themes, Institutional and interinstitutional aspects, Coordinating organizations (national and international).

**Mathematics and Statistics**

Differential and integral calculus of functions of one variable, Differential equations, Partial derivatives, Mean value theorem, Solving systems of linear and nonlinear equations, functions, Conic sections, Complex numbers, Matrix algebra, Intersection of lines/planes, distance from points to lines/planes, Differential geometry, Series and polynomials.  
 Statistics: Descriptive Statistics Univariate: Sampling and the collection of data, frequency distributions and graphical representations, Descriptive measures of location and dispersion, Probability and inference: Introductory probability theory and theoretical distributions, Sampling distributions, Estimation theory and hypothesis testing of sampling averages and proportions (one and two sample cases), Identification, use and interpretation of statistical computer packages and statistical techniques. Multivariate statistics, curve fitting (eg regression and correlation).

**Physics**

Kinematics, Newton's laws of motion, work, energy, power, rotational dynamics, torque, angular momentum, gravitation, periodic motion, simple harmonic motion, interference, wave motion, diffraction, refraction and reflection of waves, Doppler effect, Electric charge and field, electric potential, capacitance, resistance, electric current, electromagnetic induction, magnetic field, electromagnetic spectrum.

Not at all      Slightly      Moderately      Extremely

3.7 Which GISc knowledge and skills do you think the employees of your organizational unit will require in the future (which they don't have now)?

## Section 4 – Various

4.1 Indicate the number of fulltime bursaries offered by your organization or organizational unit in the following disciplines. If you do not know, leave the box empty

	Number
Environmental Science	<input style="width: 50px; height: 20px;" type="text"/>
Geography	<input style="width: 50px; height: 20px;" type="text"/>
Geoinformatics/GISc/Geomatics	<input style="width: 50px; height: 20px;" type="text"/>
Remote sensing	<input style="width: 50px; height: 20px;" type="text"/>
Surveying	<input style="width: 50px; height: 20px;" type="text"/>
Town and regional planning	<input style="width: 50px; height: 20px;" type="text"/>

4.2 Which type of self-development does your organizational unit provide to its employees? You may select more than one.

	Yes	No	I don't know
Attendance courses (i.e. no assessment)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Conferences and seminars	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
PLATO CPD events	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Certificate training courses	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Full-time studies at a Technical Vocational Education and Training (TVET) college (formerly known as FET college)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

- |   |                       |                       |                       |
|---|-----------------------|-----------------------|-----------------------|
| Part-time studies at a Technical Vocational Education and Training (TVET) college (formerly known as FET college) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Fulltime studies at a university or a university of technology  | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Part-time studies at a university or a university of technology   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| SAQA accredited courses   | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

4.3 Indicate the level **you** represent in your organizational unit. Check only one.

- Top management
- Senior management
- Middle management
- Supervision
- Senior operational
- Junior operational

4.4 Use the text box below to tell us anything else you would like to share with us about the demand for GISc knowledge and skills in South Africa

Office use - survey number:

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