SDG ACCELERATION ROADMAP

UNLEASHING THE POWER OF PRIVATE-SECTOR DATA IN THE GLOBAL SOUTH

Improving Sub-National Spatial Data Analytics in Kenya Through Public-Private Initiatives

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Context

In 2010, Kenya enacted a new Constitution that decentralized its governance architecture. One of them, and the second smallest of all, is Vihiga County, with a population of approximately 900,000 and a wide range of natural resources. The county is reliant on agriculture and tourism as its main industries.

While county governments like Vihiga County are vested with the responsibility to enact legislation, execute budgets and report, they are also expected to adopt evidence-informed approaches to planning and implementation of activities and programmes. The Constitution of Kenya expects each government to put in place a spatial plan as a way of ensuring that planning, resource allocation and service delivery leave no one behind. These spatial plans are expected to have a 10-year life and be used as part of the evidence for policy formulation and service delivery.

Vihiga County, in its previous form as a district within one of the eight provinces of the former centralized structure, was already exploring the use of spatial technology as a source of evidence for decision making in 2010. One particular constituency known as Emuhaya was the home of the first GIS Lab providing data and evidence for the member of parliament and his constituents to aid planning and advocacy. That MP was H.E. Wilber Otichilo, a former Director General at the Regional Centre for Mapping of Resources for Development (RCMRD), an agency of United Nations Economic Commission for Africa (UNECA) and an experienced GIS expert.

The Emuhaya Constituency GIS Lab was a small facility equipped with computers, a large format printer, internet access and some human resources to process, analyze, curate and share products based on satellite imagery and remote sensing data relevant to the constituency. It did not cover the entire Vihiga district as it was an initiative by the MP and not the national government. The GIS Lab was primarily used by the MPs constituency office to support advocacy on resource allocation and service delivery as well as empowering local actors such as community-based organisations and NGOs with up-to-date spatial information. Its products were also available to others interested in Emuhaya.

Data Action – Data Sharing & Capacity Building

Vihiga County's collaboration with private sector partners in order to access data from new sources and use new technologies for decision making is an example of data sharing for sustainable development.

While there is now better supply of data on agricultural production, health services, education, meteorology and public finance than a decade ago, there is still a shortage of data for decision making due to the lack of interoperability between data sources and datasets. Even where data supply has improved, accessibility remains a challenge. This is particularly true for satellite imagery and remote sensing data which is either expensive to purchase or too technologically advanced for the average user to use.

A collaboration between the county government of Vihiga and partners who have the data and the technology and skills to make it usable was therefore valuable in making this new source of data for decision making accessible to those who need it most.

Methodology

This case study took a mixed methods approach in trying to understand how Vihiga county collaborated with its partners to deliver on the vision of a GIS Lab.

Desk Research

A number of documents were studied to understand the partners and some of the projects that emerged from the GIS Lab. These included:

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- County Government Act 2012
- Public Private Partnerships Act
- Public Private Project presentation
  The KILIMO Project website

Key Informant Interviews

A number of individuals were key to the design, implementation and use of the GIS Lab. Some were identified through the desk research, while others were identified through a waterfall. Their names and designations are provided in Annex 1.
The interviews were conducted using an interview guide which is shared in Annex 3.

The Vihiga County Government Partners

About Airbus Defence and Space

The division of Airbus SE, known as Airbus Defence and Space, is responsible for the manufacture and development of the corporation's defence and space-related products, as well as the provision of related services. This division was established in January 2014, as part of the corporate restructuring of European Aeronautic Defence and Space (EADS), and includes the former Airbus Military, Astrium, and Cassidian divisions.
Airbus Defence and Space has infrastructure to capture, store and share high resolution imagery. In the recent past, Public Private has made these satellite services commercially available to both the public and the private sector making this type of data accessible to countries that do not have their own satellites in space.

About LocateIT Ltd

LocateIT Ltd is a Geo-ICT company that offers cutting-edge location-based products and services pillared on ultra-modern Space Science & Technologies / Remote Sensing / Earth Observation, GIS, Airborne sensors, and Geo-Apps (especially for socio-economic data collection). Based in Nairobi, Kenya, LocateIT supports clients in both the public and private sector by providing GIS specific services or turnkey solutions that utilize a diverse set of technologies to deliver

on the client's desired outcomes.

About Esri

Esri is a multinational software company based in Redlands, California, that specializes in GIS systems. The company is renowned for its popular ArcGIS products which make it the leading supplier of GIS software, web GIS, and geodatabase management applications worldwide.
Originally established in 1969 as a land-use consulting firm under the name Environmental Systems Research Institute, Esri has since grown and currently operates 49 offices across the globe, including 11 research and development centers in the United States, Europe, the Middle East, Africa, and Asia Pacific. Esri has over a million active users in 350,000 organizations, and employs 4,000 people. The company remains privately held by its founders.

The Vihiga County GIS Lab

In 2013, H.E. Wilber Otichilo was elected as the first Governor of Vihiga County (formerly Vihiga District) becoming the head of the county executive branch and bearing responsibility for the functions devolved by the 2010 Constitution of Kenya to subnational governments. The Constituency GIS Lab, which had proved useful for Emuhaya, now a unit area within Vihiga County, became the inspiration for a much larger effort. In 2013, the idea of a County GIS Lab was born.
Governor Otichilo was now keen to implement this county level GIS Lab which would enable his government to better serve residents in the county. However, Vihiga County didn't have the resources or expertise to start a lab on its own. He reached back to the companies that had helped him set up the constituency lab in order to make this new data source for the county a reality; Airbus, Esri and Kenyan technology services company, LocateIT.[1]

Vihiga County provided physical space for the GIS Lab. LocateIT, a Kenyan

[1] Vihiga adopts GIS technology in design of county projects - https://www.businessdailyafrica.com/bd/corporate/technology/vihiga-adopts-gis-technology-in-design-of-county-projects--2190002
[2] Vihiga adopts GIS technology in design of county projects - https://www.businessdailyafrica.com/bd/corporate/technology/vihiga-adopts-gis-technology-in-design-of-county-projects--2190002

company headed by the late Erick Khamala,[2] a well-known GIS expert and a collaborator during the constituency GIS Lab phase, provided technology, training and infrastructure support. The Esri President Jack Dangermond, donated through Esri 17 computers and software for the lab while Airbus donated high resolution satellite imagery to get the lab started. The initial image Airbus provided was an archive image from 2009 and proved useful in demonstrating the use case pursued by Vihiga County.

At only 531km2 the cost of a county-wide high-resolution satellite image is relatively low for Vihiga compared to other counties in Kenya. However, even with the concessional pricing provided by Airbus, this would still be a significant hurdle to overcome every year without access to budgetary support.
The Vihiga County GIS Lab has since evolved to become institutionalized within county government structures and now receives budgetary support from the public sector. It has been used for a variety of use cases, including mapping and supporting the implementation of a maternal health care support program in the county, as well as providing a data source for agricultural advice and early warning.

The lab functions as a service provider for the entire county government, making it possible for it to provide insights that combine data from various sectors in ways that were not possible before. It now means data from water and sanitation can be overlayed with data from agriculture and health to identify potential nutrition crises as they emerge or even identify causes for diseases that the health ministry wouldn't know if the data from different sectors wasn't interoperable and available.

How the GIS Lab Works

The County Directorate for Geospatial Technology Services in the County Government of Vihiga serves as the official home of the GIS Lab. The lab works directly with its technology partners such as Airbus, Esri and LocateIT to secure data, software, hardware and technology skills in order to serve its primary clients; the other departments and agencies in the county governments.
The GIS Lab serves as a clearing house and repository for data needed for

operational and strategic decision making by being the first port of call for any department that wishes to collect data in the county. It ensures all data is interoperable and maintains the datasets on a central service.
The GIS Lab also customizes software to suit the needs of the users and provisions the software as needed e.g. data collection tools using ODK.
The GIS Lab trains personnel from other departments on basic data management including data collection protocols and standards as well as the tools they make available to teams for data collection and analysis.
Any user department or agency that identifies a data need that can be served through the services of the GIS Lab simply makes a request to the Director and a fit-for-purpose solution is designed and co-implemented to acquire the data and analysis needed.

The GIS Lab in the Health Sector

The effective provision of healthcare services requires access to accurate and timely information on various aspects of the healthcare system, such as infrastructure, commodities, and human resources. For Vihiga county this data is critical in assessing whether healthcare facilities meet the required standards.

The public health department was able to achieve this by working with the GIS Lab to collect data via a mobile app on the geocode, services being provided, infrastructure, commodities, and human resources available at each of the county's healthcare facilities. This information was submitted into a system provisioned by the GIS Lab for analysis.

These data, taken together with other data on financing, are crucial to understanding the resources available to the facility and its capacity to provide services. All this data is geocoded to provide a visual representation of the infrastructure, service delivery, commodities, and human resource capacity to inform decisions and improve the healthcare system.

According to the Assistant Chief Public Health Officer Dr Elsham Ambale, this data was not possible to find in one place in the past due to technological,

digital literacy and infrastructure challenges. The partnership that made the GIS Lab a reality now makes it possible for the department to do much more and do it more efficiently.

The GIS Lab didn't just help collect and analyse administrative data. It continues to provide valuable intelligence for use in operational decision making. Recently, Vihiga county conducted a county-wide deworming campaign[3] which was implemented in line with revised WHO guidelines with support from UNICEF. The campaign utilized datasets from the health department and also combined them with geocoded data from other departments such as education. Previously, the data was not geocoded and was kept by the primary data collector on a single computer and not available to the rest of the department or the health system.

The GIS Lab in the Agriculture Sector

One use case in the agriculture sector has brought additional private sector and bilateral partners together. It is known as the Kenya Innovation for Low Input Maize Production (KILIMO). It brough four more institutions including ITK, a French company that develops technological solutions to serve food safety and the French government's Ministry of the Economy and Finance.

Through the GIS Lab, Airbus provides satellite imagery of the whole county at 50% of the cost on an annual basis. As new use cases emerge, Airbus provides technical support in the form of training to build the capacity of the staff to utilize the imagery effectively. For instance, in the case of the KILIMO project, the teams needed to understand how to use the imagery and the artificial intelligence technologies available to identify crops vis a vis other vegetation and provide analyses to user departments. This combination of data and capacity building has helped maximize the resources and turn the lab into a new source of data for decision making in the county.

[3] https://newsroom.amref.org/blog/2023/01/mass-deworming-program-launched-in-western-kenya-to-combat-intestinal-worms-and-bilharzia/

In addition to this feature of combining data and capacity building into a single coherent intervention, this case was also selected due to its ability to bring together multiple private sector partners around a public sector effort which makes the GIS Lab a model that can be replicated across Kenya and other countries. The sector-agnostic nature of the GIS Lab means it can support evidence-informed decision making across all 17 SDGs while creating an opportunity to make data interoperable and opening vast new possibilities for development decision making. It can also attract an almost infinitely diverse set of data collaborators due its agnostic nature.

Efforts like this lab which result in partners only providing infrastructure, without creating a mechanism for supporting recurrent costs and activities, tend to have a short shelf life as funds run out and human resource is lost to other departments and institutions. To ensure the Vihiga County GIS Lab has longevity, the Governor reorganised his government to ensure there was a department within it responsible for the lab and the GIS service delivery needed by other departments. This is the County Directorate for Geospatial Technology Services. By anchoring this within government structures it was possible to assign budget support and human resources to the office and ensure future Governors find the GIS Lab running as part of the county's business-as-usual. This is a key feature and one that provides a valuable lesson for other implementers in Kenya and beyond.

Analysis of the Case

The existence of national legislation[4] mandating the use of GIS for decision making was a key driver for Vihiga County and invaluable to other counties exploring the establishment of similar labs. By establishing the labs as part of government structures and using current legislation to justify the establishment of the necessary physical and human infrastructure and resources, county governments can assign a recurrent budgetary expenditure to ensure imagery and technology are refreshed on an annual basis.

[4] County Government Act 2012 - https://countytoolkit.devolution.go.ke/sites/default/files/resources/CountyGovernmentsAct17of2012-2.pdf

Additional policies implemented by the county government, such as the Vihiga Governor's Executive Order, which resulted in the reassignment and relocation of the GIS office from the County Land Department to the Geospatial Technology Services Directorate in the Governor's Office, contributed to an enabling environment for the GIS laboratory.

This enabling environment was necessary for data champions such as Governor Otichilo, the late Erick Khamala and Vivianne Meta (former and current CEOs of LocateIT), Washingtone Olando, current Director of the Geospatial Technology Services Directorate, and their international collaborators to bring the lab to life and keep it running.

Another key factor that makes this GIS Lab and its data actions viable are the incentives for the various partners. Vihiga County was seen as a proof concept by the private sector partners, particularly Airbus and Esri. By demonstrating the utility and value of the lab to other county governments, the partners could potentially convert 46 more county governments and possibly the national government into clients for the data, infrastructure, training and technology they provide. The investment in the Vihiga County Lab can be considered part of the broader market entry and market expansion costs the companies would have to invest, but with the added value of being able to show, rather than just tell, potential clients what data and technology can do for their governments. Indeed, the lab has become a common destination for public sector experts from Kenya and beyond to visit and learn from with numerous visits reported in the last year.

Perspectives of the Local Teams

One of the main observations of the Vihiga County and LocateIT team was that the interoperability of data enabled by the GIS Lab offers immense potential for deeper and more accurate information. No other effort in the county government seems to deliver a true cross-sector merging of data to produce evidence for decision making. This is a major strength for the lab and for the approach as a whole. However, the public sector does identify the intermediation by a reseller as a potential challenge for other implementers.

In the case of Vihiga County, the late founder and CEO of LocateIT Mr Erick Khamala, and the current Governor of the County H.E. Wilber Otichilo had collaborated on the earlier constituency lab project. The relationship and trust made it possible for LocateIT to invest its own resources and act as a benevolent intermediary between Airbus, with whom they are recognized as a reseller, and the county government. When these relationships and trust do not exist, intermediation can result in a high friction relationship due to the nature of public finance processes and timelines.

The ability of the lab to not only serve ongoing routine needs of departments and agencies, but also to support long-term sector programs was another key highlight of the case. The lab was a major data source for the Otichilo Care program that supports maternal and child health in the county. It is also the underlying platform that enables the KILIMO project making it possible for other partners to coalesce around its infrastructure to create and deliver new value.
For the private sector the lab provided, and continues to provide, a new opportunity for them through the new programmes that are added and also through the interest by other county governments in following Vihiga's lead. From a business development perspective, a live functional lab of this nature allows them to demonstrate through a fully functional prototype what their capacities, technologies and data can do in supporting governments to tap new sources and technologies for data that is useful in decision making in the context of the SDGs.

Findings & Reflections

Our Analysis

Overall, we find that the Vihiga GIS Lab as an object of collaboration between Airbus and Vihiga County demonstrates a viable model for creating an enabling environment for ongoing data actions across sectors and SDGs. However, the key components that make this a success take time... take time to put in place and maybe subject to political contestation. Prioritization of considerable financial

resources for the purchase of "an image" (as may be over simplified by political non-tech actors) over addressing what would be considered more pressing challenges in health, education, water or agriculture requires strong leadership, patience and time.
A sector-agnostic approach such as this case also allows the county government to extract maximum value from the infrastructure, expertise, data and partners. This potential to help address problems for a wide array of interests and actors makes it possible to position the lab as a useful resource for any sector. Demonstrating this value would be key in mitigating the political challenges that arise when trying to scale or improve the framework that governs the data actions.

While this partnership was made possible because of Airbus' data action, now that the lab is up and running, the teams can utilize imagery from any provider of their choice, including drone imagery where it exists. Although there may be some vendor lock-in in terms of infrastructure, the laboratory has the ability to find new partners to better meet its needs if necessary. This could help them overcome scenarios where a data action is wholly tied to a single actor to the detriment of the county government.

The Gender Dimension

From the beginning, the GIS Lab in Vihiga has been used to address issues facing women and girls. In its first iteration as a constituency data information system, the lab was key in developing a policy on improving the reach of maternal healthcare in Emuhaya Constituency. In its current iteration as a County level GIS Lab, it is the data source that powers the county's Productive Maternal New-Born Child and Adolescent Health programme also known as Otichillo Care.
In developing and implementing the data interoperability enforced by the lab in its interactions with user departments, the lab prioritized gender data to ensure all data on people within the platform is appropriately disaggregated in order to be useful in supporting gender related efforts.

Conclusions

> *"Better data and statistics will help governments track progress and make sure their decisions are evidence-based; they can also strengthen accountability. This is not just about governments. International agencies, CSOs and the private sector should be involved. A true data revolution would draw on existing and new sources of data to fully integrate statistics into decision making, promote open access to, and use of, data and ensure increased support for statistical systems." (HLP Report, P23)*[5]

The High-Level Panel on the Post-2015 Development Agenda described a data revolution as one which would draw on existing and new sources of data to "fully integrate statistics into decision making..." The Vihiga County GIS Lab is one example of how the data revolution is materialising in Kenya. Satellite imagery at the resolution now available, or the artificial intelligence technologies needed to analyze that imagery in combination with other data from other sources, new and old, was inaccessible to sub national governments in low-income countries just a few years ago. The lab marks a significant advancement in this regard.

However, integrating these technologies and the data into decision making is not necessarily a technological or data problem. Vihiga County GIS Lab demonstrates the need to simultaneously implement policy changes as the pursuit for a data collaboration moves forward. Without these policy changes, it would remain a project that ends immediately if the partners stop their support. Wide scale collaborations of this nature, either as collaborations or public-private partnerships, are still not evident. But a model now exists upon which other governments can build, iterate and innovate as we move towards the next generation of data-related collaborations.

[5] A World That Counts: Mobilising The Data Revolution for Sustainable Development. - https://www.undatarevolution.org/report/

Recommendations

As more counties seek to learn from Vihiga and implement labs, we believe the following should be considered:

1. The laboratory design should include a higher level of abstraction between data and technologies to allow the government greater flexibility in determining where it obtains and stores the imagery it uses.

2. Counties near Vihiga should consider collaborating with Vihiga instead of setting up their own GIS laboratories. Infrastructure, data and human resource costs could be shared among them and access costs reduced. As county governments in Kenya continue to pursue a regional block approach to economic development, the GIS labs as shared infrastructure could help accelerate the integration of data and statistics into the workflows of more counties without the initial barriers to access, which would include budgetary constraints and the level of effort needed to craft their own industry partnerships.

[6] https://www.the-star.co.ke/counties/western/2019-05-18-vihiga-launches-land-planning-laboratory/

Annex 1: List of Interviewees

Washintone Olando, Director for Geo-spatial Technologies Services– County Government of Vihiga – 27 September, 2022
Vivianne Meta, Chief Executive Officer – LocateIT Ltd – 17 October 2022
Elsham Ambale, Chief Public Health Officer, County Government of Vihiga – 13 February 2023

Annex 2: Related Resources

County Government of Vihiga website – www.vihiga.go.ke
Airbus Defence and Space website - http://intelligence-airbusds.com
Esri website – www.esri.com
LocateIT website – www.locateit.co.ke

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