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Project Abstract

The eI4Africa project aims to boost the research, technological development and innovation (RTDI) potential of African e-Infrastructures and to support policy dialogues and Euro-African cooperation in the framework of the Joint Africa-EU Strategic Partnership on 'trade, regional integration and infrastructures' (JAES Partnership #3) as well as the Joint Africa-EU Strategic Partnership on 'science, information society and space' (JAES Partnership #8).

Specifically, the eI4Africa project seeks to achieve the following main objectives:

- Define and implement a structured multi-channel outreach strategy to support the development of African national and regional research and education networks (NRENs/RENS), build cooperation between Euro-African NRENs, RENs and user communities, raise awareness at policy level on the benefits and value of research and education networks, and promote and strengthen Euro-African collaborative research on e-Infrastructures and their applications;
- Produce a state-of-the-art study of e-Infrastructure application uptake in Africa to identify who are early adopters of e-Infrastructures (providers) and which user communities are early beneficiaries (consumers) of e-Infrastructures;
- Select existing flagship demonstrations from other continents and illustrate their relevance to the African context in order to stimulate policy dialogue on e-Infrastructures;
- Stimulate targeted policy and regulatory discussions, including (but not limited to) cross-border connectivity and affordable access to infrastructure by organising awareness raising flagship African e-Infrastructure application demonstrations.

The project Consortium consists of 8 partners (+1 affiliated partner) with significant experience of ICT policies in Europe and Africa and Africa-EU S&T/ICT/Infrastructures cooperation. It is capable of significantly impacting the expansion of Euro-African e-Infrastructures in close liaison with the EC/AUC and in partnership with key stakeholders in the field.

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1 – Introduction

*Elements of Information and Communication Technologies (ICT), including high-speed research communication networks, powerful computational resources (dedicated high performance computers, clusters, large numbers of commodity PCs), grid and cloud technologies, data infrastructures (data sources, scientific literature), sensors, web-based portals, scientific gateways and mobile devices, when integrated together are collectively known as **e-Infrastructures**.*

eI4Africa definition of e-Infrastructures, 2013

The present document is a deliverable of the eI4Africa project (Grant Agreement #312582), funded by the European Commission's Directorate-General for Communication Networks, Content and Technology (DG CONNECT), under its 7th EU Framework Programme for Research and Technological Development (FP7).

The eI4Africa project is divided into Work Packages (WP), each of them being sub-divided into Tasks (T). Work Package 3 "e-Infrastructure applications in Africa: a state-of-the-art study" of the project consists of two tasks (Task 3.1: Data Collection and Task 3.2: Analysis and Findings) aiming to collect and analyse data on established and emerging e-Infrastructure applications in Africa, which will be then evaluated within D3.2 to investigate major trends of e-Infrastructure application development, major success factors and barriers to implementation, and the value added to society by the development of the applications.

The present deliverable (D3.1 – State of the art study of African e-Infrastructure applications), prepared by Brunel University (Project Task Leader), describes the activities undertaken by the eI4Africa partnership to study the current state of the art in e-Infrastructure application uptake in Africa. In order to fulfil these activities, the eI4Africa partnership has developed a multi-layered data collection methodology with a broad aim to reach out to a wide range of stakeholders. In designing this methodology, the eI4Africa partners have also taken into consideration the networking base of "ERINA4Africa" and "eIAfrica" FP7 projects, the extensive networking activities of this project, as well as the extensive and expanding network of contacts of the beneficiaries of this project.

The outcome of the aforementioned study will therefore be to produce a state-of-the-art study of e-Infrastructure application uptake in Africa, the findings of which will be proposed as a set of recommended applications to e-Infrastructure developers to facilitate their development.

1.1 – Context of the study

At the onset of the 21st century, the way scientific research is carried out in many parts of the world is rapidly evolving to what is nowadays referred to as e-Science, i.e. a "scientific method", which foresees the adoption of cutting-edge digital platforms known as e-Infrastructures throughout the process from the idea to the production of the scientific result.

With a few exceptions, African universities and research centres lack access to dedicated global research and education resources, because they are not connected to the global infrastructure consisting of dedicated high capacity regional networks. The consequence is that scientific research and higher education requiring such access cannot currently be conducted in Africa,

and the continent is not well represented in the global research community. This is witnessed by the world map of the scientific divide, where territory size shows the proportion of all scientific papers (published in 2001) written by authors living there (Worldmapper, 2010).

Previous EU funded projects such as FEAST, ERINA4Africa, eI-Africa and CHAIN have investigated and nurtured the adoption of e-Infrastructures in Africa. Until recently, however, the cost and availability of bandwidth has hampered such projects, but this is changing rapidly and will accelerate during the life of eI4Africa as the UbuntuNet interconnections unroll largely through the implementation of the AfricaConnect network. Additionally, there has been much activity since the end of these projects, with current implementations being identified in a diverse range of areas, such as e-Health, e-Learning, and digital libraries.

On the basis of these recent developments, one of the aims of the eI4Africa project is to conduct a state-of-the-art longitudinal study, in order to examine how African scientists and researchers are currently adopting, using, and shaping e-Infrastructure applications.

1.2 – Objectives of the study

Given that e-Infrastructures represent a very heterogeneous subject of investigation, as they can span continents, scientific and professional practices, functions and technologies, the objectives of this study are to:

- Identify any current and/or planned e-Infrastructure **applications** in Africa, and their geographical usage distribution;
- Understand who are current and/or planned **users** (i.e. African scientists, researchers, etc.) of e-Infrastructure applications, and their respective domain of activities;
- Extract any existing or desired e-Infrastructure application technical and feature-specific **requirements** (e.g. computing, data, access) and technologies;
- Identify and select potential applications as **demonstrators** coming from African research groups that could be showcased in events

1.3 - Scope and purpose of the deliverable

This deliverable describes the eI4Africa data collection strategy and plan (target participant audience, potential participant channels, data collection tools and protocol), and presents the results from the state-of-the-art study that have been collected over a period of 7.5 months since the study has started.

The focus of this deliverable is to facilitate the understanding of the current e-Infrastructure scene, and its impact in Africa and in future e-Infrastructure development best practice. It will, therefore, be vital in understanding e-Infrastructure application uptake in Africa and the identification of who the early adopters of e-Infrastructures (providers) are, and which user communities are early beneficiaries (consumers) of e-Infrastructures.

Additionally, this deliverable will allow identification of actual e-Infrastructure applications that are currently in use or are planned in Africa, from which a few (2-3) applications running on high-speed infrastructures will be selected or developed, and suggested to be showcased as "*Flagship Demonstrators*" at the most relevant policy events. This deliverable's findings, therefore, feed to the activities of both WP4 "Flagship demonstration" and WP5 "Project events".

The findings that are described will be of particular interest to the following audiences:

- groups that have already implemented, or are in the process of implementing e-Infrastructures and related applications in Africa;
- communities in different regions of Africa that could benefit from the potential of collaborative use of e-Infrastructures;
- global virtual research communities in order to encourage collaboration between relevant European and African research projects;
- consortium partners in their activities to facilitate the establishment of important e-Infrastructure services, such as Certification Authorities (CAs), Identity Federations (IdFs), and an African Grid Science Gateway (available on: <http://sgw.africa-grid.org/>).

Figure 1 graphically summarizes the iterative character and scope of the aforementioned study.

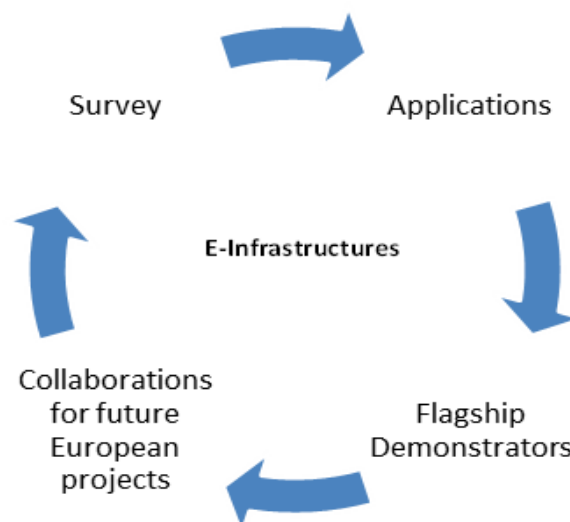


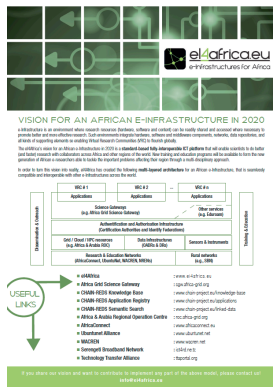
Figure 1. Virtuous circle of eI4Africa activities

1.4 – Structure of the document

The deliverable is organised in 4 main sections with a final conclusion section at the end. The first section presents the eI4Africa vision for an African e-Infrastructure, while the second section provides information about the methodology followed to identify, approach the survey's participants and collect the data. The third section looks at the main findings resulting from this survey. A discussion and recommendations section concludes this report.

2 – The vision for an African e-Infrastructure

e-Infrastructure is an environment where research resources (hardware, software and content) can be readily shared and accessed where necessary to promote better and more effective research. Such environments integrate hardware, software and middleware components, networks, data repositories, and all kinds of supporting elements so enabling virtual research collaborations to flourish globally.



The eI4Africa vision for an African e-Infrastructure in 2020 is a standards-based fully-interoperable ICT platform that will enable scientists to do better (and faster) research with collaborators across Africa and in other regions of the world. New training and education programmes will be available to form the new generation of African e-researchers able to tackle the important challenges affecting their region through a multi-disciplinary approach.

In order to turn this vision into reality, eI4Africa has created the following multi-layered architecture (Figure 2) for an African e-Infrastructure, one that is seamlessly compatible and interoperable with other e-Infrastructures across the world.

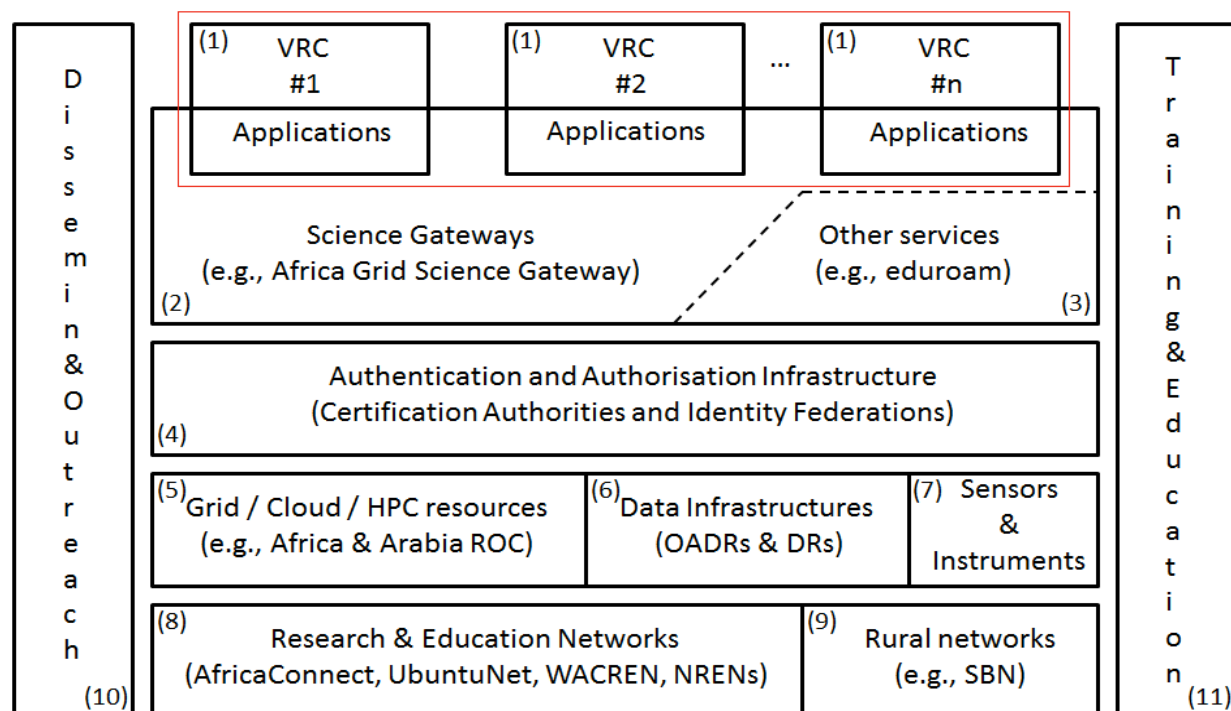


Figure 2. The eI4Africa vision for an African e-Infrastructure

In retrospect, the survey and the results presented in this deliverable document address the highlighted in red top layer (1) of this architecture, as they aim to identify current or planned applications in Africa that would then be used to facilitate the development of an African e-Infrastructure. The other numbers in the figure are used to refer to progress made in other deliverables, such as D4.2 "Reporting on flagship demos - Year 1" and D6.1 "Establishment of e-Infrastructure services and identification of e-Infrastructures priorities – Year 1 report".

3 - Methodology

This section presents the key elements of the methodology employed to realize the study. We specifically focus on the study design, the identification and selection of participants, the data collection protocol, the data analysis, as well as current and potential key challenges.

3.1 – Study design

The basic component of the approach followed in this study is an online exploratory survey, which was chosen as the preferred data collection procedure due to its economy of designing it, the rapid turnaround in data collection, and its advantage of identifying attributes of a large population from a small group of individuals (Creswell, 2009: 146).

The online survey, which was launched in March 2013 on the SurveyMonkey system, consists of a self-administered questionnaire containing 19 open-ended questions that have been designed for the purpose of this study, in order to collect information in 4 main areas and on the basis of the study's objectives: (1) the participant's background information, (2) the participant's current or planned e-Infrastructure application and users, (3) technical requirements and technologies of current or planned e-Infrastructure applications, and (4) future contact arrangements with the participant. An introductory page is also presented to the participant briefing him/her about the scope of the study and introducing the concept of e-Infrastructures.

The survey is currently open and on-going, and it is available both on <http://www.surveymonkey.com/s/eI4Africa> (last accessed 05/10/2013) and in a Microsoft Word version shown in Appendix A of this deliverable document.

3.2 – Identification and selection of participants

The methodology employed to identify and select participants to complete the survey is based on an on-going and iterative search of key contacts that would be approached and asked to share their details about their involvement in an e-Infrastructure application or project.

The site and population size of this study has been mainly targeted to be a non-specific number of scientists and/or researchers from the African continent, and particularly from the sub-Saharan region; however, participants from other continents have also been considered on the condition that they have had some direct involvement in e-Infrastructure-related activities in Africa. This on-going recruitment phase has so far produced a sample of more than 10,000 potential participants, which have been identified by employing a multilevel explorative procedure using the following six channels.

3.2.1 - Community Research and Development Information Service (CORDIS)

The extensive database of CORDIS (http://cordis.europa.eu/fp7/projects_en.html) has been explored in order to identify a first list of African key contacts that have been or are still involved in FP7 projects targeting Africa. The search under 'FP7 Infrastructures' (keywords: African, Africa, e-Science) produced a total of 534 project results, of which only 35 had a direct African connection (i.e. African partners involved and/or targeting African regions or countries). Careful examination of information provided for these 35 projects on CORDIS and

on their official websites produced a sample of 82 potential key African participants from various organisations, including universities, research institutions, and the government.

3.2.2 - ERINA4Africa FP7 project

The recruiting approach further considered the experiences from the completed ERINA4Africa project (<http://www.erina4africa.eu/>), and the extensive and expanding network of contacts of the beneficiaries of this project. In particular, the project's established 'Virtual Observatory' of case studies in Africa has been explored to similarly identify key African contacts that have been involved in e-science and e-Infrastructures projects in the region of interest. Twenty-four case studies have been considered that produced a sample of 30 new key contacts in Africa from various organisations.

A total of 112 potential participants have been identified from exploring CORDIS and ERINA4Africa. These that have been added in a local database created in order to store the survey's participant group and to serve as a basis for future collaboration development. This database will be regularly updated in the duration of eI4Africa project. Table 1 shows a breakdown of the several countries that the survey will target and the respective numbers of the identified potential contacts in each country.

3.2.3 - eI4Africa partner mailing lists, network of contacts, and related activities

The extensive and expanding mailing lists and network of contacts of the eI4Africa partners have also been considered in the participant recruitment process. A further sample of 10,000+ contacts from the databases of beneficiary *Sigma Orionis, FR* has been identified as potential participants in the survey.

3.2.4 - eI4Africa related workshops and events

Survey participants have also been recruited from workshops and/or events that are organised within the context of the eI4Africa project. After the end of the first eI4Africa thematic workshop (<http://ei4africa.eu/events/1st-thematic-workshop/>) that took place in Lilongwe, Malawi in May 2013, a further 55 contacts have been identified and have been asked to complete the survey. The upcoming second eI4Africa thematic workshop in Kigali, Rwanda (13 November 2013) and the UbuntuNet-Connect 2013 conference will also be considered as sources of recruiting participants, whereas the following upcoming list of events will be similarly targeted:

- ICT 2013 (Vilnius, Lithuania)
- 2013 Africa-EU Cooperation Forum on ICT (Addis Ababa, Ethiopia)
- Third and fourth eI4Africa thematic workshops (Lagos, Nigeria and Dar es Salaam, Tanzania)

Table 1. Countries targeted and number of contacts per country from CORDIS and ERINA4Africa

	CORDIS	ERINA4Africa	Total per country
South Africa	22	2	24
Kenya	9	3	12
Senegal	6	3	9
Ghana	5	3	8
Uganda	4	1	5
Burkina Faso	4	3	7
Cameroon	3	-	3
Mozambique	3	-	3
Ethiopia	3	1	4
Namibia	2	-	2
Mauritius	2	-	2
Tanzania	2	1	3
Malawi	2	5	7
Botswana	2	-	2
Cape Verde	2	-	2
Madagascar	2	-	2
Zambia	2	-	2
Burundi	1	1	1
Nigeria	1	2	3
Rwanda	1	1	2
Niger	1	-	1
Mali	1	-	1
DR Congo	-	1	1
Ivory Coast	-	1	1
Botswana	-	1	1
Zimbabwe	-	1	1
Total	82	30	112

3.2.5 - African universities and research centres

The current and on-going recruitment activity involves the careful examination of African universities and research centres, in order to identify a number of contacts who would be potential participants in the survey. The examination has been focusing on exploring relevant departments/institutes in each university (i.e. biological and physical sciences, computer science, health sciences, applied sciences, etc.), with a specific aim to identify 2-3 key

contacts per department/institute and note their research interests and areas of work. Specifically, the recruitment has been focused on universities and research centres from the top six African countries that have provided the most responses to the survey so far (see Figure 4)

To strengthen participant recruitment from the academic and research domain in Africa, 3 well-established organizations have been approached and volunteered to assist in the recruitment by promoting the survey to their network of contacts: (1) the international university network Association of Commonwealth Universities (ACU) (<https://www.acu.ac.uk/>), (2) the Association of African Universities (AAU) (<http://www.aau.org/>), and (3) the Agence Universitaire de la Francophonie (AUF) (<http://www.auf.org/>).

3.2.6 – Next step: iMentors FP7 data map

iMENTORS (<http://www.imentors.eu/index.php>) is a FP7 on-going project that aims to develop a one-stop-shop data warehouse on all e-Infrastructure development projects of Sub-Saharan Africa, which will be graphically represented in an online data map.

Through activities to be realized in the context of the Memorandum of Understanding (MoU) that has been signed between iMENTORS and eI4Africa, and by exploring the extensive list of e-Infrastructure projects that have been published on their expanding data map, it is expected that a significant number of potential participants will be identified and invited to complete the survey. This activity constitutes part of the future steps in the participant recruitment process.

3.3 – Overview of the data collection protocol

The data collection protocol involved 2 main parallel steps: (1) recruiting and engaging the participants, and (2) approaching the participants using email invitations.

3.3.1 – Participant recruiting and engagement

When sending the email invitations, it was imperative that the identified participants were initially interested into participating in the study. In order to motivate them, the email also consisted of a brief introduction of the study's aim and objectives, key definitions, as well as information about the opportunity to participate in the development of applications and/or increase the visibility of their current activities through their participation in the study.

3.3.2 – Email invitations

The communities of participants that have been selected during the recruitment phase of the study have been reached by disseminating the survey through email invitations that have both a direct link to the online survey, as well as a link to download the Microsoft Word version that could be completed and emailed back to the eI4Africa partnership. Participants were also asked to distribute the survey widely to others participating in e-Infrastructure-related activities. The email was either sent to the participant's direct email address, where possible, or to the participant's organizational email address specifically addressing the identified person.

3.3.2.1 - FOLLOW-UP EMAIL REMINDERS

To ensure that the best possible response rate has been achieved, 1-2 follow-up reminders to fill in the survey have been sent to all of those who will have been invited, but not responded,

whereas similar smaller reminders have already been sent to those who have responded, but have not yet completed the survey.

3.3.3 - Follow-up calls

The protocol will also involve as a separate follow-up phase getting in touch via phone with (A) a sample of participants who have responded and completed the survey, in order to further discuss their current or planned e-Infrastructure application and requirements for a more in-depth investigation and evaluation of the collected data, and (B) contacts who have not responded or delayed to respond to our invitation to participate.

3.4 Overview of the data analysis approach

The data collected with the online survey have been summarized and made available in a consolidated Microsoft Excel file provided by the SurveyMonkey platform. The file has been automatically organized according to the 19 survey questions (1 question per column), allowing for better analysis of the presented data.

Initially, a data cleaning phase has been followed, in order to ensure that duplicate responses, if any, and any information that could not be considered in the analysis have been removed. It was decided that in the case where any provided information was not usable, the response was deemed as not usable and was consequently not considered in the analysis.

The analysis phase mainly consisted of analysing the data on a per question basis, which involved reviewing the data that have been collected for each question separately and then graphically summarizing them for an easiest interpretation of the findings. Additionally, data findings from each question have been combined and cross-referenced, where applicable, in order to generate more in-depth and valuable insights, all of which are presented in section 4 of this deliverable.

3.5 Key challenges

Two main challenges have been identified during the data collection and analysis phases. The first one was related to the case where the identified participants delayed or have not responded to the email invitation. As this could have important implications to the study, the solution followed was to use follow-up emails and/or phone calls.

The second key challenge was the possibility for language bias, due to the multinational nature of the study. A cross-country study by Harzing (2006) revealed that such bias is indeed existent and majorly affects the response styles, while English-language questionnaires are shown to elicit a higher level of middle responses. To avoid potential insufficiencies in the provided data, the aforementioned solution was again employed using follow-up phone calls.

4 – Key results and findings

4.1 – Overview

This section presents the results of the analysis of the survey responses. Of the 311 responses (124 complete; 187 incomplete; 39.8 % response rate) received during the course of 7.5 months, 269 responses (114 completes; 155 incompletes; 41.1% response rate) were deemed as usable and were consequently considered in the analysis. The results are presented in 3 subsections formed in accordance with the 3 main parts of the survey, and are supported by graphical summaries of most responses.

4.2 – Part 1: Personal details (demographics)

The survey yielded responses from a significant number of African countries (n=30), as well as from other world regions, including Europe (n=20), North America (n=1) and South America (n=1), and Asia (n=1) that were involved in African-related activities in the domain of e-Infrastructures. Specifically, 79.1% of the responses came from the 30 African countries, 15.9% from 16 member-countries of the European Union, and a small share of 4.8% came from 7 countries from the rest of the world.

Figures 3 and 4 below present the lists of these countries and the number of the respective responses that have been received from each. Here, and in the following graphs and tables throughout this document, the number figures are calculated with respect to the usable number of answers received for a particular question. The presented findings below are based on 191 responses.

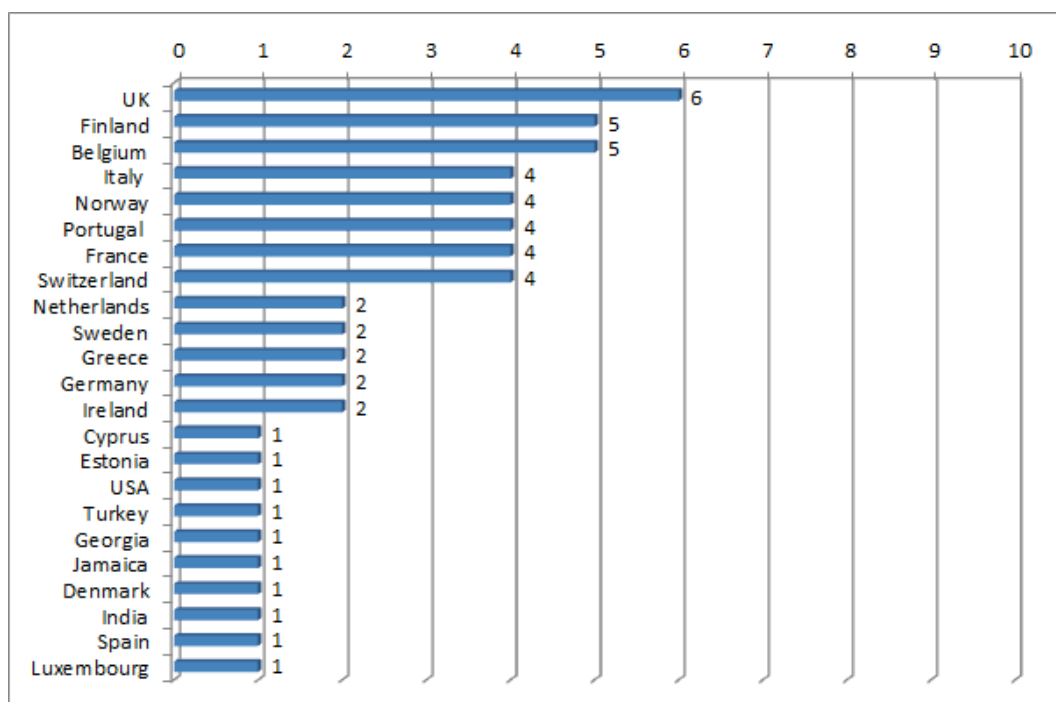


Figure 3. Number of responses for other countries

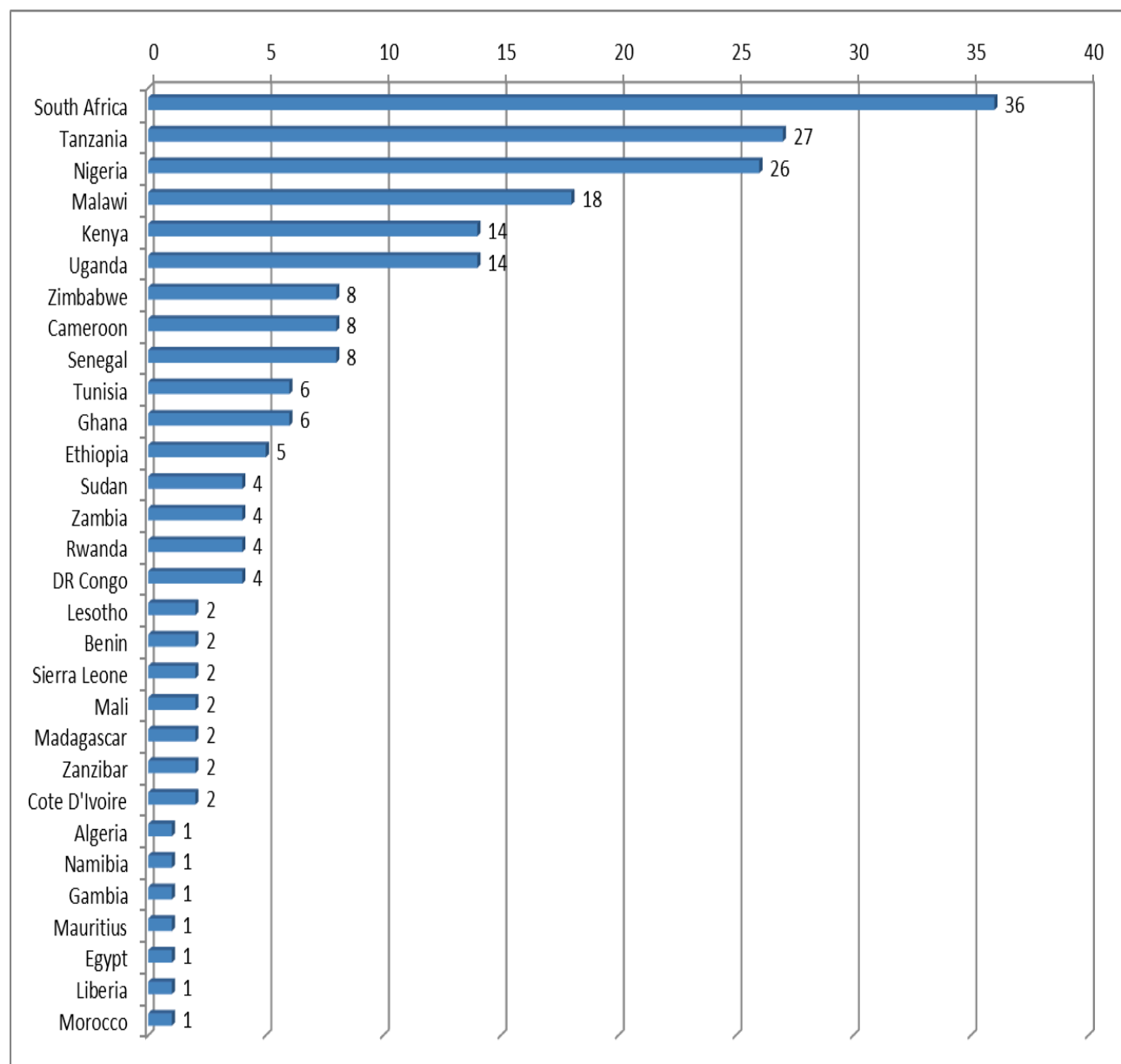


Figure 4. Number of responses per African country

The survey also achieved a good coverage of the respondents' affiliations, shown in Figure 5 below. The distribution of affiliations is rather variable, with 46.8% education institutions, 17.8% private companies, 14.4% Non-government organizations (NGOs) and/or Non-profit organizations (NPOs), 10.4% government or government organizations (GOs), 5.5% research institutions or centres, and 4.8% research programmes or projects.

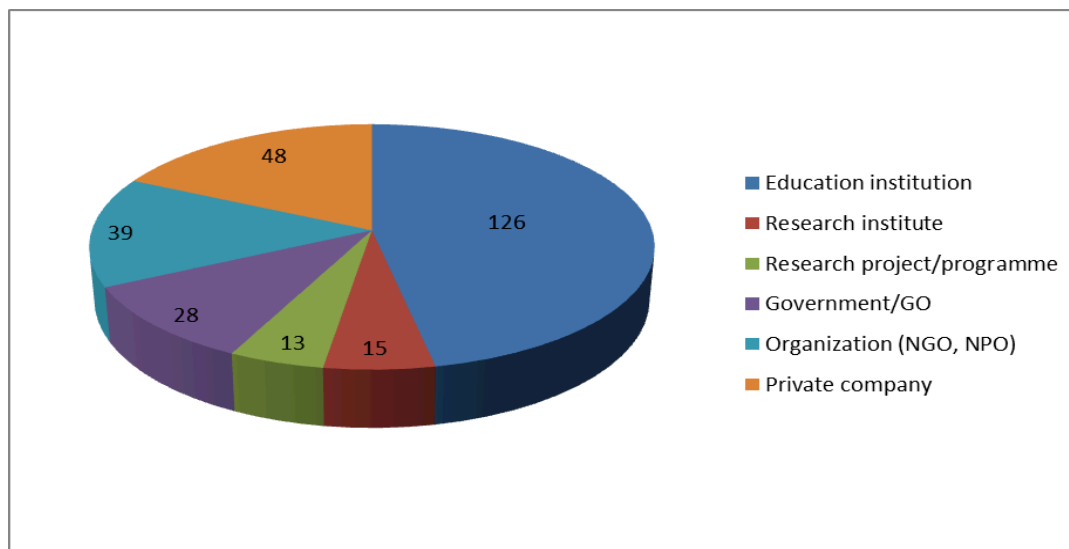


Figure 5. Respondents' affiliations and respective number of responses

Areas of the identified affiliations' activities also varied, including among others:

- For the **private companies**
 - Clinical research laboratories
 - Networking and telecommunications, and
 - Software consulting
- For the **research institutes or centres**
 - Marine, fisheries and oceanography research
 - Medical research, and
 - Physics and materials research
- For the **NGOs and NPOs**
 - Sustainable infrastructures in Africa advising (SIA Africa)
 - Fundraising, and
 - Farming and medical associations
- For the **research programmes or projects**
 - Networking (e.g. SANREN)
 - Agriculture (e.g. USAID/ERA), and
 - Health (e.g. Health Information Systems Programme)

In the case of education institutions and government and/or GOs, the areas of activities are self-explanatory. The respondents are therefore rather representative of the e-Infrastructures community: geographically, by affiliation, and by covering a good spectrum of research activities.

4.3 – Part 2: Current or planned e-Infrastructure application

This section of the deliverable presents the findings with respect to the identified current or planned e-Infrastructure applications, their targeted user groups, and information about the geographical location(s) of the application usage.

4.3.1 – Potential current or planned e-Infrastructure applications

With the main focus of the survey being to identify and outline any current or planned e-Infrastructure applications, respondents were asked to answer to three questions: “*what is your application? What is its purpose? Is there a set of problems that it is attempting to address?*” In the two subsections that follow, the answers to the questions are shown by means of: (a) Figure 6 that presents the distribution of the answers to the first question synthesized in application areas that the identified application falls into, (b) Figure 7 that shows the distribution of the answers to the remaining 2 questions synthesized in purpose/problem categories, and (c) an outline of the identified potential applications.

4.3.1.1 – TARGETED APPLICATION AREAS, PURPOSE, AND PROBLEMS TO BE ADDRESSED

The majority of the 140 usable responses revealed either plans or needs for different e-Infrastructure applications across various domains. It is interesting, nevertheless, that about 22.1% of the respondents indicated that their application is targeting education and skills development through ICT, a finding that not surprisingly reveals that continuous and accessible education is on the top of the respondents’ priorities. From a scientific point of view, the reported applications mainly address life sciences (incl. bioinformatics, environmental sciences, food sciences, genomics, and health-related sciences) (14.2%) and natural sciences (incl. chemistry, physics and astronomy, and earth-related sciences) (12.1%). With the exception of digital resources (10.7%), such as digital libraries/repositories and access to software, the rest of the answers shown in Figure 6 are distributed in a relatively flat manner (1.4% - 8.5%) and correspond to the least targeted application areas among the participants’ responses.

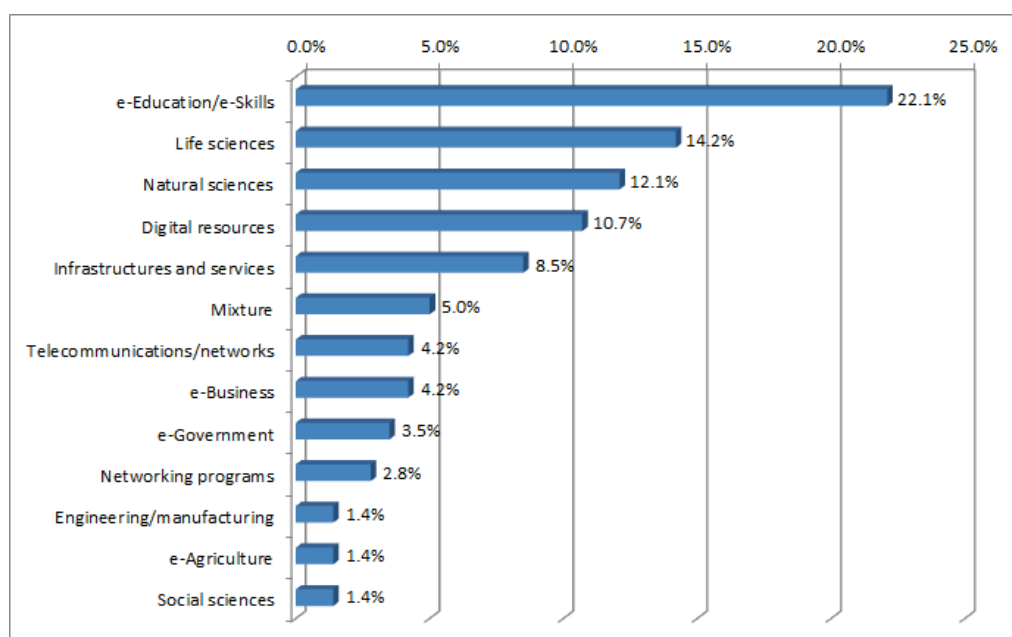


Figure 6. Domains of current or planned applications

A number of respondents also reported on the specific purpose and/or problem(s) that their application aims to address. These have similarly been synthesised into 5 categories, shown in Figure 7 with the corresponding number of responses for each.

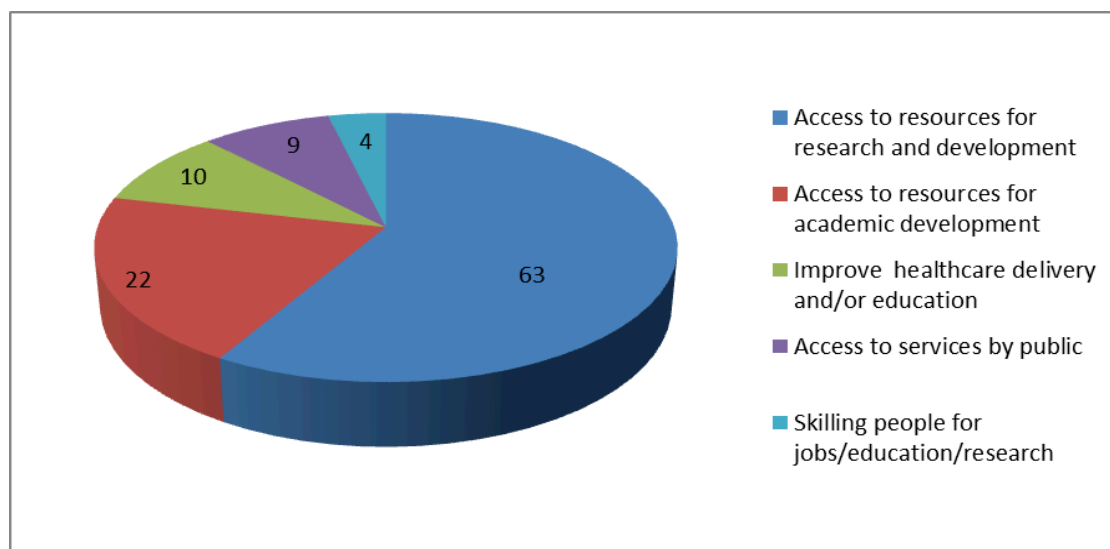


Figure 7. Identified purpose of applications and/or problem(s) aiming to address

As expected, the majority of the respondents (63) identified as their applications' purpose the access to resources for research and/or development activities. Access to resources for academic development and educational purposes was second (22) among the respondents, whereas applications to improve healthcare delivery (10) and provide access to everyday services to the general public (9) were third and fourth, respectively. The findings are concluded with the last category of skilling people for jobs, education, or research that was formed by only 4 responses.

4.3.1.2 – IDENTIFIED POTENTIAL CURRENT OR PLANNED E-INFRASTRUCTURE APPLICATIONS

The responses revealed 38 interesting examples of potential current or planned e-Infrastructure applications, several of which are currently being used or are under development, while others are still future plans. An outline of each identified application is provided in the below sample, taking into consideration the affiliation, the country of origin, a brief description of the application, and the purpose or problem it addresses. The proposers' details are omitted due to confidentiality. These will be released in the next deliverable (D3.2), if participants agree to be named.

1. VAMDC portal	
Affiliation	University of South Africa
Country	South Africa
Purpose/problem	Access to resources for research and development
Brief description	The virtual atomic and molecular data centre (VAMDC) is a portal providing access to a large number of databases containing atomic and molecular data that can be used in models or for interpreting data. The data is predominantly used in astrophysics, but has applications in atmospheric science, environmental science, plasma physics, and commercial applications such as lighting and combustion physics.
Resources needed	Access to scientific literature

e-Infrastructure benefits	VAMDC could extend its range to include more African researchers, who rather than having to access the portal in a European mirror site, an African node could be employed
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2. ProvSys	
Affiliation	ISOCEL SA
Country	Benin
Purpose/problem	Access to services by public
Brief description	An application that allows for customer provision and is integrated with Google Earth. A sectorial image has been overlaid to show the coverage of every base station so that the customer's location can be mapped or plotted, and see immediately if the customer is within coverage.
Resources needed	Small bandwidth is sufficient; MySQL database server
e-Infrastructure benefits	A sectorial image has been overlay to show the coverage of every base station, so that the customer's location can be mapped and or plotted, and see immediately if the customer is within coverage.

3. Mobile tele-psychiatry platform	
Affiliation	The West African Health Informatics Fellowship Program
Country	Ghana
Purpose/problem	Improve healthcare delivery and/or education
Brief description	A Cloud-based OpenMRS/Open-Data-Kit/DHIS2 mobile tele-psychiatry platform that consists of an OpenMRS server on an AWS cloud with the DHIS2 installed. OpenMRS is an open-source Electronic Healthcare Record System. This clinical database is remotely accessible by any browser-enabled device PCs, laptops, mobile phones etc. Open-Data-Kit is an Android-based mobile application used to remotely access the clinical database from anywhere around the globe.
Resources needed	Medical scanners, Remote mobile cardiac monitoring, Remote video capture; Processors: Intel Xeon 5500 and 5600 series Quad and Six-Core, Memory: 8GB/16GB 1333MHz DDR3, c. Storage: Maximum Internal Storage: 1.2TB; RAID Controller, d.10Gb Ethernet: Dual-Port Intel 10Gb Enhanced Ethernet
e-Infrastructure benefits	It will be used on all continents by: 1. Mental health professionals in Ghana for community mental healthcare delivery (less than 10 psychiatrists for a population of 24million), 2. The large number of Ghanaian Diaspora mental health workers (about 50 psychiatrists) mostly based in the UK, Canada, USA, 3. Post-graduate training programs by the Ghana College of Physicians & Surgeons for training in rural psychiatry, 4. Mental health training charities based in the UK, but pay regular visits to medical schools and nursing colleges in Ghana will like to use the platform to provide mentorship and support for students from abroad.

4. Integrated Virtual Private Network (IVPN) for manufacturing applications	
Affiliation	Engineering Materials Development Institute (NASENI)
Country	Nigeria
Purpose/problem	Access to resources for research and development
Brief description	A Network that would link all Advanced Manufacturing Technology Centres (AMTCs) in NASENI Institutes to the High Power Computing (HPC) laboratory at the headquarters to enhance capacity development in AMT, as well as making accessibility to other manufacturing facilities possible online. There will be integration of the various centres for the purpose of design, modelling, simulation and production of engineering components using highly specialized facilities that are located in its development institutes across Nigeria. It is also providing online access to research communities, SMEs, industrialists and university community.
Resources needed	Requires large storage and remote monitoring

e-Infrastructure benefits	It will enhance capacity development in AMT, as well as make accessibility to other manufacturing facilities possible online. There will be integration of the various centres for the purpose of design, modelling, simulation and production of engineering components using highly specialized facilities that are located in its development institutes across Nigeria. It is also providing online access to research communities, SMEs, industrialists and the university community.
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5. Nano Archive	
Affiliation	University of Strathclyde
Country	Scotland
Purpose/problem	Access to resources for research and development
Brief description	Part of the ICPCNanoNet FP7 project, it is an online repository of open-access research papers that aims to provide wider access to published nano-science research and opportunities for collaboration between scientists in the EU and the International Cooperation Partner Countries (list of African partner countries available on ftp://ftp.cordis.europa.eu/pub/fp7/docs/icpc-list.pdf). This electronic archive of nanoscience publications has a simple interface for the deposit of full-text papers and incorporates facilities for retrieval by browsing or searching. It is freely accessible to researchers around the globe, making research papers and other scholarly publications widely available.
Resources needed	2 Mbps minimum broadband
e-Infrastructure benefits	It addresses difficulties in accessing nano-related research and publications, especially for ICP countries. It particularly helps researchers across the globe in nano, advanced materials and enabling technologies who wish to upload their own peer-reviewed papers, patents, conference proceedings, etc. and other researchers/academic community who wish to access these.

6. e-documentation centre on Human Migration	
Affiliation	Association Aide aux Familles et Victimes des Migrations Clandestines (AFVMC)
Country	Cameroon
Purpose/problem	Access to resources for research and development
Brief description	An e-documentation centre that will help future and potential migrants to know their rights and duties when they want to migrate in a foreign country, as well as provide migration documentation on gender, water, agriculture and breeding.
Resources needed	Access to scientific literature; storage; access to specialised High Performance Computing facilities; specialised instrumentation (scanner, video capture, photocopy, remote capture, etc.)
e-Infrastructure benefits	Worldwide access to migration documentation by migrants/refugees/families/women

7. Online hosting of African scientific literature	
Affiliation	African Journals Online (AJOL)
Country	South Africa
Purpose/problem	Access to resources for research and development
Brief description	A free online hosting of over 450 African-published, peer-reviewed scholarly journals, as well as training and hosting of the full publishing workflow online for selected journal partners. Most of the partner journals are not online anywhere else due to resource constraints. AJOL works to offset the inequitable flow of research information from North to South, and provides the largest collection of African published research journals in the world, and is used by hundreds of thousands of researchers around the world

Resources needed	Run faster; high quality scanner
e-Infrastructure benefits	Due to huge load of visitors (nearly 3.2 million unique visitors in 2012) it could benefit as the database is starting to get really big, and the site needs to run faster

8. Indicator Progress Cards (IPCs)	
Affiliation	War Child Holland
Country	Uganda
Purpose/problem	Skilling people for jobs/education/research
Brief description	IPCs are scorecards that assess outcome indicators at all stages of War Child Holland's activities in Uganda to empower young people. The scores help to determine the impact of their programmes and provide information on the general situation. This tool has been modernized into an online application that helps War Child Holland's field staff to deliver quality data with increased efficiency by using an online database with monitoring and evaluation tools on a tablet computer.
Resources needed	Cloud-based; additional tablets
e-Infrastructure benefits	Benefit the data-collection for the monitoring and evaluation processes, which is extremely demanding and time-consuming

9. eLog software solution for the commercial fishing fleet	
Affiliation	OLRAC SPS
Country	South Africa
Purpose/problem	Access to resources for research and development
Brief description	An on-board sophisticated, touch screen ready, generic, yet highly customisable data logging and reporting eLog software solution, capable of collecting, analyzing, plotting, mapping, reporting, tracing and transmitting all vessel-related data, specially customised for the commercial fishing industry
Resources needed	GPS receiver and SATCOM or GSM communication devices
e-Infrastructure benefits	Can benefit anybody in the world who needs to track and report the full spectrum of vessels activities.

10. e-Work web-based application	
Affiliation	Rwamagana District headquarters
Country	Rwanda
Purpose/problem	Access to resources for research and development
Brief description	A web-based application that aims to connect the Rwamagana District headquarters office to its 14 sectors offices; this application will facilitate in reporting issues, information sharing among the staff from sector level to district level by using an online system, and better keeping of the data in a safe place, and also generating backups.
Resources needed	Bandwidth; storage; remote monitoring
e-Infrastructure benefits	Both 235 staff users from all levels on the private side, as well as others like people around the country or the world will be able to access the system via the public side

11. Network of Biodiversity data, GIS and digital libraries	
Affiliation	Royal Museum for Central Africa
Country	DR Congo
Purpose/problem	Access to resources for research and development
Brief description	A network of Biodiversity data and digital libraries mainly with DR Congo similar to www.gbif.org mirror.
Resources needed	High storage (several TB) for images storage, maps, 3D models; access to HPC for

	modelling, image processing, data mining, and analysis of logs; Scanner, 3D scanners, CT scanners, remote sensing, digital photography, videos, sound recordings; access to scientific literature
e-Infrastructure benefits	Enable digitalisation and encoding of not yet digitally available content, solve issue of intermittent Internet connection and the need for continuous training, some requests that need some indexing or processing (i.e. GIS can be very slow) need at least 1GB bandwidth and run into issues if have to download many satellite images from e.g. Nasa

12. A GeoMIS platform	
Affiliation	SPACEBEL SA
Country	Belgium
Purpose/problem	Access to resources for research and development
Brief description	A geospatial information management system with applications for food security, public safety, risk management, odour monitoring and forestry, targeting West African countries (e.g. Senegal, Mali)
Resources needed	N/A
e-Infrastructure benefits	Assist public authorities, 3rd parties (e.g. emergency services, crisis centres), citizens, industries, and forest managers in various world regions

13. Access to software for atomic absorption spectrometer	
Affiliation	University of The Gambia
Country	The Gambia
Purpose/problem	Access to resources for academic development
Brief description	Access to scientific literature and software in the field of atomic absorption spectrometers
Resources needed	HPC facilities
e-Infrastructure benefits	Access to software from various locations

14. Solution for governance of water resources	
Affiliation	University of Dodoma
Country	Tanzania
Purpose/problem	Access to resources for research and development
Brief description	Develop an innovative and integrated solution for governance of water resources in Lake Victoria Basin
Resources needed	Various sensors (currently in plans)
e-Infrastructure benefits	Assist multiple users at different scales: community, decision makers, enforcers of law or regulations, water resource managers, and policy makers

15. Electronic Medical Record Systems and Demographic Data Exchange	
Affiliation	Baobab Health Trust
Country	Malawi
Purpose/problem	Improve healthcare delivery and/or education
Brief description	Applications to improve patient care delivery through appropriate medical informatics.
Resources needed	GIS systems; large disk capacity for nationwide patient level data; access to HPC
e-Infrastructure benefits	Assist various stakeholders including Ministry of Health professionals and policy makers, Public Health and Medical Researchers, Health Facility management

16. National Digital Repository (NDR)	
Affiliation	Malawi National Library
Country	Malawi
Purpose/problem	Access to resources for research and development
Brief description	The National Digital Repository (NDR) is the only repository in Malawi responding to the wider problem of poor research access and dissemination in Malawi. It serves the academic community and will soon be connected to the newly set up E-Government network, and the Malawi Research and Education Network (MAREN), to connect all research and higher education institutions in Malawi to each other and to global networks.
Resources needed	Faster bandwidth
e-Infrastructure benefits	It will dramatically increase access and availability to all national-level research on Malawi both for Malawians and for researchers globally. In addition, it will be part of the national plan for economic recovery in Malawi, it will make research available, and will provide skills for this goal

17. A mobile learning portal for schools and business	
Affiliation	Growing all through Education
Country	South Africa
Purpose/problem	Access to resources for academic development
Brief description	A portal to train and rest competency. It is a tool to address this need on a cost-effective basis. Material can be viewed on mobile handsets as well as on PC.
Resources needed	N/A
e-Infrastructure benefits	Will help provide education to 250,000 learners from all income levels and countries, will assist the medical Industry with training on how to use pharmacy software systems, as well as with training on medication specification

18. A digital library for medical and allied health students	
Affiliation	Global Health Candlelight
Country	Mali
Purpose/problem	Access to resources for academic development
Brief description	A planned e-library for Malian health students who currently rely on hard copies of books
Resources needed	High storage size and high graphical processing capabilities; access to HPC; video capture; GPS
e-Infrastructure benefits	Students rely only on hard copy of books. With the evolution of information technology an e-library that will be shared by many institutions and will be linked to biomedical databases worldwide, will help to deal with this issue

19. A network of bio-banks for African food microorganisms	
Affiliation	Danish Technological Institute
Country	Denmark
Purpose/problem	Access to resources for research and development
Brief description	There are currently no storage facilities in most African research institutions for microbiological culture, such as food microorganisms required for development of starter culture. The aim of the project is to establish a network of bio-banks for African food microorganisms that can be shared across borders.
Resources needed	Software for data management of microbial material; freezers; environmental sensors
e-Infrastructure benefits	Establish a network that can be shared by food research institutions and universities, specialised commercial microbiological laboratories, food producing enterprises and SMEs across borders

20. A virtual platform for malaria diagnosis with microscopy and rapid diagnostic tests (RDTs)	
Affiliation	University of Lagos
Country	Nigeria
Purpose/problem	Improve healthcare delivery and/or education
Brief description	This is a cost-effective and efficient platform for scaling-up diagnosis in the case-management of malaria in health workers (in both the public and private sectors) that manage malaria in over 180 million Nigerians. This platform will also be available for over 100 Universities, over 100 non-universities tertiary institutions and millions of students in Nigeria and overseas.
Resources needed	Access to HPC; storage; high speed computers and monitors; scanners; video capture; remote monitoring; microphone and ear pieces; external storage devices
e-Infrastructure benefits	Help to address low capacity and non-use of malaria diagnosis in Nigeria, as well as challenges associated with scaled-up malaria diagnosis such as the cost of conducting training for healthcare providers (in- service training/ pre-service training) and quality assurance.

21. UniversiTIC tools for education and government	
Affiliation	UniversiTIC Program
Country	DR Congo
Purpose/problem	Access to resources for academic development
Brief description	UniversiTIC contributes to the development of digital access in 8 universities of DRC and Burundi. Beyond hardware solutions, UniversiTIC contributes to create sustainable development tools that support education and governance in academic institutions. UniversiTIC 2.0 is the second IT program running from 2013 to 2015. It focuses on opening up the universities and developing teaching and scientific practices with ICT at the faculties.
Resources needed	N/A
e-Infrastructure benefits	Improve connectivity on the main campuses, ensure consistency between the strategic plans of computerization of 8 universities, allow technical expertise sharing

22. Mobile platform to support farmers	
Affiliation	Foresight Generation Club
Country	Ghana
Purpose/problem	Access to services by public
Brief description	A mobile platform to support farmers in Ghana and other African countries to boost sales while preventing post-harvest losses.
Resources needed	Access to HPC; mobile phones
e-Infrastructure benefits	Farmers and young graduates in project catchment countries and communities to utilize the power of e-Infrastructures to boost local economies and improve economic situations in African communities.

23. Academica Enterprise Resource Planning System	
Affiliation	Islamic University in Uganda
Country	Uganda
Purpose/problem	Access to resources for academic development
Brief description	An application to automate and integrate the bulk of university processes from Admissions, Registration, fees payments, examinations, teaching, results processing, transcripts, library access, staff payroll and HR etc.
Resources needed	Access to HPC
e-Infrastructure benefits	Reduce inefficiencies that arising from manual processes and fragmented computer systems for the university administration and students

24. Plantisc application	
Affiliation	University of Nigeria Nsukka
Country	Nigeria
Purpose/problem	Access to resources for research and development
Brief description	An application that simulates the micro-propagation of plant tissue culture in the field of plant biotechnology
Resources needed	N/A
e-Infrastructure benefits	Access to simulation facilities for researchers and students across Africa

25. An e-Health tele-media application for patient management	
Affiliation	Icon Frontiers Ltd.
Country	Uganda
Purpose/problem	Improve healthcare delivery and/or education
Brief description	In Uganda, Malaria, Malnutrition, respiratory tract infections, HIV/AIDS and Tuberculosis are the leading causes of morbidity and mortality. There is therefore a great need to deploy technologies like Speech Recognition, IVR, SMS and web applications in the health sector that will provide patients (especially out-patients) with real-time management of illnesses, reactions or side effects to prescribed medication, update patients on scheduled doctor patient appointments and make prescription reminders, provide survey data for medical research, facilitate access diagnosis from a physician and general medical assistance using a combination of a web services, speech recognition, IVR and SMS.
Resources needed	Access to HPC; voice/speech capture
e-Infrastructure benefits	Assist developing countries with challenges of providing health care services to its citizenry, delivering the medical services, and monitoring patients for progress and real-time data collection for research and development.

26. A knowledge management portal for farmers and livestock keepers	
Affiliation	Arid Lands Information Network
Country	Kenya
Purpose/problem	Access to services by public
Brief description	Holistic knowledge management for farmers and livestock keepers in order to have a one-stop information portal.
Resources needed	N/A
e-Infrastructure benefits	Help to support business viability, competitiveness and growth, but also help with practical issues concerning planning and decision making

27. CTA Cherenkov telescope Array project	
Affiliation	IN2P3/CNRS
Country	France
Purpose/problem	Access to resources for research and development
Brief description	Namibia (supported by Southampton Africa) is one of the hostess candidate countries for CTA planning to deploy 100 Telescopes. CTA data issues are: big data collection; high- bandwidth intercontinental research network; distributed computing; scientific community Gateway; data open access
Resources needed	Parallel architecture and GPU; different Cloud paradigms; Lidar for atmospheric monitoring
e-Infrastructure benefits	Assist on data issues, such as big data collection and data open access. Also provide a high- bandwidth intercontinental research network, distributed computing, and a scientific community gateway

28. Web-based data capture for fisheries research and management	
Affiliation	Lake Victoria Fisheries Organization
Country	Uganda
Purpose/problem	Access to resources for research and development
Brief description	A web-based data capture application for fisheries research and management surveys (Frame survey; Monitoring, Control and Surveillance; Trawl, Catch Assessment, Fish Biology and Beach Management Unit (BMUs))
Resources needed	Storage (24TB); 4Mbps bandwidth; GIS; video capture; environmental sensors
e-Infrastructure benefits	Facilitate data capture and management across several countries and for various users, including fisheries research institutions of East Africa, fisheries management institutions, beach management units (1069), and the Lake Victoria fisheries organization secretariat

29. A network of 50+ geophysical observatories (AfricaArray)	
Affiliation	University of the Witwatersrand & Council for Scientific & Industrial Research (CSIR)
Country	South Africa
Purpose/problem	Access to resources for research and development
Brief description	A network of more than 50 geophysical observatories (seismometers, continuous GPS, meteorological sensors) situated in 20 sub-Saharan countries. Need to improve data acquisition, archiving, analysis and knowledge dissemination
Resources needed	N/A
e-Infrastructure benefits	Assist the community of users in 20 sub-Saharan countries to improve data acquisition, archiving, and analysis and knowledge dissemination

30. Software for data processing of data in the field of Ion Beam Analysis (IBA)	
Affiliation	iThemba Labs
Country	South Africa
Purpose/problem	Access to resources for research and development
Brief description	A software for data processing of data in the field of Ion Beam Analysis (IBA)
Resources needed	Large bandwidth; digital amplifiers; EPICS type communication control of hardware via virtual terminals
e-Infrastructure benefits	Enable most of the internal and external users at the Materials Research Department to use this software, possibly in order of 50 not including European and American collaborators, as well as software integration with hardware for data acquisition based on the CERN MIDAS platform

31. A Pan-African bioinformatics network	
Affiliation	University of Cape Town
Country	South Africa
Purpose/problem	Skilling people for jobs/education/research
Brief description	A network to develop skills in bioinformatics (computational biology) in Africa.
Resources needed	Storage; access to HPC; access to public databases
e-Infrastructure benefits	Training and development of researchers across Africa

32. A digital product for orphan crops	
Affiliation	iHub User Experience Lab
Country	Kenya
Purpose/problem	Access to services by public
Brief description	A digital product that will boost the consumption of orphan crops in urban centres

Resources needed	N/A
e-Infrastructure benefits	Assist the urban middle to upper income earner across Africa to boost the consumption through information management and sharing

33. Electronic support for clinical coding	
Affiliation	South African Medical Research Council
Country	South Africa
Purpose/problem	Access to resources for research and development
Brief description	A tool to support the process of clinical coding
Resources needed	N/A
e-Infrastructure benefits	Enable available tools to be modified for national use, or specific national tools to be developed.

34. Computer-aided diagnosis	
Affiliation	SIIVA-RIADI Lab
Country	Tunisia
Purpose/problem	Improve healthcare delivery and/or education
Brief description	Computer-Aided Diagnosis based on Medical Images Analysis and Medical Reports Retrieval
Resources needed	Access to HPC; large bandwidth
e-Infrastructure benefits	Facilitate better image interpretation and segmentation across continents, enable to cross and to retrieve within large datasets in different countries

35. Crop modelling and simulation	
Affiliation	Sokoine University of Agriculture
Country	Tanzania
Purpose/problem	Access to resources for academic development
Brief description	Crop modelling and simulation
Resources needed	PC; weather station; Sensors for moisture content and temperature
e-Infrastructure benefits	Facilitate teaching and research, but also access to such an application for researchers and/or projects across countries

36. Management of fisheries and aquatic resources	
Affiliation	Kenya Marine & Fisheries Research Institute
Country	Kenya
Purpose/problem	Access to resources for research and development
Brief description	A platform for data storage, shared access to data collections, data analysis, computing resources for the purpose of managing fisheries and aquatic resources in Kenya.
Resources needed	N/A
e-Infrastructure benefits	Facilitate data storage, shared access to data collections, data analysis, and computing resources across various stations in the country, as well as projects attached to the organization. The community will benefit through shared information

37. Simulation of communication networks	
Affiliation	The Polytechnic University of Malawi

Country	Malawi
Purpose/problem	Access to resources for academic development
Brief description	Software for simulation of communication networks
Resources needed	OpNet
e-Infrastructure benefits	Facilitate access to a simulation environment or to specific software

38.	Multi-physics simulation
Affiliation	University of Nigeria
Country	Nigeria
Purpose/problem	Access to resources for academic development
Brief description	Access to OpenFOAM software package for multi-physics simulation
Resources needed	N/A
e-Infrastructure benefits	Facilitate access to a simulation environment or to specific software from any location

4.3.2 - Current or planned users of e-Infrastructure applications

The study also surveyed the participants about who the potential or current users of their application are, with a particular interest on whether these represent an individual or group of researchers, a specific project, or a community. Additionally, they were asked to provide as much details as possible with respect to numbers and actual people. The 152 responses that were considered in the analysis provided some interesting findings about the different users of the applications, while also identified 8 additional user categories, all of which are summarized in Figure 8.

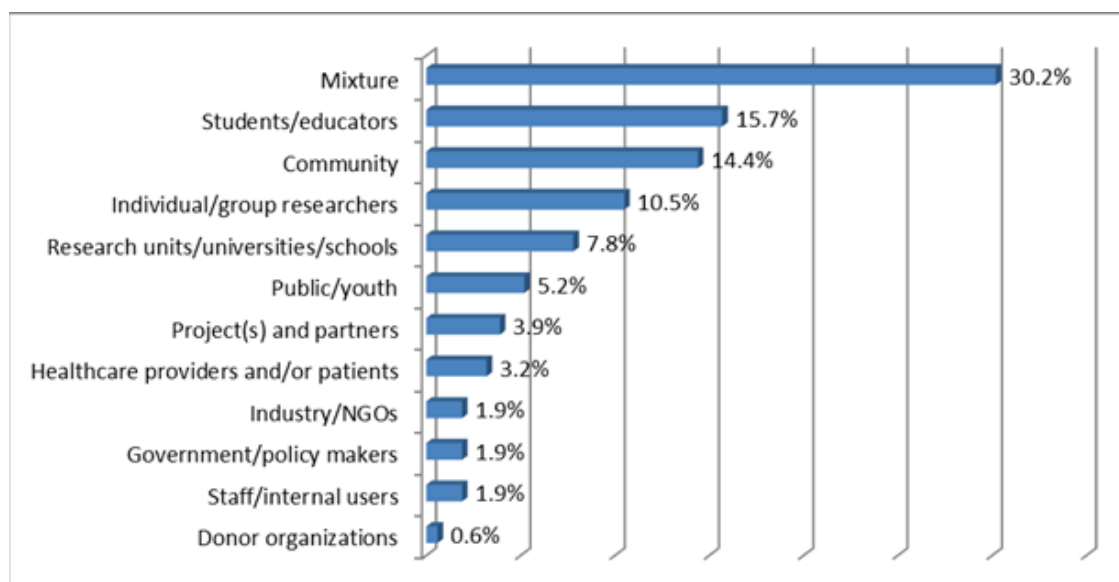


Figure 8. List of users identified for all applications

As expected, the users that are targeted by the applications largely belong to the educational/research (23.5%) and scientific (10.5%) communities. The identified top 3 user categories are concluded with the users who fall into a number of other specific or non-specific user communities (14.4%), presented later in this section. The distribution of findings for the remaining user categories is relatively flat, ranging between 0.6% and 5.2%, with general

public, projects, and healthcare providers and patients rated top amongst the least popular responses. The case of the targeted users being a mixture (30.2%) of the identified categories, however, seems to be the most targeted user group for the respondents.

4.3.2.1 –USER GROUPS AND APPLICATIONS PER EACH

In response to the second part of the question, several participants provided an estimate of the number of users that their application would be able to target. These have been summarized below in ranges, to reflect the smallest and largest reported numbers, and have been further linked to the applications or application areas that they are referring to, where possible.

- Individual/group researchers: **1 – 1,619 users**
 - Virtual atomic and molecular data centre (VAMDC) portal
 - Nano Archive - online repository of open access research papers
 - A Pan-African bioinformatics network
- Students/educators: **15 – 250,000 / 1 – 5,136 users**
 - eLearning platforms
 - Plantisc: an application that simulates the micro-propagation of plant tissue culture in the field of plant biotechnology
 - Academica Enterprise Resource Planning System
 - Mobile platform to support farmers in Ghana and other African countries to boost sales while preventing post-harvest losses
 - UniversiTIC: a platform that contributes to the development of digital access
- Research units/universities/schools: **5 – 40 users**
 - Software for data processing in the field of Ion Beam Analysis (IBA)
 - AfricaArray: network of more than 50 geophysical observatories
 - Web-based workflow for bio-specimen management
 - Web based data capture for fisheries research and management surveys
- Specific/non-specific communities: **300 – 34.4 million users**
 - e-Health tele-media application for patient management
 - e-documentation centre on human migration
 - Holistic knowledge management for farmers and livestock keepers portal
- Public/youth: **1000 - 13 million users**
 - A digital product that will boost the consumption of orphan crops
 - AJOL: a non-profit organisation providing free online hosting for over 450 African-published, peer-reviewed scholarly journals
- Projects and partners: **1- 45 users**
 - Integrated Virtual Private Network (IVPN) for virtual manufacturing (NASENI)
 - Computer-aided diagnosis based on medical images analysis and medical reports retrieval
- Health professionals/patients: **10 – 100,000 users**
 - A mobile tele-psychiatry platform

- Web-based electronic medical record system and support for clinical coding
- Industry/NGOs: **500,000 users**
 - eLog software solution: specifically designed for the commercial fishing fleet
- Government/policy makers: **235 users**
 - e-work: a web-based application aiming to connect the Rwamagana District headquarter office to its 14 sectors offices
- Staff/internal users: **10 – 100 users**
 - ProvSys: an application that allows for customer provision and is integrated with Google Earth
 - IPCs (Indicator Progress Cards) application: IPCs are scorecards that assess outcome indicators at all stages of War Child Holland's activities in Uganda
- Mixture of users: **Not specified**
 - Virtual platform for malaria diagnosis with microscopy and rapid diagnostic tests (RDTs)
 - Network of bio-banks for African food microorganisms
 - Digital library for Malian medical and allied health students
 - Mobile learning portal for schools and business
 - National Digital Repository (NDR)
 - Electronic medical record systems and demographic data exchange
 - Solution for governance of water resources in Lake Victoria Basin
 - Journal accessing and software for atomic absorption spectrometer
 - GeoMIS: geospatial information management system for food security, public safety, risk management, odour monitoring, forestry
 - Network of biodiversity data, GIS, digital libraries mainly with DR Congo
 - Data storage, shared access to data collections, data analysis, computing resources for the purpose of managing fisheries and aquatic resources
 - Crop modelling and simulation

4.3.3 - Geographical location of application usage

From a geographic point of view, 139 answers to the question “*Where would the application be used? Single country, several countries, continent, the world?*” revealed that most applications (51.7%) are to be used nationally, while 25.8% revealed that they are used in several countries. Even though only 5.7% reported that their application usage is continent-wide, a significant number (16.5%) identified their application as truly global, while 2.1% revealed 2 specific regions as additional geographical locations of usage, namely West Africa and Sub-Saharan Africa. Figure 9 presents the distribution of the geographical location of application usage.

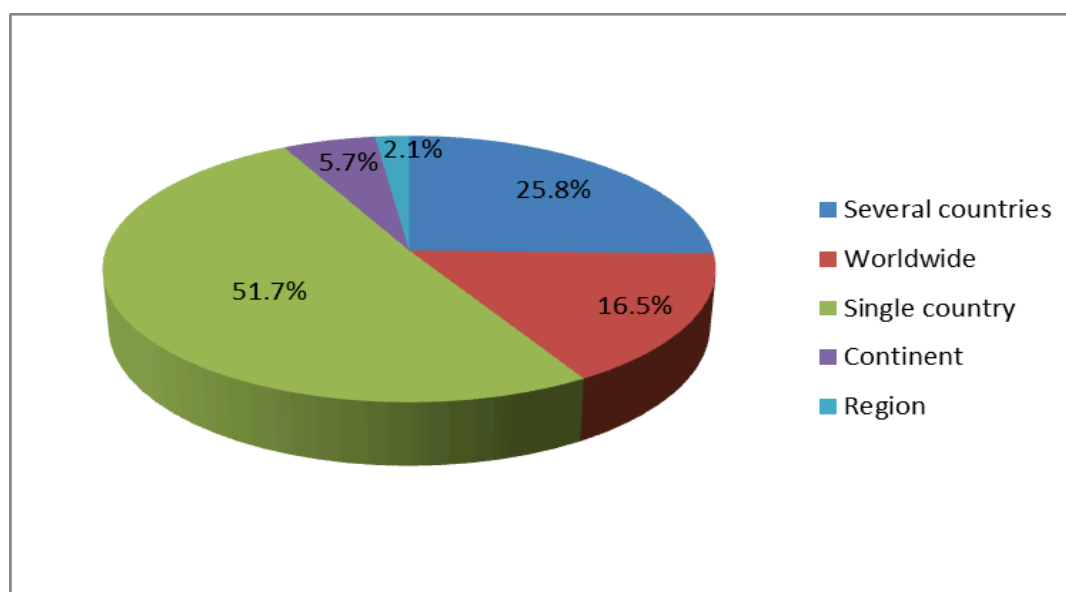


Figure 9. Geographic distribution of application usage

In the case "several countries" has been indicated as the preferred geographical location of application usage, then the specific number of these countries has been explored per available response. These have been summarized and broadly fall within the 4 ranges shown in Figure 10.

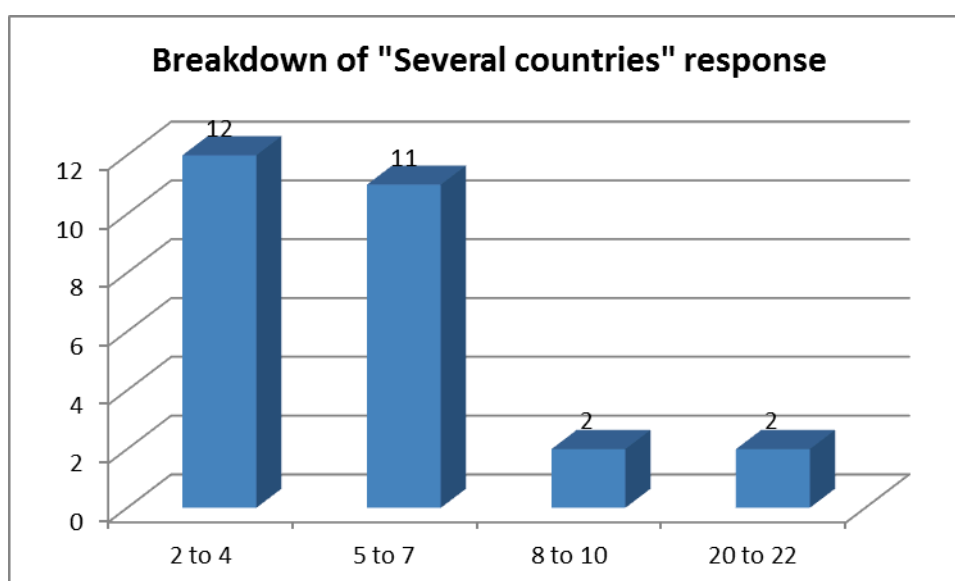


Figure 10. Number of countries and number of responses for each

Finally, from the 38 African countries that have been reported, Tanzania (n=17), South Africa (n=19), Uganda (n=14), Kenya (n=18), and Nigeria (n=11) are the leading geographical locations of application usage, whereas several other countries outside Africa have also been mentioned, with the USA and the UK ranking top amongst them.

4.4 - Part 3: e-Infrastructure application requirements

This section focuses on the technical requirements of the applications, as these have been reported by the survey respondents. The specific requirements examined cover a range of basic e-Infrastructure features, and include computing, communication, data, specialized instrumentation, sensors, access, and scientific literature requirements.

4.4.1 - Computing requirements

Participants were initially asked to indicate the computing requirements of their current or planned application. Their responses are summarized in Figure 11 and are mainly centred on the use of any particular software and what are its requirements (e.g. storage size, operating system (OS), language, graphical processing capabilities (GPU), etc.), the application's speed requirements, as well as the need for access to specialized High Performance Computing (HPC) facilities.

From the survey total of 269 responses, the 112 were deemed as usable and were consequently considered in this analysis, producing interesting findings with respect to the aforementioned computing requirements, while also generating a list of specific software and technologies that the reported applications use or would need in order to run. Not surprisingly, 19.6% of the respondents indicated that their application or software does have specific requirements, particularly in terms of storage (reported range 300MB-18TB) and memory. A number of required OS and programming languages have also been reported and are presented in Table 3.

Access to HPC was the second most important requirement among the respondents, with 12.5% revealing that their application would benefit from such a capability, as opposed to only a 1.7% that indicated they would prefer that their application would run faster, with suggested speeds ranging between 1-100 Mbps. Finally, it has to be noted that the need for equipment and Internet access (6.2%) was a concern for the respondents.

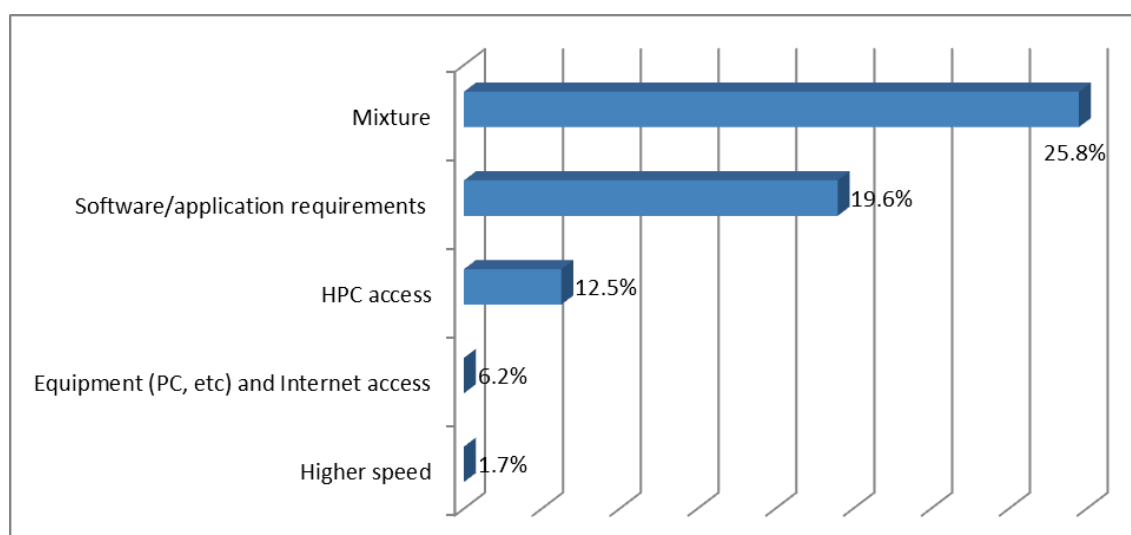


Figure 11. List of identified computing requirements

The examination of the responses further revealed that 40.1% of the participants reported that their application uses or requires particular software to run. A list of 42 different pieces of software has been compiled, and is shown in Table 2 below together with the targeted application area and the number of users for each, where possible.

Table 2. Identified software, mentioned application area and users for each

Software	Application area/ users per software	URL
<i>OpenFOAM</i>	Tele-psychiatry/ >580	http://www.openfoam.com/
<i>OpenMRS</i>		http://openmrs.org/
<i>LabVIEW</i>	Ion Beam Analysis/ 50	http://www.ni.com/labview/
<i>IDL</i>		http://www.exelisvis.com/productsservices/idl.aspx
<i>VMware</i>	--	http://www.vmware.com/
<i>Parallels</i>		http://www.parallels.com/uk/
<i>Moodle</i>	eLearning/NA	https://moodle.org/
<i>CheckPoint-VPN1</i>	Manufacturing/NA	http://www.checkpoint.com/products/
<i>Forefront UAG</i>		http://technet.microsoft.com/en-us/forefront/Ee907407
<i>Cisco VPN</i>		http://www.cisco.com/en/US/products/sw/secursw/ps2308/index.html
<i>DRUPAL</i>	Global platform/ 1000	http://www.drupal.org.uk/about
<i>PostgreSQL</i>	Biodiversity network/NA	http://www.postgresql.org/
<i>QGIS</i>		http://qgis.org/
<i>DIVA-GIS</i>		http://www.diva-gis.org/
<i>bioCASE</i>		http://biocase.org/
<i>Maxent</i>		http://www.cs.princeton.edu/~schapire/maxent/
<i>Garp</i>		-
<i>Agisoft</i>		http://agisoft.ru/
<i>Unity</i>		-
<i>ROOT</i>		http://root.cern.ch/drupal/
<i>SCOLARIS</i>	Administration and eLearning/ 120,000 students and 7,000 staff	http://www.semantico.com/technologies/publishing-platform/
<i>SYMPA</i>		http://www.sympa.org/
<i>PLOOPI</i>		-
<i>APOGEE</i>		http://www.apogee.com/
<i>ITop</i>		http://sourceforge.net/projects/itop/
<i>OCSInventory</i>		http://www.ocsinventory-ng.org/en/
<i>OpNet</i>	Network simulation/ individual researcher	http://www.opnet.com/
<i>OpenMP</i>	--	http://openmp.org/wp/
<i>ePrints</i>	NanoArchive/ 300	http://www.eprints.org/
<i>SEISAN</i>	Seismic analysis/ a project (AfricaArray)	http://www.geosig.com/SEISAN-id10377.html
<i>SAC</i>		http://www.iris.edu/dms/nodes/dmc/software/downloads/sac/
<i>PMB</i>	Library automation/NA	-
<i>OJS</i>	AJOL/NA	http://pkp.sfu.ca/?q=ojs
<i>SMS Gateways</i>	Patient management and farmers/NA	Various solutions exist
<i>Geoserver</i>	Spatial data management/a project (Afromaison)	http://geoserver.org/display/GEOS/Welcome
<i>Geonetwork</i>		http://www.fao.org/geonetwork/srv/en/main.home
<i>Eurogeoss broker</i>		http://www.eurogeoss.eu/broker/Pages/AbouttheEuroGEOSSBroker.aspx

<i>Imogene</i>	Epidemiological monitoring/ NA	http://www.cse.dmu.ac.uk/~rij/gafaq/Q20_imogene.htm
<i>Dspace</i>	Digital repositories/NA	http://www.dspace.org/introducing
<i>eCognition</i>	Image analysis/NA	http://www.ecognition.com/
<i>Articulate</i>	eLearning/ 500+	http://www.articulate.com/
<i>NS-2</i>	Mine environment monitoring/ a project	http://www.isi.edu/nsnam/ns/

Similarly, Table 3 lists the most common technical requirements that were reported by the 112 participants. Among the reported information in the below table, PHP, Windows and/or Linux, and MySQL were the most common technologies employed.

Table 3. List of most common technical requirements

Programming Languages/Environments	OS/Web Servers	Database Servers
PHP	Windows	MySQL
Ruby	Linux	
Java/Javascript	Apache	
C++	Unix	
SCRUM	HP	
HTML	Blade	
ASP.NET	Nginx	
Perl	Cloud	
XSAMS	Android	
	Centos	
	FreeBSD	

4.4.2 - Communication requirements

Participants were also asked to provide any specific communication requirements that their application would require. The responses have been summarized in Figure 12, and are based on 118 usable answers. A list of 3 communication requirements (speed, bandwidth, quality of service) was indicatively provided as potential answers, but participants were encouraged to indicate more, if applicable.

As expected, the need for better bandwidth capacity (22.8%) has been placed on the top of the respondents' requirements list, with some of their answers revealing that satisfactory capacity for the needs of their application ranges between 2Mbps and 15Gbps. Basic Internet access or standard connectivity (12.7%) to a network or to available resources was also rated as the second most important requirement; in particular, network connectivity requirements varied from basic Internet access to fibre connection to Satellite O3B "fibre-in-the-sky" links, as this has also been reported by a number of respondents. In the case of mobile communication requirements, standard GSM to 4G fast connections has been indicated by several participants.

Finally, even though network speed (8.4%) and quality of service (8.4%) alone were not among the most important communication requirements, a significant number of respondents indicated that they have multiple (21.1%) communication requirements for their application, which in most cases also include speed, quality of service, or both.

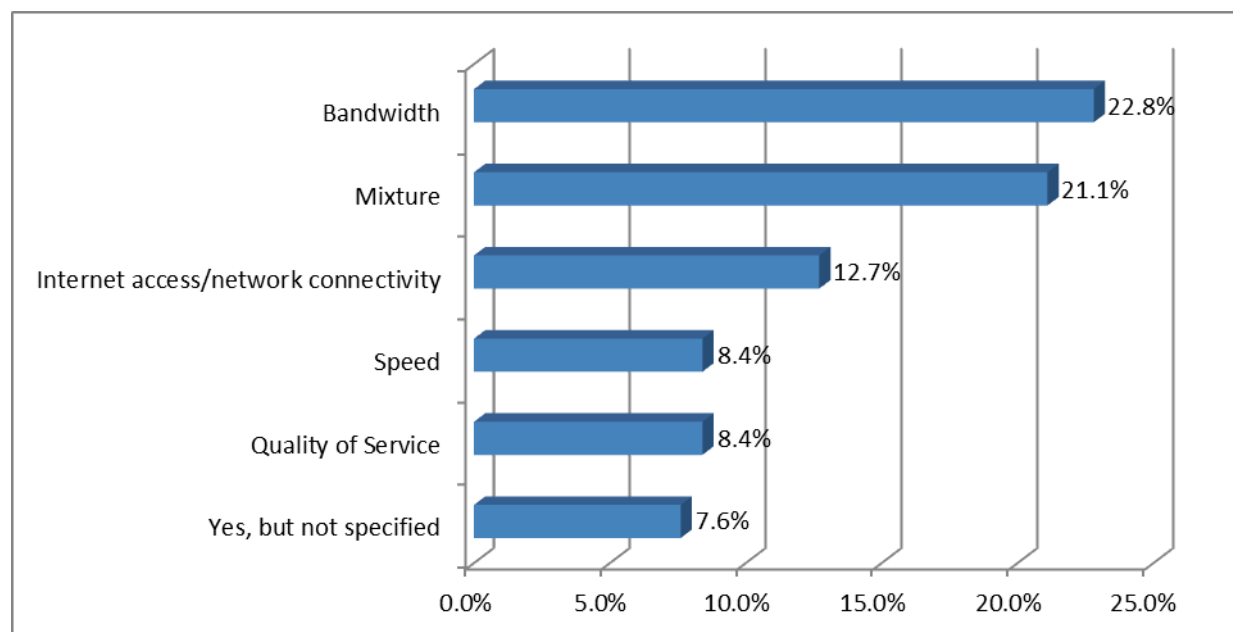


Figure 12. List of identified communication requirements

4.4.3 - Data requirements

Figure 13 shows the distribution of the answers to the question "Are there any data that your software requires (where is it located, does it need storage, any specific databases, etc.)?" The answers have been summarized considering the reported data requirements for both current and planned applications, and are based on 121 usable responses.

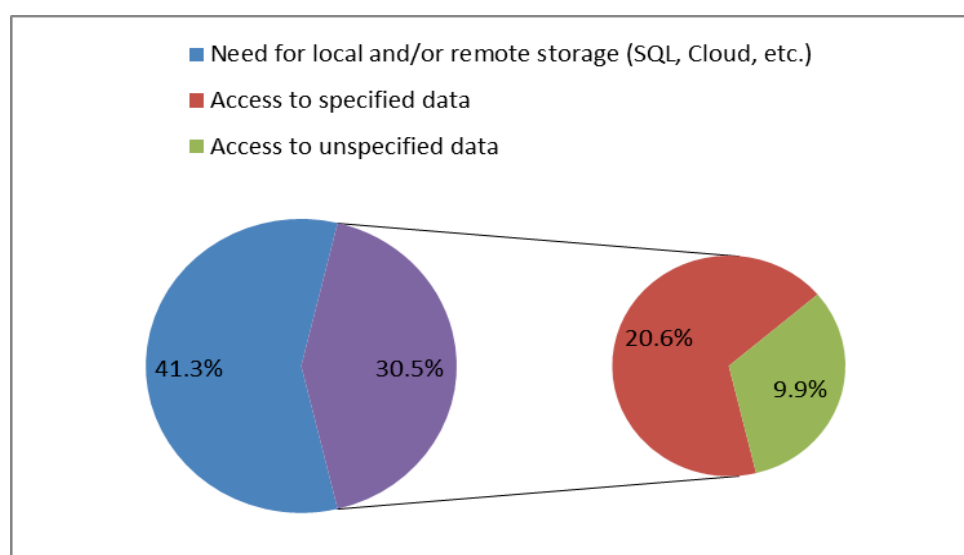


Figure 13. Data requirements identified

It is notable that 30.5% of the respondents revealed that access to data is one of the main requirements of their application. This particularly highlights that a big number of the 121 respondents thinks that it is important for their application to be able to gather and/or have access to pre-existing data; however only 20.6% of the respondents provided specific

information as to the type of data that are required by their application. Nevertheless, even though only a small number of the respondents provided such information, life sciences and biological data, environmental and earth science data, social data (population and demographics research), and educational data (lessons, meetings) are needs that have been clearly expressed by the surveyed population.

At the same time, nearly half (41.3%) of the respondents to this particular question reported the need for local and/or remote storage as another important requirement of their application. It is therefore clear that the majority of the respondents think that access to data and data storage are in the heart of their application's data requirements, and are both substantial for their research. This finding is not surprising and confirms the important implications of successful e-Infrastructures programs in Africa.

In order to also identify the technical requirements for such e-Infrastructures, participants were similarly asked to provide specific information about the type of local and/or remote storage that their application would require. Only a small fraction of the 121 respondents revealed what platform they would like their data to be preserved at, with a relational database such as SQL and Oracle, adapted to the storage needs of their application, being their first choice. Storage on the Cloud (e.g. Amazon EC2) has also been reported as the second choice among the respondents, whereas other reported platforms include Microsoft Office, PostgreSQL, or alternatively access to public and biomedical databases. Reported storage needs ranged between 50GB to 100's of TB.

4.4.4 - Specialized instrumentation requirements

Respondents were asked to indicate what kind of specialized instrumentation, if any, their application requires, including medical scanners, remote monitoring devices, and video capture equipment. Usable responses were received from 116 participants who provided information both about their requirements and, in several cases, the type of specialized instrumentation.

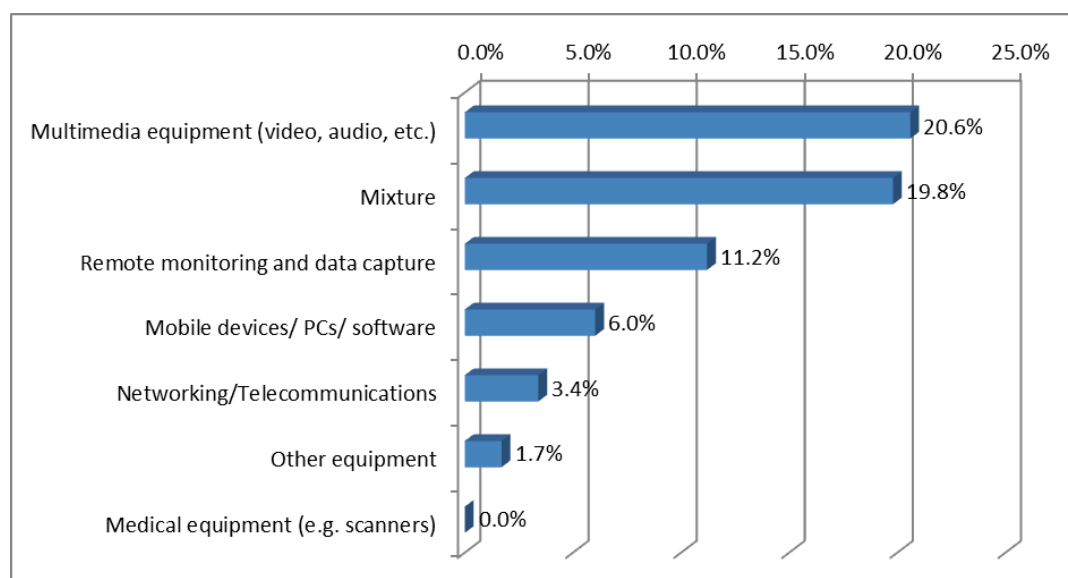


Figure 14. List of identified specialized instrumentation requirements

Figure 14 shows that the most important requirement is multimedia equipment (20.6%) followed by remote monitoring devices (11.2%), whereas a range of responses between 1%

and 6% can be noted for the rest of the reported requirements. About 19.8% of respondents indicated that they require multiple instrumentations for their application, which included multimedia equipment, remote monitoring devices, medical equipment, as well as a range of mobile devices and PCs.

Respondents were also encouraged to provide additional information as to the specific type(s) of specialized instrumentation that they require. Responses were synthesised into 5 categories in accordance with the reported instrumentation requirements of Figure 14. As Table 4 shows, respondents mainly provided specific information about their multimedia and remote monitoring instrumentations, but with a larger type variation in the case of the former. As expected, data capturing instrumentations was the most important requirement among respondents, but it is interesting to see that mobile technology and network connectivity equipment were also reported as such.

Table 4. Types of specialized instrumentation required

Multimedia	Remote monitoring and data capture	Mobile/PCs/software	Networking/telecommunications	Medical equipment
1.Digitisation equipment	1.Weather station	1.Smartphones	1.Satellite station (SATCOM, VSAT)	1.CT Scanner
2.Scanners/ 3D scanners	2.Thermometer	2.PCs	2.Chetnikov telescope	
3.Digital amplifiers, EPICS	3.Environmental sensor	3.Digitisation and archiving software	3.Server	
4.Printers, projectors	4.GIS		4.Antenna	
5.External storage	5.Atomic absorption spectrometer			
6.Microphone/ headphones				
7.Webcams/ digital cameras				

4.4.5 - Sensor requirements

Figure 15 summarizes the answers to the question regarding any specific kind of sensors that are required by the applications. A limited number of sensor requirements were identified by examining the 112 responses to this question. In fact, the distribution of responses is quite flat, but also revealing with regards to what are the most prevailing sensor requirements among the surveyed community.

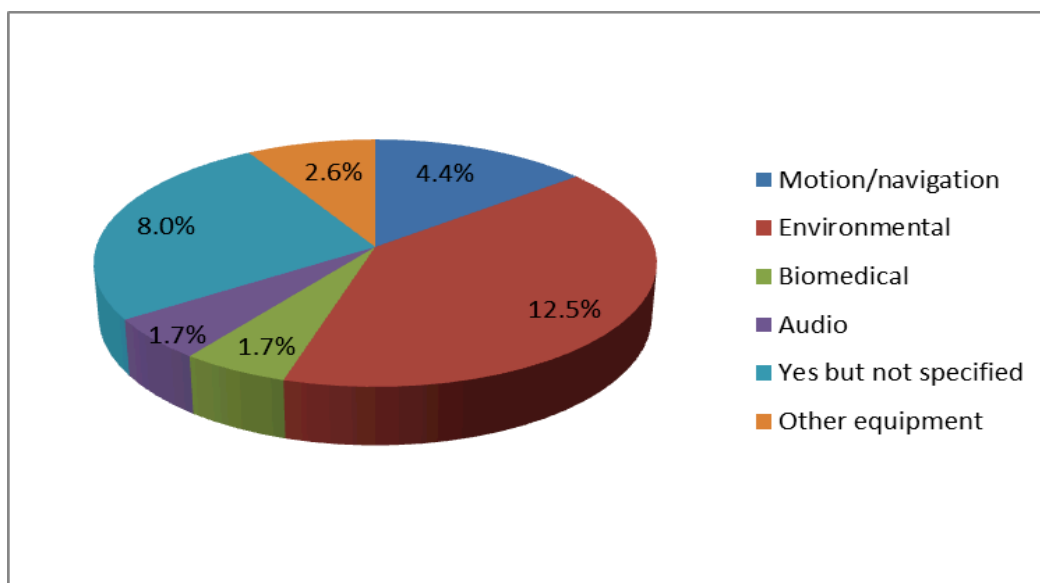


Figure 15. List of identified sensor requirements

The responses have not shown a great deal of variation in the type of sensors which applications currently use or are planned to use. Specifically, the sensor items used more frequently by the applications are environmental (12.5%) and motion and/or navigation sensors (i.e. accelerometers, GPS) (4.4%). Biomedical sensors and audio equipment, which are central in other e-Science applications, are not important for this particular population of participants. A small number of respondents (2.6%) also revealed that their applications would require some specific equipment, including nano-generators or geographical information systems (GIS).

It is finally worth looking into the respondents' first choice more closely, as some interesting variation has been observed by respondents' *affiliations*, with regards to the adoption of environmental sensors. Responses reveal that they are more important to researchers in universities (n=7); several organizations (n=5) also have been mentioned that use such sensors to support their activities, as well as was the government (n=1) and a research institution (n=1). The specified environmental sensors that are mostly used are grouped into the following:

- Meteorological and pollutant levels monitoring
- Seismometers and sensors (e.g. LIDAR) for natural resources monitoring
- Sensors to measure abiotic factors and ground cover

4.4.6 - Access requirements

Participants were also asked how their users would ideally access the application, such as for instance, through a web-based portal accessed via a workstation, through an app on a mobile phone, or SMS updates. Figure 16 summarizes the distribution of the respondents' answers to the aforementioned question, and is based on 113 usable responses.

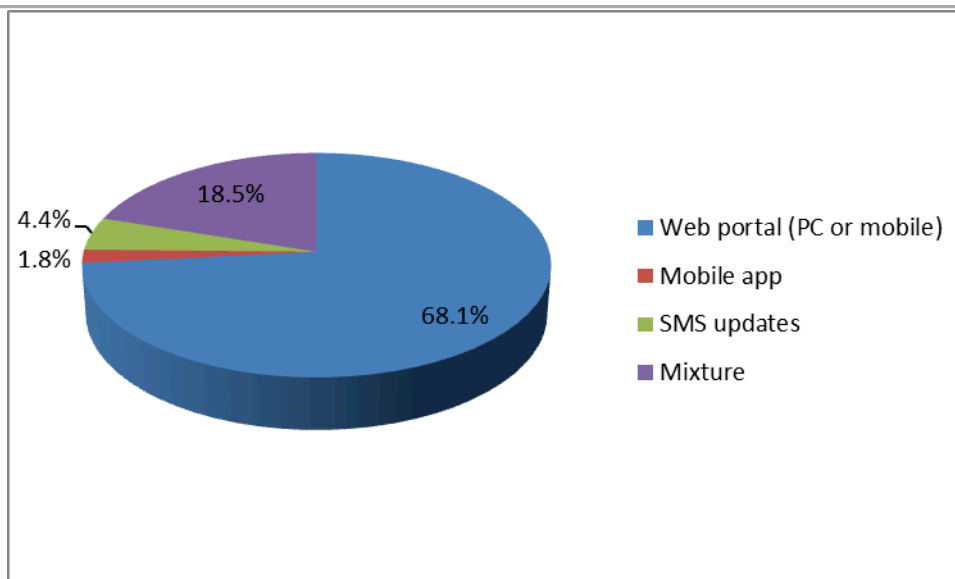


Figure 16. List of identified access requirements

More than half of the respondents (68.1%) indicated that their users' main access requirement to the application is a web-based portal that can be accessed via a workstation and/or via a mobile phone/tablet. The distribution of the remaining answers, however, is quite flat. Access to the application via a mobile app was not rated high (1.8%) amongst the respondents, as opposed to using SMS updates (4.4%), which seems to be a more familiar means of mobile devices usage. In any case, the available responses show that the use of mobile technology within their applications is continuously increasing and has been a popular choice among various ways of accessing an application.

This can be further demonstrated by looking at the remaining answers, where it is largely revealed that respondents consider a combinative approach (18.5%) as their ideal way of users accessing their application, which consists of all the 3 aforementioned access channels.

With the exception of these, no further requirements or proposed methods have been revealed; several respondents, however, expressed interest that they would like to explore the use of a mobile app in the future, whereas only 2 mentioned the use of other media, such as DVDs and external hard drives.

4.4.7 - Scientific literature access requirements

The availability and accessibility of scientific literature resources have enabled researchers to conduct larger scale science and apply scientific techniques that were previously not feasible or less known. In relation to this, the survey participants were asked if they or their application's users have problems in accessing scientific literature in support of their work, and if so, what are they trying to access and what is the problem. The 113 usable responses to the question were then collated into Table 5, where the most common scientific literature access requirements were synthesised into "Reported problems", and the proposed corrective actions into "Proposed solutions".

Table 5. List of identified scientific literature requirements

What (journals, books)?	Reported problems	%	Proposed solutions
Energy, socio-economic appropriation of ICT, biomedical, environmental, software engineering	Availability of resources	2%	Donor support (AAF, WAYF)
	Internet connectivity and speed	12%	High speed Internet
	Subscription and costs	30%	Open-access/digital libraries
	Internet connectivity, speed, and costs	6%	Partnerships with other countries and NRENs, and grants
	Training	6%	Attending conferences, workshops
	Power cuts	2%	Collaboration with local libraries/hard copies
	Software problems	2%	Proposed application is the solution
	Need for equipment (PC)	2%	
	Need for web-based applications	2%	Web-based applications
	Connect system to digital libraries	4%	Direct link/mirrors to databases and HINARI, OARE, AGORA, Oaresciences, AJOL, Biodiversity Heritage Library

The responses to this question are particularly interesting. By far the largest concern out of the 44.2% of the respondents who revealed that do have problems accessing scientific literature, centred on the need for subscription to scientific databases and the high costs of having one (30%). It is not surprising therefore that open-access and digital libraries are of particular importance among the respondents.

Internet connectivity and speed (12%) was also a significant issue. Most scientific literature resources reside on remote locations and need to be accessible anytime and with a seamless service from the local researchers. This situation reveals the reported need for solutions in the form of access to high-speed Internet connection, establishing partnerships with other countries and NRENs, as well as constantly applying for grants. Finally, a separate important issue concerns the need for appropriate training (6%). Although technological means to access scientific literature is a major step forward from established practices, it is important for a number of the respondents that they or their users would require some training in order to be able to benefit from such access to resources. Alternatively, directly attending conferences and workshops seems to be a proposed solution for the respondents.

4.5 – Brief comparison with the eI4Africa quarterly survey updates

Building on the work of previous EU-funded projects, this study attempts to provide insights with respect to the current status of e-Infrastructures uptake in Africa. In order to do so, one of the aims of WP3 involves creating and maintaining an on-going awareness of the study's findings, which has been promoted through issuing of quarterly updates of the survey results (<http://ei4africa.eu/study/>).

In examining the survey progress from the first quarterly update (April 2013) through the second (July 2013) to the current deliverable, it is notable that the study has so far reached out to a wide participant group, mainly across the continent of Africa, having as a result the identification of a respectable number of potential e-Infrastructure applications and their

technological requirements. In fact, from the 170 responses of the first update, the figure has nearly doubled to 311 responses in the present deliverable within a period of 5 months. Accordingly, the number of participating African countries has similarly been rising from 22 to 26 to the 30 countries that have been identified in the latest analysis of the results, and it expected to increase even more throughout the duration of the project.

Of particular interest in this comparison of findings is the fact that the educational domain has been the most prevailing source of responses throughout all survey updates, something that is reflected to the current number of identified applications for education or skills development (11) and to the reported application areas of activities shown in Figure 6. It is not a surprise, therefore, that the targeted users of the applications have changed from researchers reported in the two survey updates to students and/or educators in the present deliverable. The life sciences and natural sciences areas have steadily remained the same across all results, a fact that is also reflected to the number of the identified relevant applications (16). Surprisingly, however, the reported technical requirements of the applications have remained largely unchanged across the two survey updates and this deliverable, a finding that helps to give a better indication of the types of technological equipment and resources that the respondents would require.

Given the important results received in these first 7.5 months that the survey has been running, it is expected that the continuous update and dissemination of the study findings will not be concluded with this deliverable, but will continue with the forthcoming third update (October 2013) and with subsequent similar updates throughout the duration of the project.

5 – Discussion and recommendations

The analysis of the survey responses revealed that African researchers and other stakeholders are increasingly immersed and involved in development activities in the domain of e-Infrastructures, as answers coming from participants from 30 different African countries and a wide range of organizations have demonstrated. With significant contribution from education institutions, research centres, governments, and the private sector across Africa, our findings reveal a clear picture of a community that is willing to engage, lead, and support the need for action and investment in key infrastructures, in response to the issue of lacking access to dedicated global research and education resources.

Looking to other parts of the world where e-Infrastructures development is currently thriving, our findings seem to suggest that the African community similarly values the ability of e-Infrastructures to support research and development. The survey identified access to resources for research, academic, and development activities as being the most important barrier to the involvement of African researchers in the international research outcomes scene. In response, the surveyed community suggested the use of a wide variety of applications with discipline-specific features as an enabling factor, which span across education and skills development, the life sciences (incl. bioinformatics, environmental sciences, food sciences, genomics, and health-related sciences), the natural sciences (incl. chemistry, physics and astronomy, and earth-related sciences), and governments.

It is also notable that the proposed applications do not only attempt to reach a small audience of mainly local researchers. According to the survey results, more than a 1,000 users within educational, research, and scientific communities, specific projects, as well as healthcare providers and patients, and the general public could have more opportunities to benefit from such developments. Yet, in order to influence the whole African society, it is important that the applications need to be promoted outside a nation's borders, as the findings seem to suggest that is the prevailing case, and aim to engage communities from the whole continent to get involved. Therefore, it is necessary to make these advantages better known to the African communities, with a possible way being to encourage early adopters of e-Infrastructures to promote their benefits within their discipline.

The lack of availability of resources, however, poses questions with regards to the speed of uptake of e-Infrastructures and the consequent development and innovation in Africa. The need for equipment and funding are of key importance for all developing countries, and countries in Africa could not be the exception. As the survey revealed, bigger data storage or access to data, Internet access and better bandwidth capacity, access to HPC, and basic multimedia equipment and data capturing devices are all widely seen as necessary to develop and even use e-Infrastructure applications. Funding constraints are of similar importance to the surveyed community. The implication of this is a continent-wide issue of accessing scientific literature, which is centred mainly on the need for subscription to scientific databases and the high costs of maintaining one.

As the implementation of the AfricaConnect network unrolls, it is expected that these issues could be tackled benefiting from the growth of Internet and data services in the whole continent. Conclusively, it is expected that community engagement and issues of equipment and resources could be addressed by the continuous investment in these areas, which will pay off with the development of services and on-going support that could facilitate the adoption of e-Infrastructures and applications by African users.

6 – Conclusions and future work

This deliverable presented the results of the study that is being carried out in the context of the eI4Africa project assessing how African researchers are using or would like to use e-Infrastructures and related services, and identified relevant practical applications and their requirements associated with their use. Even though conclusive statements cannot be currently drawn, this study reveals interesting trends in how e-Infrastructures and their applications can contribute in research-related activities and provides interesting findings with respect to the current state of e-Infrastructure uptake in Africa.

The 269 participants of the survey, whose responses were analysed for the purpose of this study, came from diverse backgrounds and had different needs and requirements for e-Infrastructure applications. In addition, it is possible that responses from a portion of the identified sample group have not been effectively captured due to language bias, as a study reveals that participants outside English-speaking countries are less likely to complete a survey in English (Harzing, 2006).

In response, the iterative nature of this study will allow for future work to elaborate on these issues, while also continuing to capture the required data through the survey that will remain open not only for the duration of the eI4Africa project, but also after the project has concluded. To ensure that the findings are appropriately disseminated, quarterly updates of the survey results have been, and will be accordingly released.

Conclusively, the results received over the 7.5 months that the survey has been running have highlighted some important avenues for further exploration. The survey continues and it is expected that as more participants share their information with the eI4Africa partnership, the better we will be able to understand and plan for the current and potential future use of a global e-Infrastructure by African researchers and scientists. As a current or potential user of e-Infrastructures we would like to capture your details and your current or planned application by filling in this survey on <http://www.surveymonkey.com/s/eI4Africa>.

A selection of these applications will be shortlisted for development as African e-Infrastructure demonstrators to show the potential of e-Infrastructures in Africa across the world.

7 - References

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Appendix A



e-I4Africa: e-Infrastructures Survey

A survey on current or planned e-Infrastructure Applications by the e-I4Africa Project (www.ei4africa.eu)

A new era of scientific discovery is being made possible through e-Science - novel, large-scale inter-disciplinary global collaborations between scientists and researchers across many different areas fuelled by sophisticated software applications supported by advanced Information and Communication Technologies (ICT). These ICT are high-speed research communication networks, powerful computational resources (dedicated high performance computers, clusters, large numbers of commodity PCs), grid and cloud technologies, data infrastructures (data sources, scientific literature), sensors, web-based portals, scientific gateways and mobile devices. When integrated together, these ICT elements are collectively known as **e-Infrastructures**.

A potential user of an e-Infrastructure might therefore need:

- A more powerful computer to run an application
- A great number of these computers to deliver results faster
- Access to specialised High Performance Computing facilities
- Access to large data sources
- Access to software not available locally (see examples at the Africa Grid Science Gateway <http://sgw.africa-grid.org/applications>)
- To collaborate with other scientists across the world
- Access to scientific literature resources
- To connect to specialised instrumentation for analysis
- To connect to sensors for data collection
- Access to these facilities via a web-based portal or mobile device (e.g. the Africa Grid Science Gateway <http://sgw.africa-grid.org>)

In Africa a major step forward is underway as the global high speed scientific networking infrastructure is being extended via AfricaConnect (www.africaconnect.eu). Our e-I4Africa project (www.ei4africa.eu) is actively promoting e-Infrastructures in Africa. To help us focus our work, we invite you to assist us in understanding the current and potential future use of a global e-Infrastructure by African researchers and scientists. As a current or potential user of e-Infrastructures we would like to capture your details and your current or planned application by filling in this questionnaire. A selection of these applications will be shortlisted for development as African e-Infrastructure demonstrators to show the potential of e-Infrastructures in Africa across the world.

If you would like assistance in filling in this questionnaire, or would like to discuss a potential e-Infrastructure application, then please get in touch with the e-I4Africa team at info@ei4africa.eu. Keep in touch with the on-going survey results and our other activities at www.ei4africa.eu.

Part 1: Personal Details

Your name:

Affiliation:

Address:

Tel:

Email:

Web address:

Part 2: Current or planned e-Infrastructure Application

Please provide an outline of your current or planned application

What is your application? What is its purpose? Is there a set of problems that it is attempting to address?

Current or planned users

Who are your users – an individual researcher, a project, a community? Please give as much detail as possible (numbers, actual people, etc.)

Geographical location

Where would the application be used? Single country, several countries, continent, the world? It would be helpful if you could name actual countries.

Part 3: e-Infrastructure Application Requirements

Application computing requirements

Does your application use any particular software? Does this software have any requirements (storage size, operating system, language, graphical processing capabilities, etc)? Does it need to run faster (and if so then please estimate an acceptable speedup if possible)? Does it need access to specialised High Performance Computing facilities (including parallel architectures, GPUs, etc.)?

Communication requirements

Does your application require any specific communication requirements (speed, bandwidth, quality of service, etc.)

Data requirements

Are there any data that your software requires (where is it located, does it need storage, any specific databases, etc.)?

Specialised instrumentation requirements

What kind of specialised instrumentation does your application require (if any)? This could include medical scanners, remote monitoring, video capture, etc.

Sensor requirements

Some applications have, for example, sensors in the field used to capture environmental information. Is there any specific kind of sensor required by your application?

Access requirements

Ideally how would your users access the application (through a web-based portal accessed via a workstation, through an app on a mobile phone, SMS updates, etc.)

Scientific literature access requirements

Do you or your application's users have problems in accessing scientific literature in support of your current or planned work? If so what are you trying to access and what is the problem?

Part 4: Contact

Please indicate if you would be happy for a member of the e-I4Africa team to contact you to discuss your application (note: this question was added in October 2013).

Yes/No

Please indicate if you would like us to send you our newsletter and keep you up to date with our planned African e-Infrastructure workshops.

Yes/No

Please indicate if you would be happy for the e-I4Africa team to share your details for research purposes only, and within the context of the eI4Africa project and aligned projects.

Yes/No

Thank you for your time!