Co-creating Geospatial Solutions in Africa: Nordic–African Partnerships

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1. SUMMARY

Africa is undergoing rapid social, economic, and environmental transformation. Urbanisation, population growth, and climate change are reshaping cities, rural landscapes, and governance systems. At the same time, geospatial information, Earth observation, and location-based technologies are becoming essential tools for planning, public service delivery, land management, agriculture, infrastructure development, and disaster preparedness.

Across the continent, applied geospatial innovations is already merging. Local governments, start-ups, researchers, and community organisations combine satellite imagery, GIS, drones, and mobile technologies to generate new information in contexts where traditional data is fragmented, outdated, or completely lacking**.** These innovations are largely driven by practical needs such as identifying service gaps in informal settlements, monitoring crop conditions, managing traffic flows, or responding to floods and droughts.

However, this potential is constrained by uneven data access, limited interoperability, gaps in digital skills, insufficient long-term investment, and institutional barriers. Nordic and African cooperation can address these gaps when it is not based on one-way technology transfer but on co-creation, joint problem definition, shared learning, and mutual capacity building.

This paper draws on insights from the *Unlocking Growth in Africa* webinar series and the development of the *Nordic–Africa Business Guide*. It examines how Nordic and African actors can work together to co-create geospatial solutions that respond to local needs while contributing to global sustainability objectives. This paper shows that impactful partnerships combine Nordic strengths in open data, digital governance, and quality standards with African strengths in frugal innovation, rapid experimentation, and strong community engagement.

The paper concludes that geospatial co-creation is not only a technological agenda but also a social and institutional one because effective solutions require trust, skills development, appropriate business models, and supportive policy ecosystems.

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2. INTRODUCTION

Africa's urban, demographic, and economic transitions are progressing at a pace rarely observed elsewhere in the world. Cities often grow faster than they are mapped. New suburbs and informal settlements emerge without reliable spatial information on infrastructure, land tenure, or service accessibility. Climate change intensifies pressures through floods, droughts, and heat waves, amplifying the need for spatially explicit information to support adaptation and risk management**.**

At the same time, Africa has become an active arena of digital leapfrogging and innovation. Mobile technologies, digital payment platforms, and entrepreneurial ecosystems have enabled the rapid adoption of new solutions without necessarily following the same trajectory as European or North American countries. Geospatial technologies form a growing part of this innovation landscape.

The *Unlocking Growth in Africa* webinar series demonstrated clearly that the key challenge is not the absence of ideas or talent. Innovators are already using GIS, Earth Observation (EO), and location data in highly pragmatic ways. Rather, the question is how to:

- build equitable international partnerships.
- ensure long-term investment and maintenance
- integrate informal and formal knowledge
- strengthen innovation and entrepreneurial skills
- scale successful pilots

This paper argues that co-creation between Nordic and African partners provides one pathway to address these challenges. Nordic actors contribute for example with their practical experience in open data, cadastral systems, interoperability frameworks, standards, and digital public services. African actors bring deep contextual knowledge, community-embedded innovation practices, and agility in resource-constrained environments.

The objective of this paper is therefore twofold:

1. to describe Africa's geospatial innovation landscape and the challenges faced as learned in the webinar series *Unlocking Growth in Africa*, and how these challenges can be potential areas of mutual benefit for both African and Nordic actors.

2. to outline a service model that takes advantage of the European Digital Innovation Hub ecosystem and how Nordic–African partnerships can support co-creation of sustainable geospatial solutions.

3. AFRICA'S GEOSPATIAL INNOVATION LANDSCAPE

Practical applications of geospatial data by local actors are being seen on the continent through initiatives such as the Ramani Huria and Tanzania Resilience Academy, which demonstrate how universities, local authorities, and practitioners use open data, satellite imagery, and participatory mapping to support flood risk assessment and informal settlement mapping for urban resilience planning (Resilience Academy 2025.). These programmes have trained students and community members to produce high-resolution GIS and drone-based maps of drainage systems, buildings, and flood-prone areas, generating spatial datasets now used by municipal agencies for disaster preparedness and infrastructure planning (Ramani Huria, n,d.; World Bank, 2016, Msilanga et al 2021). Similarly, Geo YouthMappers at Makere University in Uganda have supported sanitation planning, public health monitoring, and service delivery in cities such as Kampala (Fawaz, 2023). These cases show that African innovators, institutions, and communities are not only generating geospatial data but actively interpreting and applying it to real-world decision-making, while creating work opportunities for young people.

However, scaling and institutional integration remain ongoing challenges. Evidence from Tanzania's innovation ecosystem shows that many data-driven solutions are faced with limited mechanisms for long-term institutional ownership, interoperability, and sustained financing (Mtambalike, 2024). Studies by national mapping authorities and international organizations highlight gaps in metadata, coordination mechanisms, and governance frameworks that constrain the routine use of geospatial data within urban planning departments and ministries. Skills development is advancing rapidly, yet organizational capacity and long-term investment models do not always keep pace with growing demand for data-driven planning (World Bank, 2020).

3.1 Nordic–African partnership as a learning process

While Nordic firms possess world-leading geospatial expertise and institutional stability, their internationalization is frequently constrained by institutional void anxiety (Kostova et al., 2020). This anxiety emanates from a perceived lack of familiar structures in African environments as compared to Nordic environments of high institutional trust, low corruption, and higher transparency.

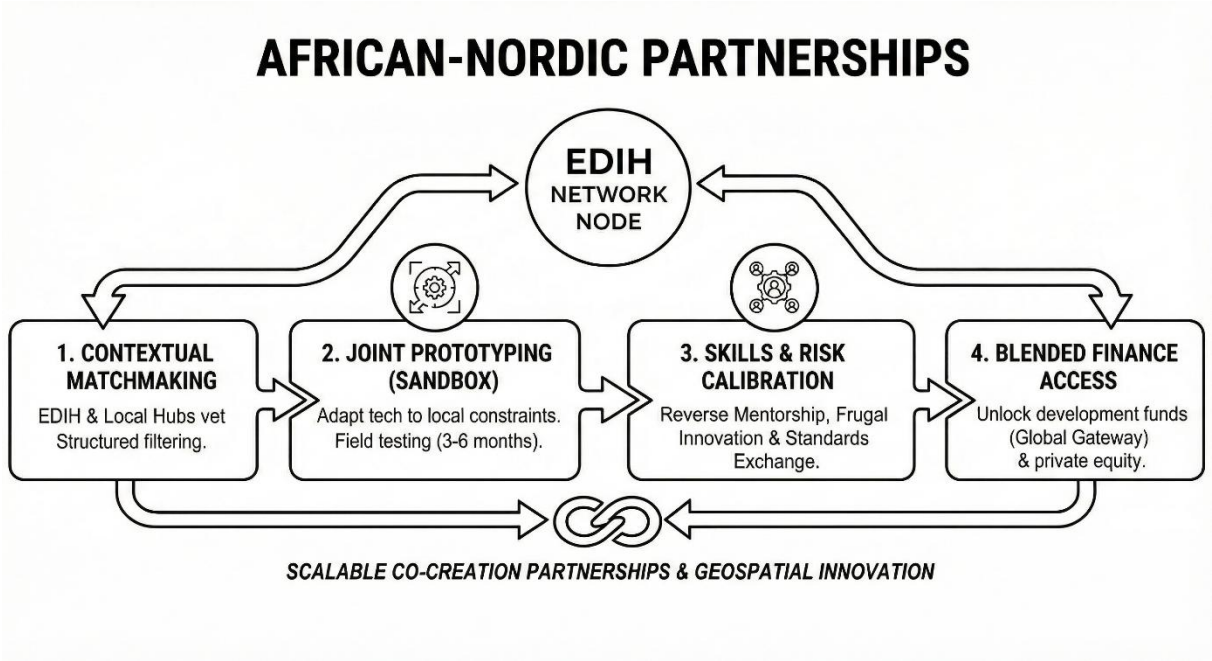
To this end, the organizers of the *Unlocking Growth in Africa* webinar series, Location Innovation Hub and University of Turku, possess established innovation ecosystems spanning government institutions, European Digital Innovation Hubs (EDIHs), private businesses,

research institutions, and more. These networks have an interest in the exportation of Nordic companies to serve African markets.

By positioning African partners as context-integrators and the EDIH network for mitigating perceived risk through its service catalog, the model de-risks entry by bridging the institutional distance between highly regulated Nordic environments and the dynamic African market landscape (Kostova et al., 2020). Crucially, this partnership allows Nordic companies to adopt principles of African frugal innovation, characterized by prioritizing core functionality and resourceful problem-solving (Leliveld, 2018), and Nordic expertise to co-create sustainable and impactful innovations.

The aim of this initiative is thus to use the existing service models that support Nordic businesses and extend them to exportation to African markets as shown in Figure 1. Using these models, access to funding, development support, and new markets can be achieved. This co-creation model as illustrated in Figure 1 serves as a vital strategic extension to current Nordic export initiatives, such as those led by the Location Innovation Hub and the broader EDIH network, by shifting the focus from traditional technology transfer to equitable, bilateral innovation. This shift is in line with the Nordic strategic pivot, a fundamental move away from traditional donor-recipient aid models toward equitable, interest-based partnerships that prioritize mutual economic growth, technological co-creation, and shared climate objectives (Bjarnesen, 2025). Using this model is a learning process that will continuously inform Nordic-African relations in the geospatial sector.

Figure 1: Nordic-African Co-creation Model



3.2 Role of co-creation in geospatial innovation

Co-creation refers to processes in which end users, local communities, public-sector organisations, researchers, and companies jointly design solutions (Matti & Rissola, 2022). In the geospatial domain, this means that communities are not only data sources but also analysts, interpreters, and decision-makers.

Co-creation is particularly relevant in Africa because:

- many planning challenges are directly linked to daily livelihoods
- local knowledge is critical to interpret geospatial data
- trust determines whether data is used or contested
- formal datasets are often incomplete or outdated.

These conditions create opportunities for Nordic–African co-creation, grounded in complementary strengths. African partners contribute contextual knowledge, community engagement practices, and applied innovation, while Nordic companies bring experience in open data policies, interoperability standards, quality assurance, and institutional scaling (European Commission, 2007). Through joint design of interoperable systems, capacity-building models, and sustainable business approaches, partnerships can extend the value of locally generated geospatial data and embed it more deeply into governance and market ecosystems. This approach supports inclusive growth while enabling Nordic companies to learn from adaptive innovation environments and co-develop solutions with global relevance. When geospatial innovation is co-created, it becomes practical and sustainable.

By leveraging these partnerships, the co-creation of location-based innovations directly promotes several Sustainable Development Goals (SDGs) such as:

- SDG 6 Clean Water and Sanitation: Leveraging on existing expertise and technology from Nordic flagship projects within the EDIH network, such as Digital Waters (Digital Waters, 2025), and partnering with community-based projects, co-creation partnerships can localize such expertise to solve major clean water problems faced in many African communities, as is happening in Tanzania.
- SDG 8 Decent Work and Economic Growth: By integrating the technical expertise of the Nordic EDIH network with the entrepreneurial agility of African frugal innovation hubs, this co-creation model drives higher economic productivity through technological upgrading, fostering decent work and scalable GIS business growth.
- SDG 9 Industry, Innovation and Infrastructure: By further promoting Nordic businesses' participation in Africa-EU Space projects and easing the exporting of services through instruments such as the *Nordic–Africa Business Guide* and requisite networks, more co-creation partnerships can be nurtured, promoting GDP growth, cross-sector innovation, and improved physical and digital infrastructure.

- SDG 11 Sustainable Cities and Communities: Building on projects like Tanzania Resilience Academy (Resilience Academy, 2025), co-creation partnerships with Nordic partners, like Open Gesospatial Consortium (OGC) and Location Innovation Academy, can localize expertise in GIS mapping to manage rapid urbanization and solve critical service gaps in informal settlements, thus promoting sustainable communities.
- SDG 13 Climate Action: Co-creation partnerships facilitate sustainable transfer of Nordic climate change expertise in advanced flooding prevention, forest digital twins, ecology data science that can be localized to solve major problems related to environmental resilience and drought monitoring in Africa.
- SDG 17 Partnerships for the Goals: Through the expansion of networks using established EDIH networks and ecosystems, co-creation partnerships can be created towards achieving the above-mentioned SDGs.

4. METHODOLOGY

The findings of this paper are grounded in a five-part webinar series titled *Unlocking Growth in Africa.* The series involved contributions from both African and Nordic speakers, including representatives of international organisations such as the European Space Agency and the World Bank. The webinar series brought together a diverse group of participants, including African start-ups, city authorities, Nordic small and medium-sized enterprises, and researchers. The sessions addressed a range of thematic areas such as smart cities, geospatial entrepreneurship, funding and investment, the African context, climate and environmental services, and digital public infrastructure.

All recordings and associated discussions were systematically reviewed and thematically coded, with particular attention to emerging use cases, key challenges, enabling factors, partnership models, and skills and capacity needs. Insights generated through this process were subsequently synthesised into the Nordic–Africa Business Guide (Nyamahowa et al, 2025), which translates the discussions into practical tools in the form of checklists, regulatory overviews, funding opportunities, and partnership strategies. Taken together, the approach applied in this study combines qualitative thematic analysis and secondary research with practitioner-oriented synthesis.

5. RESULTS

The Nordic–Africa Business Guide represents a key output of the work undertaken, translating the insights gained from the webinar series into practical tools for companies. The guide emphasises that successful entry into African markets requires an appreciation of the continent's national diversity, across 54 countries with differing historical, economic, and

political contexts, as well as an understanding of local institutional ecosystems, legal and regulatory environments, and the crucial role played by trust and long-term presence.

The guide does not remain at the level of abstract recommendations but provides concrete examples of where collaboration is already taking place. It points to well-established innovation hubs, including iHub (Kenya) and CcHUB (Nigeria), as key actors supporting joint experimentation, prototyping, and verification of new services. These hubs bring together start-ups, municipal authorities, and investors, thereby creating environments where geospatial applications related to mobility, urban planning, or service delivery can be tested in real contexts.

The guide also identifies several key principles that should underpin Nordic engagement. It stresses that partnership with local stakeholders is essential, and that co-creation is generally more effective than simple technology transfer. Furthermore, it argues that sustainability and quality constitute important Nordic competitive strengths, that business models need to be aligned with locally identified needs, and that robust risk management and ethical data governance are indispensable components of responsible market entry.

In relation to sectoral opportunities, the guide outlines several domains where geospatial solutions are particularly relevant. These include smart city and urban services, land administration and cadastre modernisation, climate and environmental monitoring, agri-tech and food security applications, as well as logistics and mobility analytics. These opportunity areas correspond closely with the United Nations Sustainable Development Goals and with national development agendas across many African countries.

In relation to technology opportunities, the guide explicitly identifies geospatial and earth observation services as one of the cross-cutting growth areas. Examples mentioned include the use of satellite data for land-cover mapping, drought monitoring and cadastral modernisation, as well as analytics that support smart urban services, and agricultural decision-making. These examples demonstrate that geospatial information is not a niche technology sector but an enabling infrastructure that supports wider digital economies.

The guide also illustrates the importance of capacity building through visual and textual references, including activities of the Tanzania Resilience Academy, where students and practitioners are shown collecting field data using geospatial tools. This case exemplifies how training, education, and hands-on data collection are already strengthening local skills and institutions, forming the basis for longer-term innovation and entrepreneurial ecosystems.

Finally, the guide discusses the funding and enabling frameworks that can support Nordic–African cooperation. It maps mechanisms such as the EU's Global Gateway initiatives, Africa–EU space cooperation programmes, multilateral development banks, and Nordic development

finance institutions. These instruments have the potential to reduce risks associated with pilot deployments and to provide pathways for scaling successful solutions.
Rather than prescribing solutions, it offers tools for navigating cultural and legal frameworks, understanding regional and national regulatory environments, and identifying emerging technology opportunities. For instance, it highlights geospatial applications in smart urban services, such as GIS-supported planning and early warning systems, as well as climate-focused use cases that build on existing data infrastructures.

Furthermore, the Nordic–Africa Business Guide maps specific mechanisms that can support the scaling of geospatial solutions. It discusses programmes such as the Africa–EU Space Partnership, funding instruments of multilateral development banks, and investments from Nordic development finance institutions, including Finnfund, Swedfund and Norfund. These examples illustrate how co-created geospatial solutions can move from pilot projects to sustained operations when appropriate financing and partnership structures are available.

By grounding business expansion in local collaboration and realistic use cases, the guide reinforces the principle that sustainable geospatial innovation depends on mutual learning and shared ownership.

6. CONCLUSIONS

The webinar series demonstrated that Africa's geospatial innovation landscape is already active, skilled, and deeply connected to everyday challenges. The opportunity ahead lies in strengthening collaboration between African and Nordic actors to bridge talent, markets, and innovation ecosystems.

Through co-creation, capacity building, and responsible use of geospatial data, partnerships can generate solutions that serve local needs while contributing to global sustainability objectives. This approach moves beyond donor-recipient narratives, positioning geospatial innovation as a shared endeavour shaped by diverse experiences and common goals.

The main opportunities for the future lie in strengthening the foundations that enable geospatial innovation to grow and scale sustainably. This involves building local capacity through training and education so that skills are rooted in local institutions and communities rather than relying on external expertise. It also requires the development of shared standards and interoperability, enabling data and systems to work together across organisations, sectors, and national borders. In addition, future progress will depend on reinforcing public–private partnerships that combine policy mandates, research expertise, and entrepreneurial implementation capacity. Equally important is the need to ensure ethical and inclusive data governance so that geospatial solutions

respect privacy, promote equity, and serve the interests of the communities they are intended to benefit.

Looking ahead, the future opportunity lies in using these ecosystems and programmes more systematically. Innovation hubs such as iHub and CcHUB illustrate how local capacity can be expanded through training and entrepreneurship support. Initiatives like the Tanzania Resilience Academy show how education and practical fieldwork can build geospatial competence among the next generation of professionals. At the same time, European and African partnership frameworks, including the Africa–EU Space Partnership and Nordic development finance institutions, provide concrete avenues to develop interoperable systems, strengthen public–private partnerships, and promote ethical and inclusive data governance.

Geospatial solutions co-created between Nordic and African partners can significantly contribute to climate resilience, inclusive urban development, and sustainable growth, provided they are grounded in trust, respect, and long-term commitment.

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BIOGRAPHICAL NOTES

Nanji Nanshall Yahaya is an applied researcher at the Location Innovation Hub, Finland, focusing on the business, policy, and partnership dimensions of geospatial innovation. She contributed to the research underpinning this FIG paper and to the development of the Nordic–Africa Business Guide, supporting collaboration between Nordic and African actors. She brings a background in banking and business management to research on market access, collaboration models, and the translation of geospatial technologies into sustainable economic and social impact.

Dr. Antti Jakobsson works at the National Land Survey of Finland and coordinates the Location Innovation Hub (LIH). His doctoral thesis 2026 was titled “On the Future of Topographic Base Information management in Finland and Europe”. During 2008-2012 he was the Programme Manager at EuroGeographics. He has been working with development of national mapping, quality management and data quality issues. He has participated in the development of standardization of geoinformation both in ISO and CEN. During 2013-2016 he has been the technical coordinator for the European Location Framework project which is providing access to authoritative data from European National Mapping and Cadastral Agencies. At NLS he led the renewal programme of the National Topographic Database. His current focus is on the development and uptake of geospatial, AI and digital twin solutions. He has extensive experience in European research and innovation collaboration, particularly within the Digital Europe Programme and Horizon Europe, where he has contributed to initiatives on geospatial data infrastructures, AI, data spaces and smart rural and urban development. His work concentrates on building partnerships between public authorities, research organisations and industry, and on promoting the practical use of geospatial data in society and business. He has

a special interest in co-creation approaches, capacity building and the role of geospatial information in supporting sustainable digital transformation in Europe.

Frank Nyamahowa works at the National Land Survey of Finland and is expert in African entrepreneurship ecosystems. He is currently the Project manager for a data economy driven project called DATASTEP. He also works in the Location Innovation Hub (LIH) as customer management, helping with the service design and journey management of LIH customers. Prior to moving to Finland, Frank was an entrepreneur in the construction industry in Zimbabwe. He has a keen interest in complex and adaptive systems and uses such knowledge in his work.

Niina Käyhkö is a professor of geography at the University of Turku. She is a geospatial data and digital innovations expert with scientific and hands-on experience in co-creation of transformative land use and landscape sustainability solutions, tackling systemic nature-human challenges and climate change impacts in the urban, rural and coastal environments. Since January 2018, she has been a Professor in Applied Digital Geospatial Research at the Department of Geography and Geology. She has been leading approximately 30 research, education, development cooperation and consultancy projects since 2005 at the University of Turku.

Antero Järvi is a researcher and lecturer at the University of Turku, Faculty of Technology, specializing in software engineering. His work focuses on innovation, digital business development, and entrepreneurship. Beyond academia, he has been actively involved in startup ecosystems and in several startups in different roles. He has ten years of experience working in Tanzania, where he has contributed to multiple projects in innovation, entrepreneurship, technology transfer, and higher education development, particularly in geospatial and data-driven technology contexts.

Tytti Tengström works at the University of Turku as a Project Researcher in the Location Innovation Hub (LIH) project. She's been planning and organizing the webinar series and contributed to the guide. Tytti has worked in the higher education development sector in the Tanzanian context in close collaboration with Niina and Antero for several years. She's also a fresh graduate of Master of Science in Economic Geography from Turku School of Economics.

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