



**Meeting Summary**  
**High Level Meeting for AgriSense-STARS Project in Uganda**  
**for Potential National Partners and Stakeholders**  
**Thursday September 3, 2015 at Sheraton Hotel Kampala, Ballroom B**



**Background:**

On September 3, 2015, The Department of Relief, Disaster Preparedness and Management in the Office of the Prime Minister in collaboration with the University of Maryland (USA) and Environmental Surveys, Information, Planning and Policy Systems (ESIPPS) International hosted a high level stakeholders' meeting to introduce the AgriSense-STARS project which is one of the Spurring a Transformation for Agriculture through Remote Sensing (STARS) projects.

The objectives of the meeting were to a) introduce the AgriSense-STARS' Project and overview proposed methods for monitoring crop conditions for food security in Uganda, showcasing a pilot study in Moroto district in Karamoja region planned for the 2016-growing season b) to identify and engage potential key partners/stakeholders in the country to identify collaboration links and c) to identify avenues and possible contributions of AgriSense-STARS to current crop monitoring in Uganda. The workshop brought together participants from key government ministries, departments and agencies, research institutions, development partners, academia and the private sector. *A full list of participants, workshop agenda, presentations and project fact sheets are attached.*

***Link to workshop photographs:***

***<https://www.facebook.com/media/set/?set=a.696791390452360.1073741833.591207964344037&type=1>***

After round table introductions, **Honorable Gerald Menhya** [*Assistant Commissioner, Disaster Preparedness & Management, Office of the Prime Minister (OPM)*] welcomed all participants appreciating the overwhelming positive responses, which inevitably highlights the recognized potential opportunities presented by the AgriSense-STARS project. He gave a brief overview of the challenges of crop monitoring in Uganda. Honorable Menhya recognized that, national crop conditions monitoring is still a big challenge in Uganda especially when using conventional approaches that require extensive human and financial resources. He emphasized that this however, does not justify inaction because crop monitoring is paramount for ensuring food security and support economic well-being especially because, agriculture as a sector, remains the backbone of Uganda's economy. He gave special importance to having concerted efforts in place by all stakeholders and the absolute necessity to work in an integrated way. He announced the September-November seasonal forecast was just released by the Uganda National Meteorological Authority, which predicts an occurrence of normal to above normal rains (due to El Niño rains) for most parts of the country. These are likely to lead to flooding in flood prone areas of the country, storms, and droughts. In this regard, the OPM has a role to develop a national contingency plan to enable the country to adequately respond as the El Niño rains present negative implications to the socio-economic status of the country including loss of human lives and livestock, complete crop failures, and landslides. Consequent to this, OPM will be facilitating monthly disaster risk platform meetings. These meetings are aimed at helping the nation to develop sound-sector specific contingency plans (Water Environment; Agriculture, Fisheries and Livestock; Works and Transport; Health) so as to adequately help population masses in the event of disaster occurrences.

He declared the workshop officially open after thanking the funders of the STARS projects, the Bill and Melinda Gates Foundation (BMGF) for recognizing not only the need but also the challenges developing countries face in monitoring crop condition and the huge gaps in capacity to do so effectively and efficiently.

**Dr. Rolf A. de By**, [*Associate Professor, University of Twente, ITC, Netherlands*] followed to give an overview of the STARS project. STARS is a coordinated effort funded by the BMGF to learn, identify opportunities, constraints and risks and to test hypotheses around potential exploitation of high-resolution Remote Sensing (RS) technology in production systems and livelihoods of smallholders. The STARS project is a consortium of five main partners: ITC, University of Maryland, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), International Maize and Wheat Improvement Center (CIMMYT) and Commonwealth Scientific and Industrial Research Organization (CSIRO). He stated that, achieving monitoring crop growth within smallholder farms of sub-Saharan Africa and Southern Asia using time-series remote sensing would allow improved outlooks for crop yields throughout the growing season, inform policy-makers and ensure more effective evidence-based advisory services at the farm level. This would provide critical information to farmers and agro-businesses in near-real time. He also stressed that though all the above can be achieved, several challenges such as heterogeneity in crop and crop varieties, cropping systems that complicate mapping and monitoring efforts have to be overcome.

**Jan Dempewolf** [*Assistant Research Professor, University of Maryland*] followed to present an overview of the AgriSense-STARS project whose major objective is to improve the quality and timeliness of information on agriculture to support food security monitoring and assessment. The project uses remote sensing, smartphones and internet technology to collect, package and deliver information on crop conditions for government, NGOs and the private sector, providing information on cropland distribution, crop types, cropping systems, cropland extent and crop conditions throughout the growing season. AgriSense-STARS' main tools include the GLAM-East Africa portal for user-friendly satellite time series analysis, the Crop Monitor online collaborative portal for agricultural data collection and synthesis, the GeoODK electronic field-data collection and delivery system and the use of Unmanned Aerial Vehicles (UAVs) to map and monitor crop area and conditions. The methods and components are expanded upon in the attached AgriSense-STARS factsheet. **[Above: UAV image of maize fields collected in Tanzania, April 2015].**



**Eunice Nyiramahoro Duli** [*Associate Consultant, ESIPPS International Ltd*] described preliminary results from an exploratory survey of private sector companies and institutions using geographical information systems (GIS) and remote sensing information and data in Uganda. The study showed that over 53.7% of potential users do not currently use these technologies. The remaining 46.3% use these technologies in their programs mainly for mapping and delineating crop systems, vegetation types, land cover and land use maps. Table 1. Summarizes some of the key capacity gaps in the use of remote sensing and GIS technology in Uganda particularly in the agriculture sector as per the study.

Capacity Gaps for Use of GIS & RS	Percent
No awareness of the relevancy of GIS & Remote Sensing (RS)	16.2
Lack of appropriate facilities	24.3
Lack of trained staff	18.9
Inadequate access to GIS & RS services	35.1
Others	5.4
Total	100

**Recommendations to fast-track and enable the use of remote sensing and GIS in Uganda for crop monitoring;**

- Facilitate affordable access to GIS and remote sensing services
- Establish training centers for GIS & remote sensing
- Training in satellite imagery processing, interpretation, modeling, and database management
- Target farmers for use and adaptation of GIS tools and information
- Capacity building trainings for institutions
- Collaborations and partnerships

**A round table discussion on agriculture monitoring in Uganda (Opportunities and Challenges) followed.** This session was aimed at understanding monitoring mandates, tools and methods being used in Uganda and was led by Dr. Victor Kongo [*Consultant, Bill and Melinda Gates Foundation*]. The section below summarizes some of the key points from the discussion, followed by a table that captures main points organized under the main discussion questions.

1. The **MAAIF** Early Warning Unit conducts crop and post-harvest performance monitoring using questionnaires. The outputs are performance monitoring and food security reports. However, the accuracy of data is highly questionable as the data are collected by from District Agricultural

Officers who are meagerly funded and due to difficulties with data quality control. Recently, MAAIF established the Directorate of Agricultural Extension, which that is anticipated to improve the data collection process. At the management level, MAAIF recognizes that Remote Sensing is the way to go, however, there is a gross lack of human and infrastructural capacity to actualize this ambition.

2. **World Food Program (WFP)** conducts periodic assessments to determine the nutritional status of their beneficiaries. The users of WFP information are WFP herself, NGOs, DLGS and the Government. WFP is interested in applying remote sensing to determine agricultural production level, expectations in terms of yields, follow trends and make food security projections.
3. **AgriProFocus** Uganda promotes farmer entrepreneurship and helps monitor the impact of investments to increase financing for producer organizations. The focus is to monitor business deals struck and identify, capacity gaps for follow-up and support. The AgriProFocus monitoring systems are real-time smartphone based systems, which tracks the GPS coordinates of the senders. The information sent is processed by the AgriProFocus Platform and disseminated to the top users. However, if anything goes wrong at data the collection level, the proceeding information will be inadequate.
4. **FAO** supports **MAAIF** in conducting food security assessments updating the Food Security Map twice a year. FOA also monitors changes in vegetation based on the Normalized Difference Vegetation Index (NDVI) measurements and management practices in the Karamoja region. Additionally, FAO conducts crop and disease surveillances using a mobile-based platform to advise on the extent of spread of a given disease. All FAO information is packaged following communication template formats meant for policy makers (technical briefs). The OPM and MAAIF are required to translate information in technical briefs to suit their end users.
5. **Makerere University (MUK)** has a mandate for teaching, research and outreach. MUK works with many agencies in the areas of GIS and Remote Sensing for agriculture and other applications including the National Emergency Coordination and Operations Center (NECOC) under the OPM. The GeoNetCast system housed at both MUK installed by the University of Twente and OPM enables collection of near real-time satellite data. MUK is available to link with international GIS and Remote Sensing Experts in the area of capacity building. MUK has been able to understand what the public needs and adapt itself through curriculum reviews or facilitating tailor made trainings.

**Table 2: Summary of round table discussion on agriculture monitoring in Uganda (opportunities and challenges):**

Question	Main point/summary
<b>What are you monitoring?</b>	<ul style="list-style-type: none"> <li>• Crop performance (growth and postharvest) using questionnaires</li> <li>• Changes in land cover and farmers practices</li> <li>• Rainfall estimates</li> <li>• Nutritional status</li> <li>• Producer links to organizations</li> <li>• Changes in vegetation cover</li> <li>• Farmer practices</li> <li>• Food security situation through assessments</li> </ul>
<b>How do you package your information</b>	<ul style="list-style-type: none"> <li>• Monitoring performance reports</li> <li>• Food security reports</li> <li>• Communication templates</li> </ul>
<b>Who are the end Users?</b>	<ul style="list-style-type: none"> <li>• Government agencies including MAAIF, OPM</li> </ul>

	<ul style="list-style-type: none"> <li>• Policy makers</li> <li>• WFP</li> <li>• Local Governments (District)</li> </ul>
<b>Challenges and some weakness</b>	<ul style="list-style-type: none"> <li>• Data accuracy very low due to heterogeneity of farms</li> <li>• Difficulty to interpret reports that tend to be too technical</li> <li>• Data collection is done at district level which affects accuracy</li> <li>• Inadequate funds for monitoring and carrying out assessments</li> <li>• Limited/ poor access to necessary equipment</li> <li>• Inadequate historical data and information on crop production is needed to make estimates and projection</li> <li>• Low capacity within local governments to monitor</li> <li>• Estimates not reliable</li> <li>• Getting up –to-date data is still a big challenge</li> <li>• Capacity to interpret data still low</li> <li>• Timeliness of delivering/ releasing information still poor</li> <li>• Data-sharing and collaboration among agencies can be improved</li> </ul>
<b>Strengths</b>	<ul style="list-style-type: none"> <li>• MAAIF has a statistics unit with highly trained staff</li> <li>• Training programs and research in remote sensing are available though still very limited</li> <li>• Committee chaired by MAAIF of food security exists and brings together key stakeholders</li> <li>• a Directorate of Agricultural Extension is being established in MAAIF and this will improve central and local government linkage</li> </ul>

**Catherine Nakalembe** [*Faculty Research Assistant, University of Maryland*] presented the proposed pilot project of Agri-Sense-STARS methods and tools for Karamoja. The pilot project is still in design phase will be based on AgriSense-STARS methodologies. Field segments to be monitored will be selected using an Area Frame based statistical sampling strategy. The pilot will make use of very high-resolution satellite data map agriculture. This will facilitate monitoring crop conditions in Moroto district with the possibility of expansion to parts of the country. Ten high-intensity agriculture segments will be monitored in each district during the 2016-growing season using the GLAM system, field data will be collected by district and village officers and by farmers when possible. Electronic data collection forms and variables and data storage and dissemination tools will be designed with contributions from all anticipated key end user organizations. Monitoring will be done from the beginning to the end of the 2016-growing season with consistent and continuous reporting to all stakeholders.

Upon mapping segments, the following are some of the variables that will be monitored and reported throughout the 2016 cropping season: Crop developmental stage, Crop Density, Crop Height, Leaf Count, Crop intensity, Crop height, Market prices (FAO), Nutrition (WFP)

**Variables to be monitored include:**

- Crop development stage
- Crop Density
- Crop Height
- Leaf Count
- Crop intensity
- Crop height
- Crop damage
- Market prices (FAO)
- Nutrition (WFP)



**Field data collection using GeoODK smart phone application during a pilot assessment August 2015**

## DISCUSSION ON FUTURE COLLABORATION

This was facilitated by **Dr. Victor Kongo** [Independent *Consultant for AgriSense and BMGF*] and organized around four main questions (see table below).

Question	Summary of discussion
<p><b>1. Do we see a reason to collaborate?</b></p>	<p>All participants agreed in unison that, yes, there are several reasons to collaborate namely:</p> <ul style="list-style-type: none"> <li>• Technology transfer</li> <li>• Knowledge, data and information exchange</li> <li>• Capacity building</li> <li>• Resource maximization</li> <li>• Minimize duplication of efforts</li> <li>• Access to remote sensing data including very high resolution imagery</li> </ul>
<p><b>2. How best can we collaborate?</b></p>	<p>Capacity building in terms of human resources and technology transfer (hardware and software). AgriSense-STARS could contribute to building capacity in the following:</p> <ul style="list-style-type: none"> <li>• MAAIF in the area of Disease and Vector Monitoring as well as estimation of acreage per crop;</li> <li>• NECOC Early Warning Sub Committees in the area of Remote Sensing data processing;</li> <li>• UNFFE in the area of Agricultural Insurance advocacy by helping build human and technological expertise for determining crop performance and the extent of anticipated damage to facilitate estimation of agricultural insurance premiums;</li> <li>• FAO in the area of production and yield estimation as well as food price monitoring.</li> </ul>
<p><b>3. Can we have a commitment to collaborate?</b></p>	<ul style="list-style-type: none"> <li>• Memoranda of Understanding between stakeholders</li> </ul>
<p><b>4. What can AgriSense-STARS contribute to your mandate?</b></p>	<ul style="list-style-type: none"> <li>• Report on the findings, challenges and recommendations that would contribute to implementation of government programs.</li> <li>• MAAIF in crop modeling</li> <li>• Crop monitoring, capacity, software and equipment</li> <li>• Estimate area planted, crop performance at different stages.</li> <li>• Farmers and field officer training in GeoODK system.</li> <li>• High resolution images for NECOC</li> <li>• Capacity building of NECOC (Early warning sub-committee) in image analysis</li> <li>• Increase timeliness using electronic data</li> <li>• Real-time crop conditions information that can support early warning and support FS Assessments (WFP)</li> <li>• Provide agricultural information for farmers and access insurance companies</li> <li>• Provide information on crop, yield estimates to counter-check on yield/production estimates</li> </ul>

In summary, participants agreed that, the best way to collaborate is by focusing on what each institution can contribute towards integrated crop monitoring. Government collaboration with knowledge institutions and the private sector is critical for the development and addressing of societal problems. The best commitment is demonstrated by absorbing tested and proven technologies and innovations into sectoral development and policy plans. This would ensure sustainability of programs, continuous and consistent monitoring that can provide critical information for designing and deploying interventions that would benefit farmers.

**Ms. Catherine Ahimbisibwe** [*Senior Disaster Preparedness Officer, OPM*] presented the meeting wrap up which was followed by closing remarks from **Ms. Beatrice Namaloba** [*Senior Agricultural Officer, MAAIF*] on behalf of **Dr. Okasai Opolot** [*Director Crop Resource, MAAIF*]. Ms. Namaloba noted that, existing challenges in monitoring significantly impact the food security status of the country. Information sharing allows us to know who is doing what, thus collaboration in this regard will greatly foster harmonization of disseminated information. The AgriSense-STARS project is expected to help build capacity at MAAIF to map crop type, estimate acreage and yield forecasting. This will go along way in helping the country adequately plan for food distribution across all regions. Therefore, high tech remote sensing is the way to go for effective agricultural intensification. She concluded by calling upon all stakeholders to collaborate to create harmony through information consolidation to better inform the public and decision makers for the benefit of society as a whole and more for the smallholder farmer.

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