

ASSESSMENT OF THE GEODETIC HUMAN CAPACITY IN AFRICA

**A REPORT OF WORK PACKAGE 2
UNDER THE BUILDING THE FOUNDATION FOR GEODETIC
EXCELLENCE IN AFRICA PROJECT**

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Introduction

- The objective of the project “*Building the Foundation for Geodetic Excellence in Africa*” through the Africa-UK Physics Partnership seeks to lay the groundwork for a comprehensive understanding and enhancement of the geodetic infrastructure in Africa
- This was achieved through the assessment of the current state of geodetic equipment and computational infrastructure across African nations/Countries
- The assessment of the Geodetic Human Capacity in Africa was accomplished using desktop review, site visits to some select countries through administration of a distinct questionnaire

Introduction

- This assessment of existing geodetic human capacity across African nations was implemented in **Work package 2**.
- The methodology used included:
 - ✓ **Data collection:** Developed and distributed questionnaires to collect data on existing human capacity.
 - ✓ **Geodetic Human Capacity assessment:** Assessment of the current level of expertise in geodesy and related fields, identifying gaps in knowledge and training needs
 - ✓ **Data analysis:** Analysed the collected data to identify strengths, weaknesses, and opportunities as well as gaps geodetic human capacity

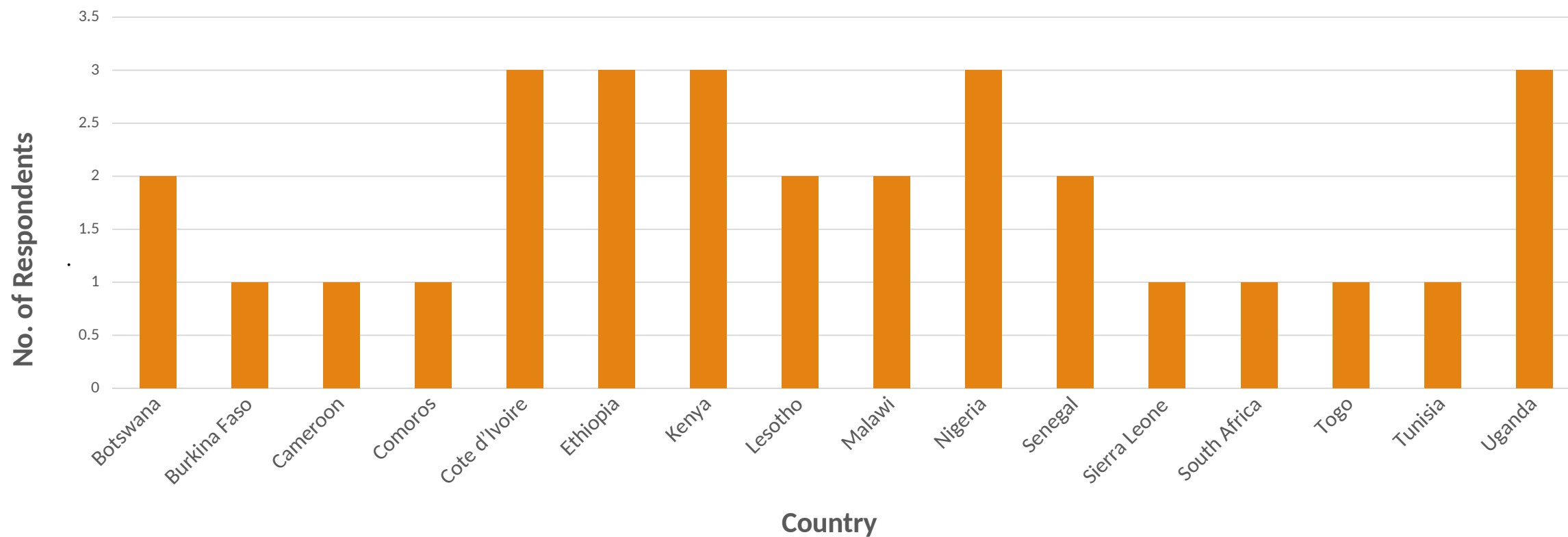
Findings

- **Source of Data: Questionnaire and Desk top review**
- The questionnaire was structured according to the following scheme:
 - ✓ Section A - Education and Training within the respective countries
 - ✓ Section B – Technical Skills within the respective countries
 - ✓ Section C – Training and Development Needs within the respective countries
- 30 respondents on mapping of the human capital participated in the assessment.
- These comprised of 14 public universities, 1 private university, 14 government agencies while 1 was an international organization

Respondent Type	Comments	Respondents
Public Universities	e.g. Universities, Survey Institutes, Institute of Land Administration, Institute of Cartography	14
Private Universities	e.g. Lecturers, Senior Lecturers, Professors, Research Fellows	1
Government Agencies	e.g. Land survey and physical planning departments, Topo Cadastre Unit, Directorate of Geographic Information Systems	14
International Organizations	e.g. Regional Mapping Agency	1
TOTAL		30

Findings

Distribution of the respondents to the human capital assessment

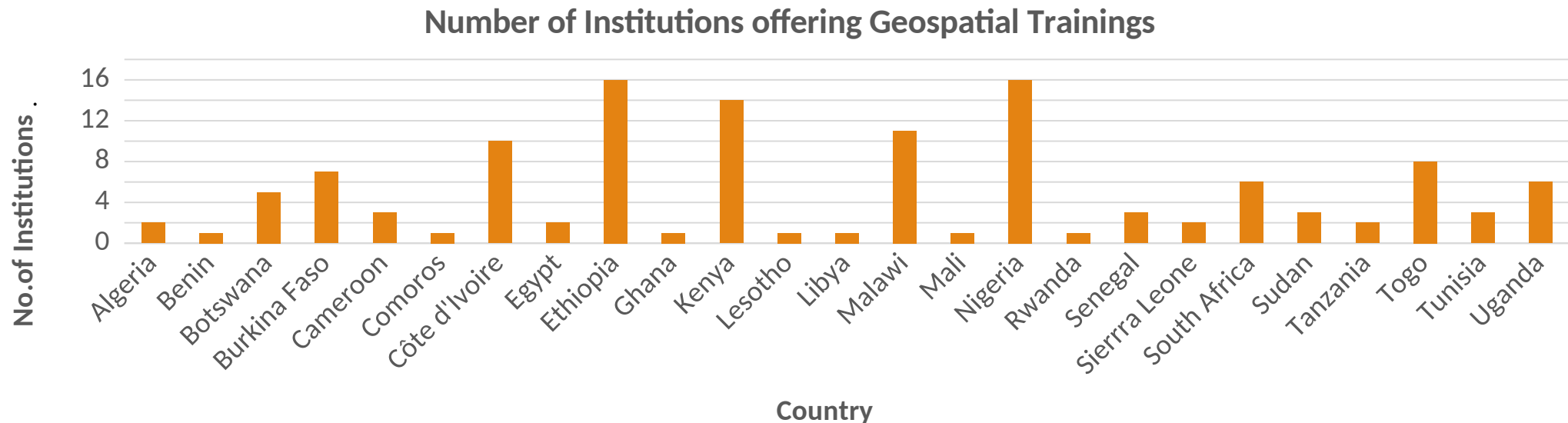


Findings

- **Human Capacity in Geodesy**

- **Education and Training**

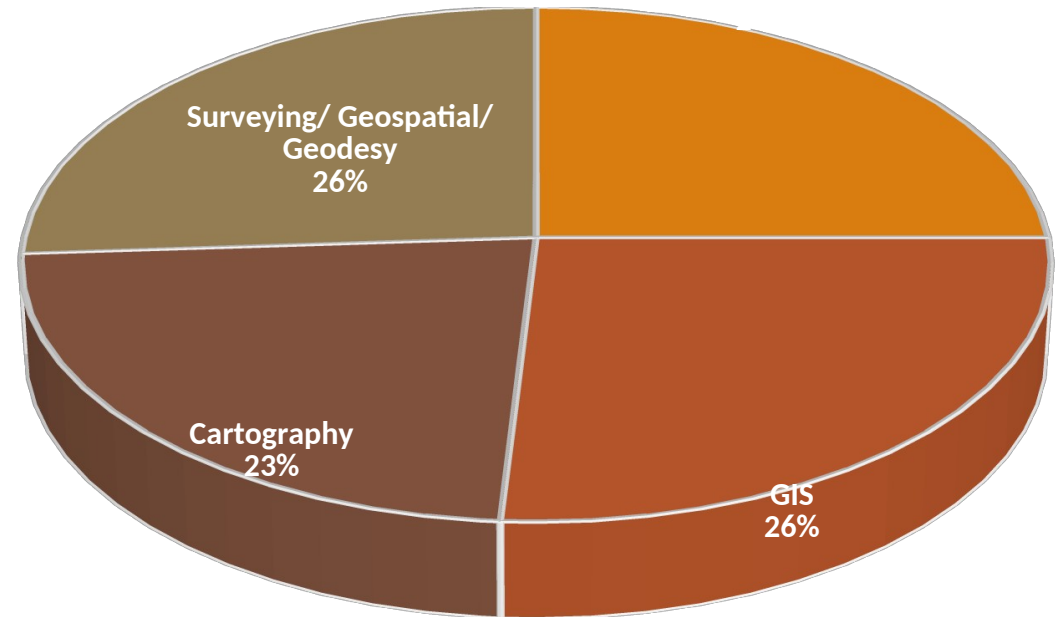
- According to the assessment of the human capital in geodetic sciences, several universities across Africa offer specialized education in Geomatics, Geoinformatics, and Geospatial Engineering, surveying, GIS, and remote sensing education



Findings

- **Human Capacity in Geodesy**
- **Education and Training**
- The assessment established the following as key training areas in geodetic sciences in Africa;
 - Cartography (23%)
 - LIS (25%)
 - GIS (26%)
 - Surveying/ Geospatial/ Geodesy (26%).

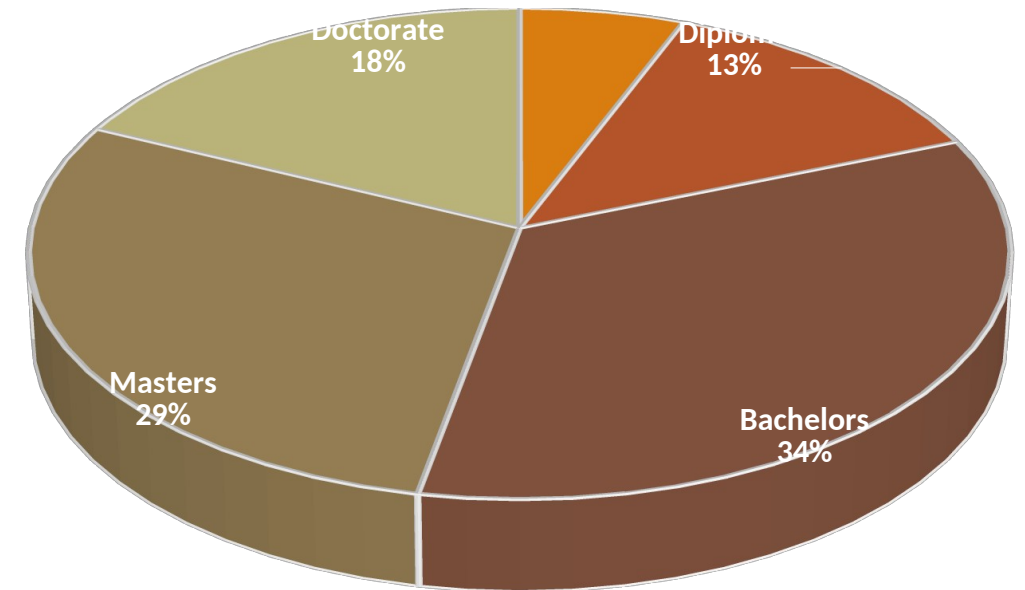
Training areas in geodetic sciences in Africa



Findings

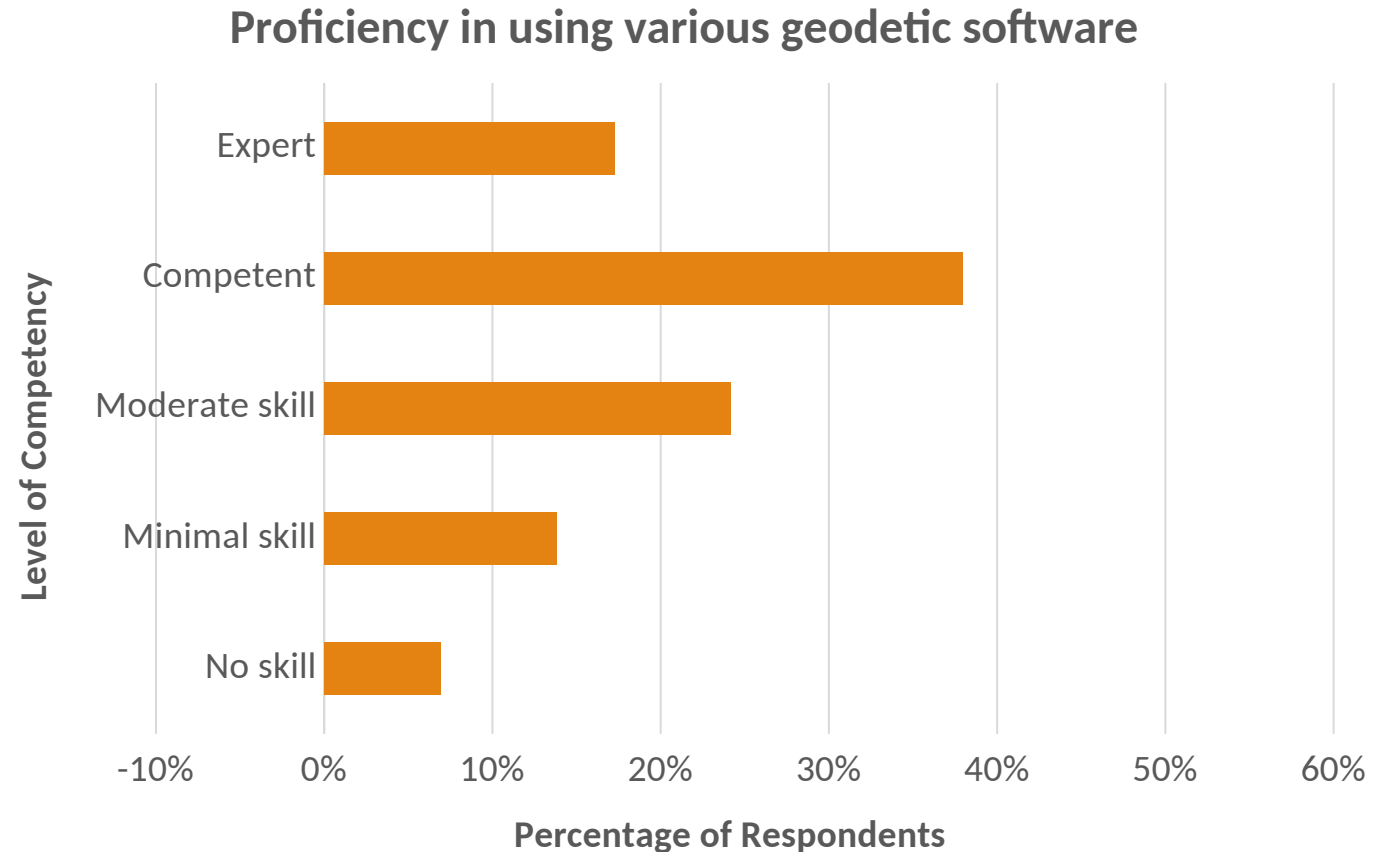
- **Human Capacity in Geodesy**
- **Education and Training**
 - According to the assessment of the human capital in geodetic sciences, several universities across Africa offer specialized training levels ranging from bachelor's to doctoral degrees
 - The assessment also established the following as key training levels in geodetic sciences in Africa;
 - Certificate (6%)
 - Diploma (13%)
 - Bachelors (34%)
 - Masters (29%)
 - Doctorate (18%)

Key training levels in geodetic sciences in Africa



Findings

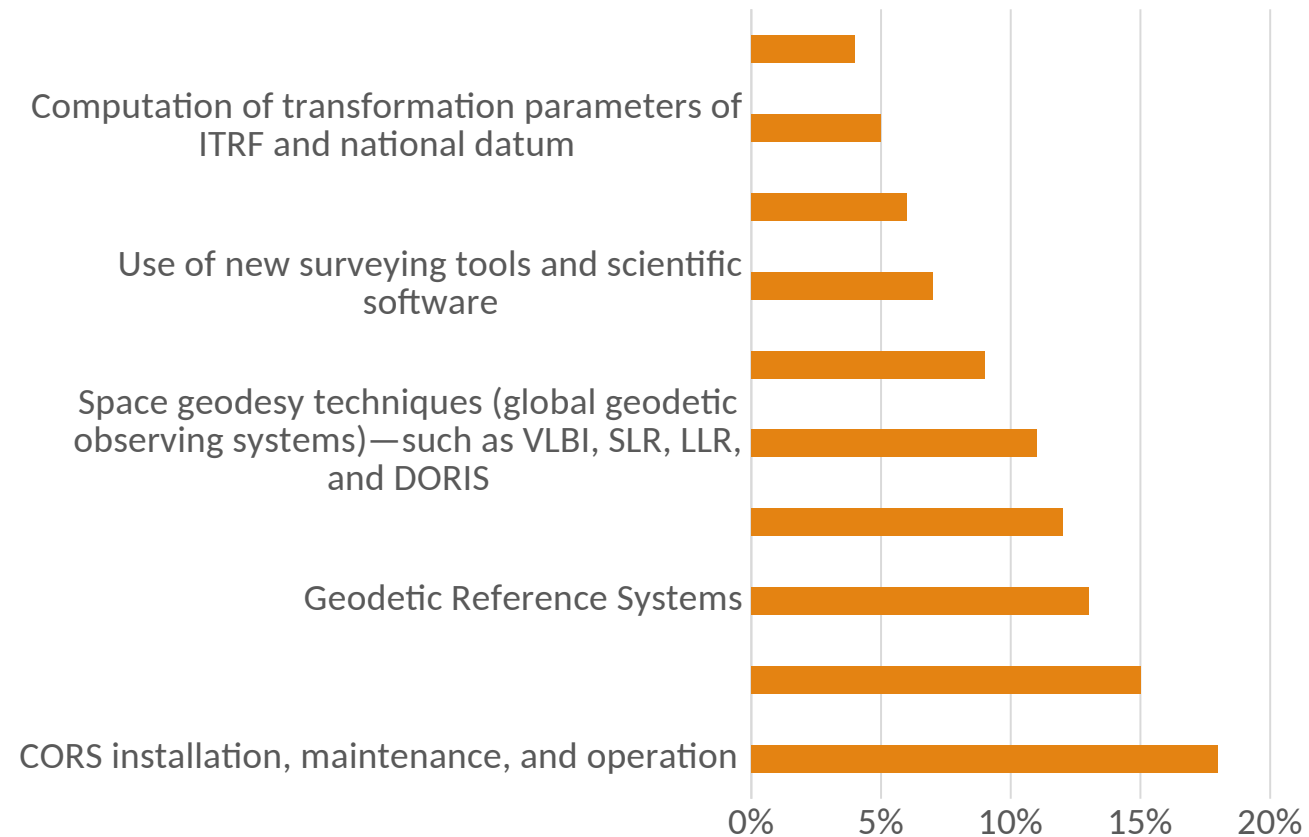
- **Technical Skills**
- **Data Processing Software**
- This study also enquired on the competency level of the respondents in processing geodetic/ geospatial data in the Likert scale of 1 to 5:
 - 0 1= No skill
 - 0 2=Minimal skill
 - 0 3=Moderate skill
 - 0 4 = Competent
 - 0 5: Expert



Findings

- **Knowledge Gaps and Training Needs**
- According to the assessment, the top ten priority knowledge gaps and training needs that emerge were:
 - CORS installation, maintenance, and operation (18%),
 - Design and operation of GNSS networks including data processing (15%)
 - Geodetic Reference Systems (13%)
 - Geoid modelling (12%)
 - Space geodesy techniques (global geodetic observing systems)—such as VLBI, SLR, LLR, and DORIS (11%),

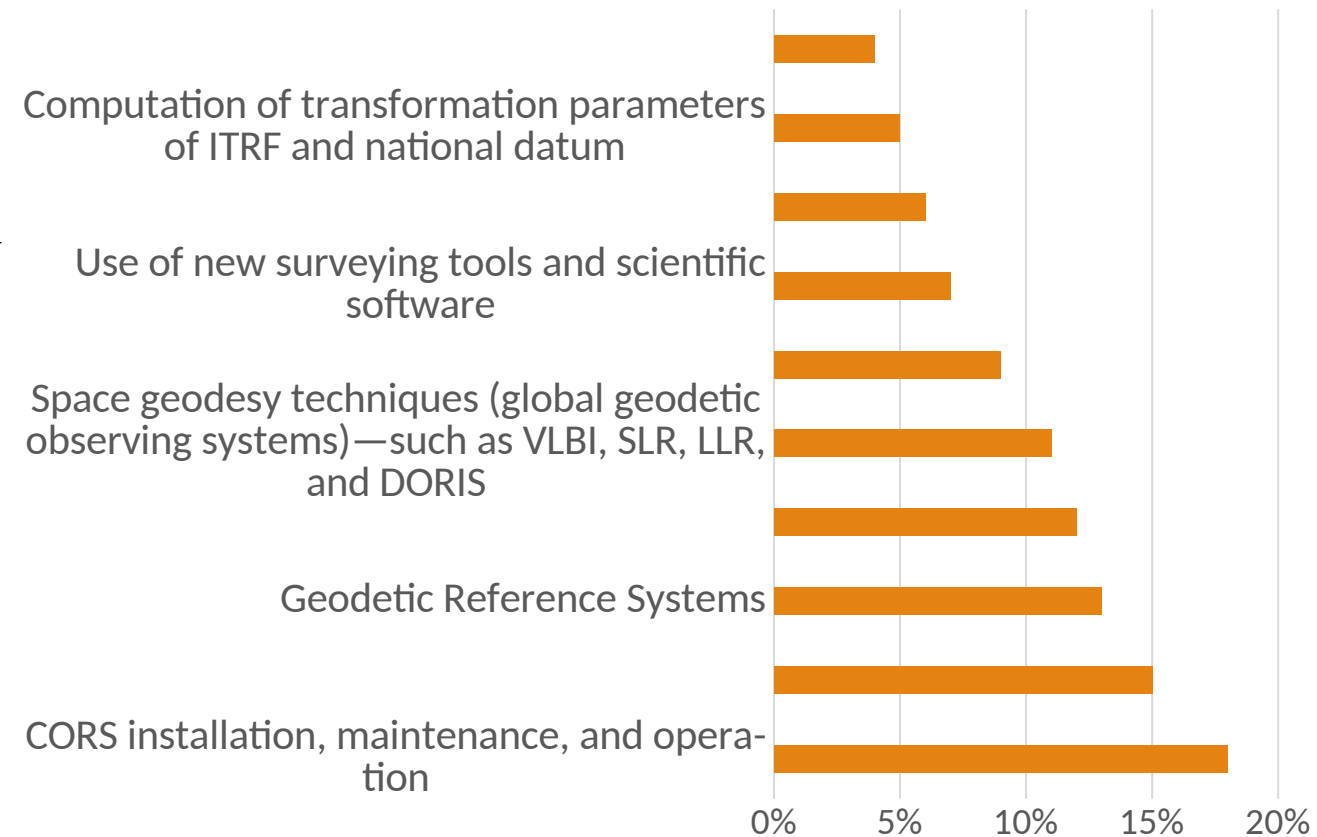
Top 10 Priority Training Needs in Geodetic Science



Findings

- **Knowledge Gaps and Training Needs**
- According to the assessment, the top ten priority knowledge gaps and training needs that emerge were:
 - Emerging technologies like UAVs, LiDAR, and cloud-based GIS (9%)
 - Use of new surveying tools and scientific software (7%),
 - Coding, Artificial Intelligence, Machine learning (6%)
 - Computation of transformation parameters of ITRF and national datums (5%)
 - Lastly Geodetic network adjustments and analysis (4%)

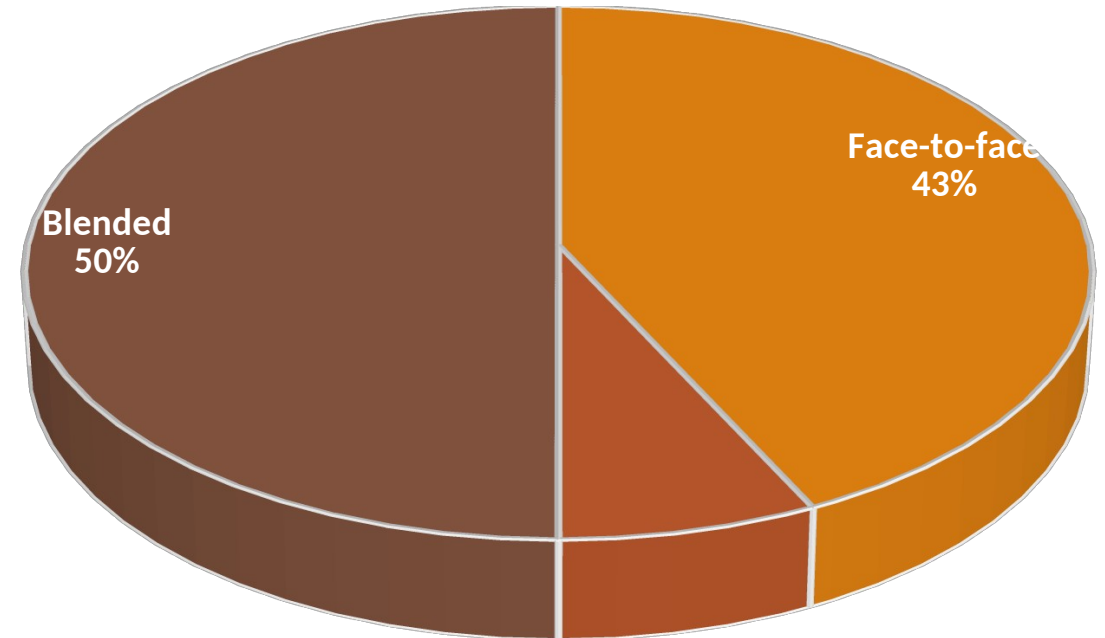
Top 10 Priority Training Needs in Geodetic Science



Findings

- **Preferred Mode of Training**
- On the type of training most effective for the respondents, the assessment established that most
 - ✓ (50%) of the respondents preferred blended trainings with some being face-to-face and others being online trainings
 - ✓ (7%) of the respondents preferred purely online trainings
 - ✓ 43% of the respondents preferred only face-to-face trainings

Types of training methods most effective for the respondents



Conclusions

- Several programs and initiatives exist in the respective African Countries aimed at building capacity for the country's critical areas of need
- There are adequate institutions offering geospatial related courses with GIS and surveying forming the major components of the trainings offered in Africa with the certifications being dominated by Bachelors and Masters degrees
- According to the assessment, 95% of the African countries have professional certifications or licenses related to geospatial science and practice and have personnel with sufficient proficiency to:
 - ✓ using various geodetic software
 - ✓ in operating various surveying/geodetic instruments
 - ✓ geodetic datums, coordinate systems, and projections

Conclusions

- The findings on the human capital assessment revealed that the top five gaps and training needs that emerge were
 - ✓ CORS installation, maintenance, and operation (18%)
 - ✓ Design and operation of GNSS networks including data processing (15%)
 - ✓ Geodetic Reference Systems (13%)
 - ✓ Geoid modelling (12%)
 - ✓ Space geodesy techniques (global geodetic observing systems)—such as VLBI, SLR, LLR, and DORIS (11%)

Recommendations

- It is necessary to compare the content of the existing curriculums of the training institutions with the findings of the training needs gaps identified to determine if they may address the top five gaps and training needs that emerged from the assessment
- Current existing professional training bodies/agencies should review and incorporate the gaps and training needs identified within the optimal scopes, times and costs.

Limitations

- Use multiple data & information sources from different sources and triangulating the results strengthens the validity and objectivity of capacity assessment results

*Thank
you*

