# Toward a Virtual Academic Consortium to Promote Land Information Sciences in Africa

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## SUMMARY

The land in a continent as Africa is an economic resource, a basis of wealth promoting growth and human development, and a tool of empowering and governing. Most of native africans are peasants and have their main living and fundmuntal insfrastructures based on land and land resources. Then, land adminastrating and management which are largelly tied to the diversity of the local cultural and traditional practicies should be enhanced in a good and scientific manner. For such purpose, african universities will play a major role in promoting a scientific revolution throught innovation and technology development. Certainly, every university has its own scientific community living inside or abroad. To make progress, it is indisponsible to gather efforts, create favorable conditions to promote african brains, and encourage research to face many challengies in a world dominated by the knowledge economy. Knowledge does not arise simply from having access to large amount of information but by exchanging ideas to which values have been added by particular experience of each university context. Indeed, a Virtual Academic Consortium dealling with land information (VACLIS) is extremely needed to establish a virtual mechanism networking universities that furnish education and training in land information systems and land information management. As an academic consortium of researchers, it will provide a series of tools enabling communication, development, and sharing of educational and research experiencies among the community of universities specialised in LIS/LIM across Africa.

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## 1. INTRODUCTION

In Africa, land is a core resource for rural and urban activities and a primary key for investing and generating incomes. "Africa today is going through a period of great renewal. Important global and regional developments over the past decade have created an enabling environment for the continent to make positive changes that advance its socio-economic development agenda" (Annan, 2006). However, we observe that land is becoming progressively more scarce, conflicts are increased over land and economic opportunities are remaining constrained. Then, we have to anticipate conflict and develop mechanisms for conflict resolution. Effective measures such as better land administration and planning should be taken to avoid conflict spreading out into social tension motivated by ethnic incidents and intrinsic inequalities.

In recognition of the key role of land, the Economic Commission for Africa (ECA) focuses on developing a vision of a succesful land policy and reform in a comprehensive framework. The ECA indicates in its business plan 2007-2009 that among the development outcomes expected to emerge from ECA work we distinguish (ECA, 2006, p3):

- Increasing regional integration and integration into the global economy;
- Strengthening and better networking of institutions and centres of excellence.

On the other hand, ECA will collaborate with African universities and research institutions as well as civil society organizations working on development issues (ECA, 2006, p6). It considers universities as its natural partners that will complement its work in capacity development and knowledge management.

One should agree with the idea that "Economies in Africa are dependent on land-based resources, especially agriculture, livestock, tourism and mining. The management and administration of this land resource requires accurate and current land information to support appropriate policy decisions. The collection, storage, updating and dissemination of land and land-related information such as sizes of land parcels, ownership and type of land rights held, among other sets of land information, is fundamental to good land management" (Mwathane, 2007). An African Consortium dealing with land issues will have a major role to complement the ongoing efforts to develop continental framework for land information management and land administration policy in Africa.

## 2. TENDENCY IN LIS EDUCATION

### 2.1 The international tendency

**The land information management systems** are facing challengies due to the evolution of technology and to institutional changes induced by politcal and economical development at national, regional and international levels. Theses changing criteria will affect land based educational startegies at each level. So it is necessary to assess carefully the nature of skills required for the information era. Universities should focus on developing profiles that facilitate efficient interaction between teaching, research, and practicing.

In today's surveying education process, the technical skills should be reinforced by management skills so as to provide specialists with keys of interpreting and managing data to help problem solving and decision making. Management discipline are necessary skills permiting the ability to deal with new problems in a scientific way. The new Information Technlogy paradigm are progressively integrated in the learning and teaching processes. The traditional approaches based on campus activities are being to be enhanced to more open atmosphere such as virtual academy in a form of various delivery modes such as distance learning, electronic learning, and or online learning. The course delivery on a virtual campus is an international tendency that has the aim to suport the sharing action of knowledge and research reasults (Enemark, 2001).

Another characteristics of the new millinnium is the focus on lifelong learning process that permits developing individual capabilities by renewing and updating professional skills. In this regard, universities will achieve their missions in an interactive act with users and professionals within a virtual academic network. The main reason is that a gained knowledge in a degree has only an average useful life span of four years (Enemark, 2009). Any graduate especially from a vocational degree needs to enhance continuousaly his skills and to keep up to date his knowledge.

**An international modele of virtual education** is experienced around the world by several universities co-operating in a network called UNIGIS Internationational to design and deliver a distance learning in Geographical Information Systems (UNIGIS, 2009). The UNIGIS offers in a modular and flexible curriculum innovative courses to meet the industrial and commercial needs. It has grown from the European framework to the international network to ensure various academic programmes and qualifications in GIS (Strobl and Car, 2009). The UNIGIS plays a major role in curriculum development linked to geospatial sciences by offering an adjustable core of professional outcomes and educational curricula in GIS and Information Technology. LIS as a special component of geospatial sciences is evolving rapidly at the international and african levels. A specific interest should be accorded to the LIS topic in Africa to set up a balacing art of technology adoption and innovation taking in account the african demands in a continuous and professional frame.

## 2.2 GIS and LIS education networks in the African context

By analyzing the education outlines at the african universities' level, one may remark a diversity of projects and experiences linked generally to regional context over the continent. Most of the programs are only concerned by the geospatial sciences such as remote sensing, resource and natural hazard mapping and forcasting, surveying engineering, and GNSS as the modern positionning techniques. The delivery mode of the majority of theses programs is on-campus based courses. However, the Land Information Sciences and Land Information Management components that should be emphasized are mostly missing in major programs.

**A leading modele,** in virtual education**,** called African Virtual University (AVU) was established in order to enhance capacity by facilitating the access to education and training through the innovative use of information communication technologies (AVU, 2009). As a network gathering partner institutions of the sub-saharian countries of Africa, the AVU is engaged to promote Open Distance and eLearning (ODeL) methodologies across Africa by a series of multinational projects such as Teacher Education, ODeL centres, Capacity Enhancement Program, and Gender Mainstreaming. However, the Land Information topics are not integrated in the AVU designed profiles and strategy.

**At the Western region of Africa**, the Regional Centre for Training in Aerospace Surveys known as RECTAS was founded to provide training in the field of "Geoinformatics including

in particular photogrammetry, remote sensing, cartography and geographic information systems and their applications in geophysical surveys, environmental studies, natural resources management, and mapping" (RECTAS, 2009). It also provides assistant services to the african institutions dealing with geoinformation and belonging to the countries members of the Economic Commission of Africa. Some of the topics can be delivered in a form of distance learning especially for continuing education, however the land information courses are optional and at the regional level only.

**At the Eastern African,** the RCMRD for Regional Center of Mapping Resources for Development has been established since 1975 in Kenya. The Center has the aim to promote the geoinformation technologies in GIS, Remote Sensing or Earth Observation, Global Positioning System , and Database Development Systems (RCMRD, 2009). The RCMRD achieve his goals by offering competitive geoinformation services and products in africa but without focusing on a virtual model for LIS/LIM.

According to previous context, special interest has to be affected to Land Information sciences and Land Management to avoid the shortcoming of the existing projects. An alone university with a unique experience cannot contribute in developing local competencies without interacting with its environment. Adopted curricula will not induce to evolution and cannot provide either students or professionals with new and modern concepts in land information management unless it interacts with universities of similar profiles within and outside other african countries via a vitrual consortium.

## 3. THE AFRICAN UNIVERSITY CONSORTIUM FOR LIS (VACLIS)

### 3.1 The main and specific objectives

The main objective is to bridge some of the univesity diversities in various african countries by fostering collaboration and building a consensus around issues affecting education quality. As an umbrella network of several universities dealing with land information systems and land management in Africa, the virtual academy consortium will provide support to the core functions of universities. One agree with who assumes that the university is the catalyst of any developments and a bridge to the future. In the era of the knowledge development and where land information is a currency, the consortium will enable creating benefits to users in a social and scientific interactionism based on land local knowledge.

The VACLIS will be a basic frame enabling to provide best solutions for the future huge classes. The number of students requesting graduate and postgraduate degrees or diploma in LIS is growing in an astonishing manner. The evolving demands are linked to the nature of land development in Africa. More efforts are needed to govern and manage land for social and economic development.

Specific objectives behind creating the VACLIS can be identified as below:

- Building a pool of educational experts who will design and develop harmonized and normalized curricula in LIS.
- Promoting the introduction of new technologies that enable improving education in land monitoring, land redistribution, land consolidation, and land assessment.
- Strengthening the use of new methods and approaches of educating such as e.learning.
- Developing paradigms facilitating the creation of adequate interface's unites between educational and professional systems at the level of each country and over the continent.
- Acting as advisor to African governments by promoting and developing special studies and researches.

- Supporting the African university capacities and overall efficiency in major areas of interest linked to land information and land management namely natural resource management, facilities management, and transportation networks.
- Developing an African strategy for providing continuous professional education for administrative and technical managers in land management and land administration.

### 3.2 Areas of interest and activities

The universities can flourish through the consortium and develop improved curricula to stimulate academic standards across Africa. They should act as the basic enhancer of the education profiles in land information management systems which are linked to surveying and mapping as well as to social sciences. The Consortium, by cooperating efforts, will have the duty to widen a new educational paradigm composed of two interoparable levels. The first level concerns the fundamental curricula including technical studies related to measurment science such as geodetic sciences, mapping, surveying procedures, and photogrammetry.

The second level should encompass land information management studies supported by spatial information and spatial planning. Such a paradigm can be described in the following components (Figure 1):

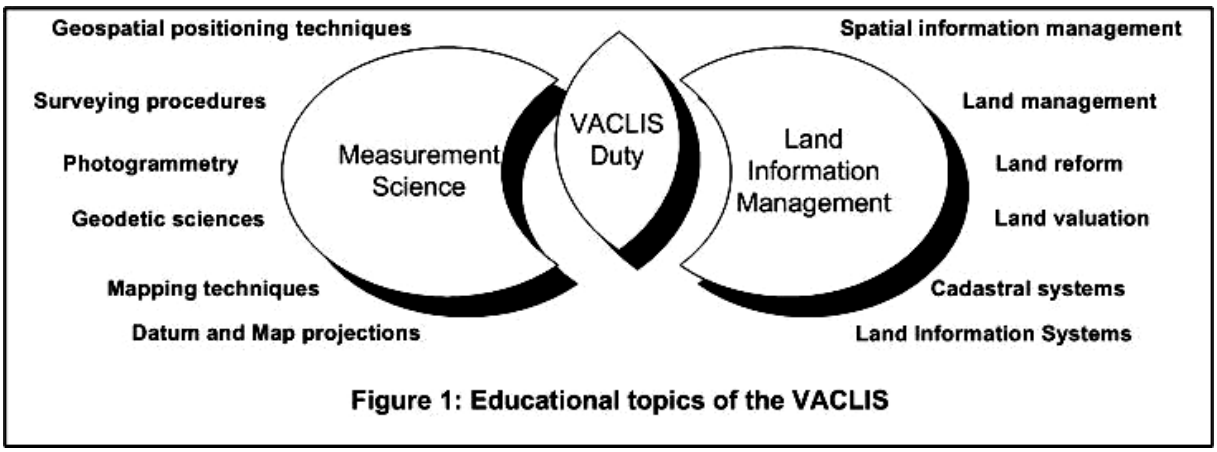


**Figure 1: Educational topics of the VACLIS**

- Land and Cadastral Systems: Cadastral systems, land consolidation, land registration, cadastral mapping
- Land Information Systems: digital data acquisition, cadastral and land data processing, digital mapping, design of LIS based GIS, LIS development
- Land Management (eGovernment): modern techniques of delivery of land administration data, data accuracy assessment, and legal aspects of LIM.
- Land Valuation and Planning: methods of land evaluation, urban planning, land consolidation, risk management, and land valuation.
- Land Reform Strategies: legislation governing land reforms, techniques and methods for realization of land reform, financing of land reform and organizational aspects related to land reform.
- Spatial information managements: policy formulation and development of National Spatial Data Infrastructures for LIS/LIM initiatives.

The consortium will ensure the achievement of activities that include the following topics:

- Developing tools for reality checking by analyzing pilot tests and compiling developed experiences.
- Organizing seminars, symposia, and periodical meetings to ensure the dissemination of developed experiences and curricula.

- Developing a harmonized course accreditation system to facilitate mutual recognition of qualifications and to share continuing education strategy in LIS/LIM for professionals.
- Strengthening the capacity building (both human and capital resources) in African universities.
- Developing a mechanism for sustaining the consortium by involving the local as well as the international funding organizations.

### 3.3 Beneficial outcomes of the VACLIS

Univeresities, according to their role as incentive institutions for development, will contribute in scientific researches to enhance legal, institutional, and technical aspects of land administration and management. Scientists and researchers within an appropriate framework will define and describe existing properties status, land right reality, tenure security, boundaries mapping, and educational profiles to develop basic conditions of transparency, sustainable management, and equitable access to productive resources. An inter-university cooperation through a consortium will enhance the quality of academic outcomes linked to land information management and administration

## 4. BRIEF PRESENTATION OF THE CONSORTIUM INITIATORS

### 4.1 School of Surveying Education - Institute of Agronomy and Veterinary Medicine

The school belongs to the Institute of Agronomy and Veterinary Medicine Hassan II, which is polytechnic institute with five schools educating in different fields. One of them is the School of Surveying that represents the educational level within mentioned land management matters. It was established in 1970 and funded within the framework of a Canadian cooperation. There are two departments within the school: the Department of Geodesy and Surveying and the Department of Mapping and Photogrammetry. The school has launched its process of reviewing and reforming its curriculum. This initiative focuses on a new educational profile to be in accordance with the new curricula architecture: Engineer / Master / Doctorate. The School has a wide relationship with various institutions, ministries, private companies, and public agencies. It also organized several continuous education sessions for technical staffs for agricultural offices, non-governmental organisations, and private companies.

### 4.2 Zimbabwe: Department of Surveying and Geomatics - Midlands State University

In 1998, the Ministry of Higher Education and Technology began a policy of devolution, which was aimed at expanding access to higher education by converting teachers and technical colleges into degree granting institutions. The State University in the Midlands Act of April 1999 transformed the devolution project at Gweru Teachers College into Zimbabwe's third state university (Midlands State University). The mandate of the institution include the advancement of knowledge, the diffusion and extension of arts, science and learning, the preservation, dissemination and enhancement of knowledge that is relevant for the development of the people of Zimbabwe through teaching and research and, so far as is consistent with the objects, the nurturing of the intellectual, aesthetic, social and moral growth of the students at the University. The university’s mission involves the interfacing with the community at local, regional and global levels. The university is committed to a culture of problem solving through quality research, teaching and training, work related learning and strategic partnerships with the University's stakeholders for the immediate and ultimate benefit of humanity. The university is also committed to the enhancement of the quality of people's lives through new ideas and skills for sustainable utilization of resources.

To date, the University has established seven faculties, as follows: Arts, Commerce, Education, Law, Natural Resources Management and Agriculture, Science and Technology, and Social Sciences. The Department of Surveying and Geomatics falls under the Faculty of Science and Technology. The department is involved in teaching and research in Surveying and Geomatics and is currently offering an honors degree in Surveying and Geomatics at the undergraduate level.

### 4.3 Department of Geospatial and Space Technology (GST) - University of Nairobi

The Department of Geospatial and Space Technology (GST), formely, the Department of Surveying is one of the five departments in the School of Engineering. The department started offering the degree programme in 1964 as the Department of Surveying. The department re-engineered its undergraduate programme in response to modern technological developments and introduced a programme in geospatial engineering, which took effect from the academic year 2004/5. The programm covers the following as the broad core areas of study: Geodesy and goedynamic; Positioning and Navigation; Topometry and Measurements; Geoinformatics and Visualization and land & Infrsatructure management. In addition to the undergraduate programme, the department now offers a Masters degree in GIS.

## 5. CONTROL QUALITY AND MONITORING OF THE CONSORTIUM

The consortium should be supervised and the control quality should be achieved by members of the consortium elected and organized in Technical Committees, an Advisory Board, and a Steering Committee. The Technical Committees are from educational staff from African universities involved in LIS/LIM. They have to coordinate the consortium activities and address specific technical issues raised by the Steering Committee and Advisory Board.

The Advisory Board will be formed from LIS/LIM experts members of African universities. It has to ensure that the running of the consortium meets the requirements of the potential membership and fit with the formulated goals in LIS/LIM. It has also to supervise and assess the financial and technical matters of the consortium. The Steering Committee have to supervise the consortium scheduling of activities and ensure the best management of its structures such as technical committees.

To achieve this goal, it is necessary to initiate a pilot study aiming to identify issues of similarity in the nature of teaching the surveying engineering, the nature of land information related topics and the nature of qualification required to attend the academic education. This step will enable the consortium to establish an educational threshold that facilitates the mutual recognition of academic qualifications across Africa. The second step concerns the cooperation with the professional organizations at each country to identify the professional qualification needed to be licensed for practicing. This permits to define an appropriate code of conduct and ethics and permits to foster exchanging academic staffs and professionals to face the lack of human resources needed to operate in a country.

## 6. CONCLUSION

Such a proposed mechanism to promote firstly the virtual educational paradigm and secondly the land information systems will serve african students, users, scientists, and university faculties, non matter from which coutry any individual or group is from. African stakeholders, national decision makers, and international investors feel the need to find significant trained professionals and consultants from Africa under a unique educational umbrella. This help to develop standards and establish a reference of project conduct linked to african land status, africa land administration, and ICT related land information. However, it should be emphasised that the implementation of such network requires serious costs in terms of budget

and time. In Africa where population is growing and the economic development is constraining, one remarks that conflicts over land are likely to increase. Then, it is necessary to anticipate conflicts and prepare indigenous land experts for problems resolution adopting a virtual continent network for LIS education as an incentive way to avoid mobility restrictions and social obligations.

Through the umbrella of the VACLIS, international principles and modern practices in land management and administration could be delivered in a standard educational core. Indeed, a conceptual standard frame could be taught by providing important backgound about experienced mechanisms for land conflict resolution from various african regions fromwhich students or trainees are virtually networked. Under the VACLIS, considerable advances can be made to enhance technical skills with knowledge on socioeconomic realities, financial, and legal issues taking in account the specific context for africans. This will be a capacity building mainframe to deliver expertise in land valuation and taxation and land use planing by sharing the country specific land issues and enriching the policy dialogue.

However, the implementation of this insight is a challenge for current and future time. Given the universities diversity, the cost, and the complex nature of land in Africa, the way to establish a such network will need a synergy collaboration between a limited number of partners before enlarging to the whole continent. Secondly, once convergence among basic partner opinions is achieved on the fundamental concepts, it is naturally challenging to translate the emerging strategy and agreement into programs for a testing period of two years. An evidence should be expected which concerns the necessity to address the international organisation such us United Nations and FAO to take benefits of their substantives. Finally, monitoring indicators have to be developed to ensure that implementation is keeping up with expectation and to sequence the future expansion.

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## BIOGRAPHICAL NOTES

Moha El-ayachi, Engineer in surveying, got his Doctorate Es Sciences in a joint supervision program between the University of Minnesota and the Institute of Agronomy and Veterinary Medicine Hassan II in the field of Land Information Management. He's Professor and Head of Department of Geodetic Sciences and Surveying within the School of Geomatics and Surveying Engineering. He's an active member of the corps of Licensed Surveying Engineers in Morocco (ONIGT). He established the first Arabic version of the booklet Cadastre 2014 in 2003. He published more than 20 papers in the field of land information, land governance, global positioning system, and GIS development. He's involved in many partnership searching programs at the national and international levels.

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