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D5.1 Preliminary requirements for the design study

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Executive summary

This document — Preliminary Requirements for the Design Study — is a foundational output of the DIGITAfrica project, aimed at establishing the requirements needed to design a federated, sustainable, and inclusive digital African research infrastructure, with a strong European assistance.

It presents the preliminary needs, including initial results based on stakeholder needs, gap analysis of existing capacities, and insights from relevant European and African research infrastructure initiatives

The document draws on three main sources of input: stakeholder consultations and workshops conducted across African and European research communities, an analysis of existing research infrastructures and their capabilities, and a review of relevant policy and strategic frameworks at national, regional, and continental levels.

Building on this evidence, the deliverable identifies key research priorities and maps current capacities and gaps across the African research ecosystem. Four initial directions for pilot actions emerge: federated infrastructure and blueprints, governance and sustainable funding models, impact-driven co-design and open science, and layered capacity building and skills development.

A structured stakeholder engagement roadmap — spanning mapping, bilateral discussions, collaboration structuring, and activation — underpins the identification of infrastructure, operational, and community needs. Mechanisms for building a sustainable community of practice, including governance, knowledge sharing, and participation incentives, are also addressed.

The target research infrastructure is described in terms of its vision, expected services and core capabilities, and the diverse African user communities it will serve. The central contribution of the deliverable, sets out preliminary requirements across six dimensions: functional, technical, organisational and governance, training and capacity building, legal and ethical, and inclusiveness and gender considerations.

The document further contextualizes these requirements within Africa's current digital research landscape and sustainability challenges, and explores the funding landscape, cost considerations, and initial business model perspectives to support long-term viability.

The deliverable concludes with a roadmap articulating the key milestones, next steps, and risk dependencies for the transition into the full Design Study phase.

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Abbreviations

ACQF	African Continental Qualifications Framework
AI	Artificial Intelligence
AOSP	African Open Science Platform
ASREN	Arab States Research and Education Network
AU	African Union
DoA	Description of Action
DTSA	Digital Transformation Strategy for Africa
EOSC	European Open Science Cloud
ESFRI	European Strategy Forum on Research Infrastructures
FAIR	Findable, Accessible, Interoperable, and Reusable
GEDI	Gender Equality, Diversity, and Inclusion
HPC	High-Performance Computing
IoT	Internet of Things
IXPs	Internet Exchange Points
MoU	Memorandum of Understanding
National Research and Education Networks	NRENs
PPPs	Public–Private Partnerships
RBAC	Role-Based Access Control
RENs	Research and Education Networks
RI	DIGITAfrica Research Infrastructure
RIaaS	Research Infrastructure-as-a-Service
SNS JU	Services Joint Undertaking
STI	Science, Technology and Innovation
STISA	Science, Technology and Innovation Strategy for Africa

WACREN	West and Central African Research and Education Network

1 Introduction

1.1 Objective of the Deliverable

The objective of this deliverable is to identify and document the preliminary requirements that will guide the design study of the future DIGITAfrica Research Infrastructure (RI). Building on the initial needs assessment conducted within the project, stakeholder consultations, the analysis of existing research infrastructure initiatives, and the work carried out during the first 18 months of the project, the deliverable provides an initial framework for defining the technical, organisational, governance, training, and sustainability dimensions of the proposed infrastructure.

The document aims to establish a common understanding among project partners and stakeholders regarding the challenges, opportunities, and expectations associated with the development of a pan-African digital research infrastructure for Digital Sciences. It consolidates early findings from project activities and contributes to the progressive definition of the infrastructure vision, services, and operational model.

More specifically, the deliverable seeks to:

- Identify and mobilize the relevant African academic community;
- Identify the main research and innovation priorities that the future infrastructure should support;
- Analyse existing capacities, gaps, and needs across participating countries and institutions;
- Capture stakeholder expectations regarding infrastructure services, training activities, governance mechanisms, and sustainability conditions;
- Define a first set of preliminary requirements to be further refined during the design study phase;
- Support the preparation of the DIGITAfrica blueprint and subsequent infrastructure development activities.

As an intermediate step within the project lifecycle, this deliverable does not provide a final design. Instead, it establishes the foundations for the design study by bringing together evidence collected from consultations, surveys, capacity assessments, policy analyses, and exchanges with relevant African and European research infrastructure initiatives. The findings presented here will serve as a reference for subsequent technical, organisational, and sustainability planning activities undertaken throughout the project.

1.2 Document Structure

The remainder of this document is organised as follows.

Section 2 presents the emerging common research agenda, including the identification of research priorities, existing capacities and gaps, and initial directions for pilot actions.

Section 3 focuses on the stakeholder ecosystem, summarising the main stakeholder groups involved in DIGITAfrica, their needs and expectations, and the community-building activities supporting the future infrastructure.

Section 4 provides an overview of the target DIGITAfrica Research Infrastructure, including its vision, objectives, expected services, and target user communities.

Section 5 introduces the preliminary requirements identified for the design study, covering functional, technical, organisational, governance, training, legal, ethical, and inclusiveness aspects.

Section 6 discusses the broader context of digital research infrastructures in Africa and highlights key sustainability challenges and opportunities for EU–Africa collaboration

Section 7 presents initial considerations related to funding, sustainability, and business model perspectives.

Finally, Section 8 outlines the roadmap towards the next stages of the design study, while Section 9 concludes the document and summarises the main findings.

1.3 Scope and Methodology

The scope of this deliverable covers the identification of preliminary requirements for the DIGITAfrica design study, including functional, technical, organisational, governance, training, legal, ethical, and inclusiveness dimensions. It builds on the consolidation of stakeholder needs, existing capacities, and lessons learned from relevant European and African research infrastructure initiatives. The objective is to ensure that the future DIGITAfrica Research Infrastructure reflects real African needs and operational constraints while supporting a scalable, interoperable, and sustainable pan-African digital ecosystem.

The methodology adopted for this deliverable is based on a co-construction approach, in line with the broader DIGITAfrica strategy. This approach ensures that the design process is not top-down, but instead grounded in continuous interaction with stakeholders, iterative validation, and progressive refinement of requirements.

The design process follows a structured three-step methodology, combining scientific expertise, network effects, and stakeholder engagement:

The first step consists of the identification and onboarding if the relevant African community. We will aim at both identifying specific needs and sharing experience and consolidating existing knowledge from European research infrastructures (notably SoBigData and SLICES) and African partner institutions. This phase relies on stakeholder consultations,

workshops, surveys, bilateral exchanges, and existing project outputs. The objective is to identify initial needs, constraints, and use cases across participating countries, while capturing the diversity of institutional and infrastructural contexts.

The second step focuses on the structuring and consolidation of collected inputs. Requirements are analysed across multiple dimensions (functional, technical, governance, training, legal, and inclusiveness) and cross-validated through iterative feedback loops with stakeholders. This phase ensures coherence between local constraints and the overarching design of a federated, multi-site research infrastructure. It also enables the identification of common building blocks that can be shared across sites while allowing local adaptation.

The final step aims at transforming consolidated requirements into actionable design principles and implementation-oriented guidelines. This includes validating proposed directions with stakeholders, refining use cases, and aligning them with sustainability and governance considerations. The process leverages the network of African and European partners to ensure scalability and replication potential, while also strengthening community ownership and long-term engagement.

Across all three steps, the methodology is guided by several cross-cutting principles:

- Iterative feedback loops, ensuring continuous refinement of requirements through regular stakeholder interaction;
- Network-based structuring, leveraging the distributed expertise of African and European partner institutions;
- Inclusiveness and representativeness, ensuring participation from diverse regions, institutions, and stakeholder groups;
- Evidence-based analysis, grounded in surveys, consultations, and existing research infrastructure frameworks;
- Progressive convergence, moving from fragmented inputs towards a shared and coherent infrastructure vision.

Overall, this co-construction methodology ensures that the DIGITAfrica design study is rooted in real-world needs while remaining aligned with international best practices and the strategic objectives of African digital transformation.

1.4 Sources of Input and Consultation Process

The design of this deliverable is based on a combination of stakeholder engagement activities, internal project outputs, and external policy and research frameworks. The objective is to ensure that the proposed research infrastructure design reflects both practical needs identified in the African context.

1.4.1 Stakeholder consultations and workshops

This deliverable builds on multiple sources of input generated through co-construction activities carried out throughout the project, combining consultation activities, workshops, bilateral exchanges, surveys, training activities, and continuous interactions with stakeholders across Africa and Europe. This multi-channel approach relies on iterative feedback and continuous engagement to shape the design of a sustainable digital research infrastructure.

Stakeholder engagement activities include consultation workshops, thematic discussions, bilateral meetings, surveys, webinars, training events, and interactions conducted through dissemination and community-building activities. These activities involve universities, research centres, national agencies, research infrastructures, regional organisations, policy actors, and industry stakeholders.

Within the project framework, engagement activities are supported through a combination of consultation workshops and dedicated community activities. The project foresees the organisation of three consultation workshops distributed across its lifetime, complemented by summer and winter schools, High-Level Policy Forum[1] activities, webinars, blueprint-related activities, and dissemination events to support community building and validation processes.

These interactions have served several complementary purposes:

- Validating the transformative effect of an African research infrastructure in Digital Sciences.
- Confirming initial assumptions regarding infrastructure requirements and sustainability conditions;
- Identifying priority use cases in domains such as AI, digital infrastructures, data science, and connectivity;
- Collecting technical, organisational, and policy-related requirements for the design study and blueprint activities;
- Supporting co-design processes with future e users and stakeholders;
- Strengthening community building and long-term engagement around the future ecosystem.

[1] High-Level Policy Forum: An online structured engagement platform that brings together senior policy makers, institutional representatives, and key stakeholders to discuss strategic priorities, ensure policy alignment, and support coordinated decision-making around a shared initiative.

This iterative consultation process follows a co-construction approach where stakeholder feedback continuously informs both technical development and sustainability planning. For more information regarding the stakeholder consultations please refer to section 3.

1.4.2 Analysis of existing Research Infrastructures

The design study of DIGITAfrica builds upon the analysis of existing European and international initiatives that provide valuable experience regarding governance models, service provision, interoperability mechanisms, sustainability approaches, and community-building practices. Rather than replicating existing infrastructures, the objective is to identify reusable components, and operational practices that can be adapted to African requirements and deployment contexts.

A first and particularly important source of inspiration is represented by the ESFRI landscape, and especially by the digital research infrastructures participating in the project consortium. DIGITAfrica leverages the experience accumulated within the SoBigData RI and the SLICES RI. SoBigData provides a mature model for the provision of data-intensive research services, including federated access to datasets, data analytics environments, reproducible research methodologies, training programmes, and community-building mechanisms. The infrastructure also offers valuable experience regarding governance arrangements, access policies, user support services, and the integration of Open Science principles into operational practices. SLICES contributes expertise in the design and operation of large-scale distributed digital infrastructures supporting experimentation on networking, edge computing, cloud systems, Internet-of-Things environments, and future communication technologies. Of relevance are SLICES' approaches to resource federation, infrastructure programmability, remote experimentation, authentication and authorisation infrastructures, and the management of geographically distributed facilities. These capabilities provide important reference models for the development of shared digital infrastructure services capable of operating across multiple countries and institutions.

A second family of reference initiatives consists of the Pilot and Testbed projects funded under the Smart Networks and Services Joint Undertaking (SNS JU). Projects such as 6G-SANDBOX, 6G-XCEL or 6G-SUNRISE have developed advanced experimentation platforms designed to support the validation and testing of next-generation communication technologies and digital services. These initiatives demonstrate practical approaches for federating heterogeneous infrastructures, orchestrating distributed resources, enabling experimentation-as-a-service, and supporting multi-domain testing environments. Their experience is particularly relevant for DIGITAfrica because it illustrates how geographically distributed infrastructures can be integrated into coherent experimentation ecosystems while maintaining local ownership and operational autonomy. However, there are not sustainable as SLICES or SoBigData are.

A third source of input derives from European initiatives supporting cloud, data, artificial intelligence, and high-performance computing ecosystems. Infrastructures and service federations such as EGI provide valuable experience regarding federated cloud services, distributed computing environments, identity and access management, resource sharing mechanisms, and operational support structures. Lately AI factories have also emerged with

the objective to leverage the supercomputing capacity of the EuroHPC Joint Undertaking to develop trustworthy cutting-edge generative AI models. Another structuring initiative is the European Open Science Cloud (EOSC). It should provide an open and trusted multi-disciplinary environment where researchers can publish, find and reuse data, tools and services for research and innovation through common access frameworks and interoperability standards.

1.4.3 Relevant policy and strategic frameworks

The activities described in this deliverable are aligned with a set of African, European, and international policy frameworks that shape the development of digital infrastructures, research ecosystems, skills development, and international cooperation. These frameworks provide guidance not only for infrastructure deployment, but also for governance, interoperability, sustainability, inclusiveness, and capacity building.

At the continental level, the work aligns with the African Union Digital Transformation Strategy for Africa (AU, 2020), which identifies digital infrastructures, digital skills, research and innovation capacity, and regional integration as key components for Africa's socio-economic development. In particular, the strategy highlights the importance of strengthening digital ecosystems, expanding connectivity, and increasing African ownership of digital technologies and infrastructures. The proposed research infrastructure approach contributes directly to these objectives by exploring mechanisms for shared digital capacity and cross-border collaboration. In this regard, AU's initiatives, strategies, frameworks, and regulations are presented in Figure 1.

The work is also aligned with the Science, Technology and Innovation Strategy for Africa (STISA-2024 and STISA 2034[2]), which identifies research infrastructure development, scientific cooperation, and innovation ecosystems as central elements for strengthening African research capacity and competitiveness. The design study contributes to these objectives by exploring sustainable models for shared infrastructure development and coordinated research ecosystems across countries.

The broader policy landscape for digital transformation in Africa further reinforces these objectives. The Smart Africa Initiative, launched in 2014 and endorsed by African Union Member States, established an early continental framework for expanding connectivity, digital services, and digital innovation ecosystems through multi-stakeholder collaboration. More recently, the African Digital Compact (2024) has emerged as a complementary implementation-oriented framework designed to accelerate digital transformation efforts and provide stronger coordination mechanisms across countries and sectors.

Several additional continental frameworks are particularly relevant for the design of sustainable and interoperable research infrastructures. The African Union Data Policy Framework (2022) promotes interoperable data ecosystems, cross-border data flows, and stronger national data governance mechanisms, while the African Union Interoperability

[2] https://au.int/en/documents/20250718/science-technology-and-innovation-strategy-africa-stisa-2034

Framework for Digital ID (2022) provides guidelines for harmonised digital identity systems across Member States. Together, these frameworks reinforce the importance of interoperability, trusted digital services, and cross-border collaboration.

From a regulatory perspective, the African Union Convention on Cyber Security and Personal Data Protection (Malabo Convention, 2023) establishes common principles for cybersecurity, privacy, and data protection, all of which are important considerations for digital research infrastructures operating across jurisdictions. Similarly, the emerging AfCFTA Protocol on Digital Trade (2024) aims to create more harmonised digital markets and regulatory environments across Africa, creating opportunities for greater interoperability and service integration.

Given the growing importance of artificial intelligence across research and innovation ecosystems, the work also considers the principles outlined in the Continental Artificial Intelligence Strategy (2024), which promotes an Africa-centric, development-oriented, and responsible approach to AI adoption. These principles are particularly relevant for ensuring that future infrastructure development supports trustworthy, inclusive, and sustainable AI ecosystems.

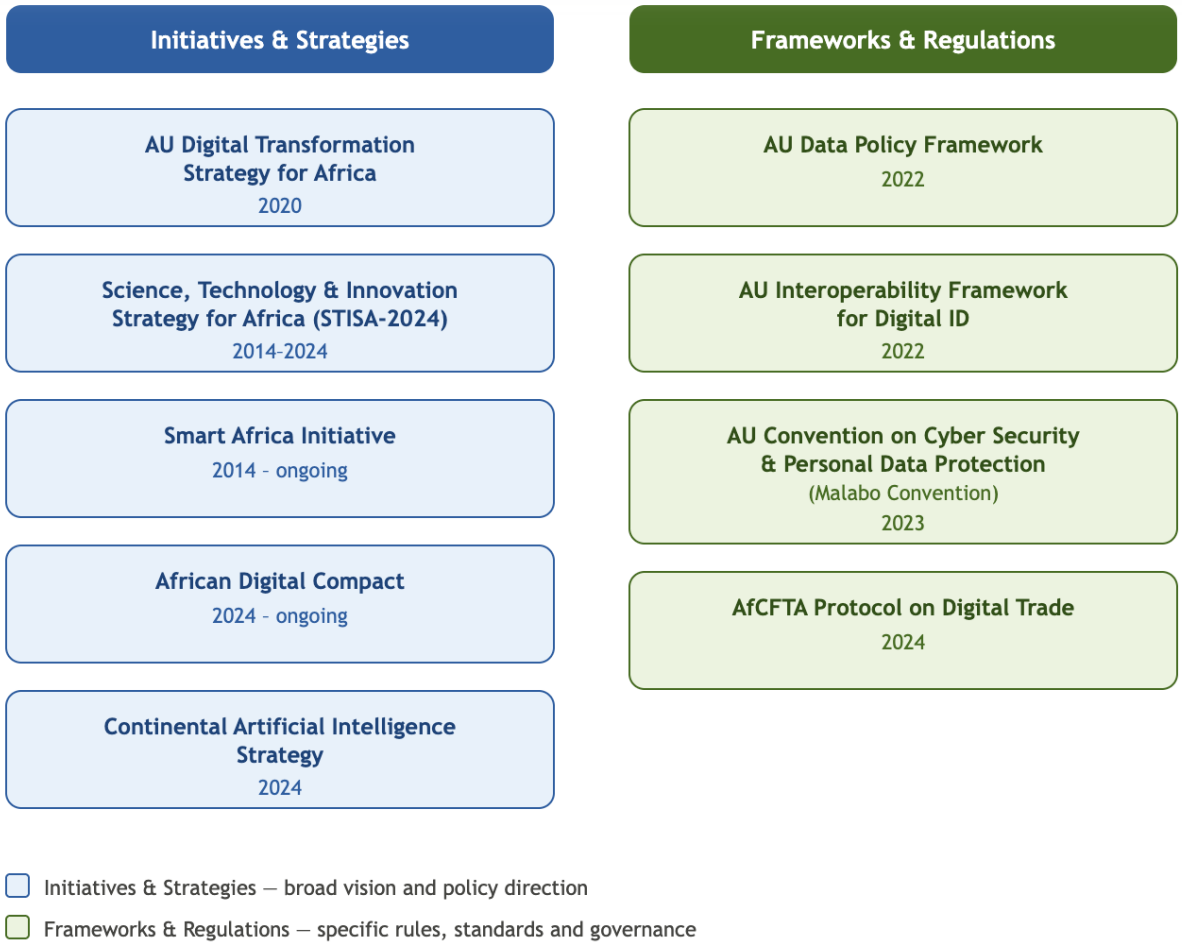

Figure 1: AU Digital Policies (Author's own illustration)

From a skills and education perspective, several studies have been referenced in D4.2: Competence Framework and Modular Curricula for General and Targeted Training on Digital Technologies, such as:

- UNESCO (2022), Towards a Common Definition and Shared Principles for Micro-credentials: This document provides a globally recognised reference framework for defining micro-credentials, including principles of quality assurance, transparency, and portability. It is particularly relevant for ensuring that the DIGITAfrica competency framework aligns with emerging international standards for credential design and recognition;
- UNESCO-IESALC (2025), Micro-credentials and their impact on higher education in Latin America and the Caribbean: This study analyses the role of micro-credentials in transforming higher education systems, with a focus on flexibility, lifelong learning, and institutional adoption. Although the evidence base is rooted in Latin America and the Caribbean, several findings (particularly on institutional uptake and skills recognition) are considered transferable to the African context with appropriate adaptation;
- African Continental Qualifications Framework[3] (ACQF): The ACQF provides a continental reference framework aimed at improving comparability, transparency, and recognition of qualifications across African countries. It is particularly relevant for supporting the portability and interoperability of micro-credentials within regional education and skills ecosystems, which is a key consideration for long-term sustainability.

These frameworks are particularly relevant for supporting interoperable training pathways, recognition mechanisms, portability of credentials, and sustainable capacity-building approaches.

The design study is further informed by Open Science principles and research data management practices, including FAIR principles, reproducibility, interoperability, and responsible data governance approaches. Open-source solutions and reusable infrastructure components are considered important to enabling mechanisms to reduce technological dependencies and facilitate local innovation ecosystems. This is reflected in the emphasis on commodity infrastructure, reusable services, and open-source software approaches adopted throughout the project.

At the European cooperation level, the work builds upon broader EU–Africa research and innovation cooperation priorities, particularly efforts aimed at strengthening research infrastructures, increasing scientific collaboration, and supporting digital capacity development across both continents. Lessons and practices are considered from:

[3] https://acqf.africa/

- SoBigData Research Infrastructure, particularly regarding large-scale data services and community building;
- SLICES Research Infrastructure, particularly for distributed infrastructures, programmable networks, and edge-cloud experimentation;
- GreenDIGIT, particularly regarding environmental sustainability considerations for digital infrastructures.

These reference initiatives provide practical inputs for technical design choices, sustainability mechanisms, and operational models while reducing implementation risks and avoiding duplication of effort.

Cross-cutting principles also influence the design process, including:

- Inclusiveness and participation of women and early-career researchers;
- Responsible and trustworthy AI principles;
- Multi-stakeholder participation involving academia, policy actors, research infrastructures, industry, and civil society.

Taken together, these policy and strategic frameworks provide the foundation for the design study, helping ensure that technical decisions, governance models, training activities, and sustainability mechanisms remain aligned with broader African priorities and international best practices while supporting long-term cooperation between African and European research ecosystems.

1.5 Role of the Deliverable within DIGITAfrica

This deliverable represents an intermediate step in the DIGITAfrica roadmap. At month 18, the project has already generated an initial understanding of stakeholder needs, existing capacities, training requirements, and potential infrastructure use cases through consultations, surveys, workshops, and internal project activities.

The role of D5.1 is to consolidate these first findings into a coherent set of preliminary requirements that can guide the next phases of the design study. It provides an initial picture of the future DIGITAfrica Research Infrastructure, identifying key priorities, constraints, and opportunities while highlighting areas that require further investigation.

As such, this deliverable should be considered as a baseline reference rather than a final specification. The requirements and directions presented here will be progressively refined through additional consultations, technical analyses, pilot activities, and validation processes during the remaining project period. These future activities will contribute to the development of a more mature and comprehensive infrastructure vision to be achieved by the end of the project.

2 Towards a Common Research Agenda

Under the strategic framework of the African Union's Science, Technology and Innovation Strategy for Africa (STISA), member states have progressively aligned their national research agendas with the vision of Agenda 2063: "The Africa We Want". This collective effort reflects a decisive shift from resource-based development models toward innovation-driven and knowledge-based economies. Rather than focusing solely on theoretical research, the emerging common research agenda across African countries is strongly oriented toward applied research, problem solving, and sustainable development. It aims to address critical societal challenges while strengthening technological capabilities and digital sovereignty in strategic sectors.

From the outset, detailed internal assessments enabled the DIGITAfrica African partners to identify baseline requirements (D1.1 and Task 2.1) that reflect the operational realities, digital constraints, and development priorities of their respective regions. Building on these findings, DIGITAfrica seeks to align local needs with the broader strategic objectives defined at the continental level. By leveraging these localized baselines, the project aims to lay the foundations for a shared digital research infrastructure ecosystem that can be used by African countries and connected to the wider international research community.

The envisioned infrastructure is designed to democratize access to advanced digital resources, enabling researchers, innovators, and institutions to benefit from computing capabilities, high-performance infrastructures, shared platforms, and common services required to support research, experimentation, and innovation activities.

2.1 Identification of Research Priorities

By bringing together the strategic priorities of the Science, Technology and Innovation Strategy for Africa (STISA), and the objectives of the Digital Transformation Strategy for Africa (DTSA 2020–2030), a coherent framework for research and innovation is emerging across the continent. Within this framework, particular emphasis is placed on addressing major societal challenges through the effective use of digital technologies and secure digital infrastructures.

Priority areas include food security and precision agriculture, sustainable management of water, energy and environmental resources, biosecurity and pharmaceutical sovereignty, as well as the development of a unified African Digital Single Market. Achieving these objectives increasingly relies on digital capabilities such as Artificial Intelligence (AI), Data Science, cloud computing, cybersecurity, Internet of Things (IoT) infrastructures, data-driven decision systems, and trusted digital platforms that support regional cooperation and economic integration.

At the same time, consultations conducted within DIGITAfrica highlight the need to strengthen Africa's digital sovereignty through the development of resilient digital infrastructures, secure cloud environments, trusted digital services, and robust cybersecurity frameworks. While research communities across the continent demonstrate strong expertise in areas such as AI, data science, and digital technologies, their ability to

scale research and innovation activities is often constrained by fragmented infrastructures, limited access to advanced computing resources, connectivity challenges, and skills shortages. A federated infrastructure approach can help mitigate these limitations by promoting resource sharing, interoperability, and collaboration across institutions and countries.

Guided by the needs identified in Deliverable D1.1 and the DIGITAfrica consultation process, the project focuses on a set of strategic technological domains, including AI and machine learning infrastructures, data-intensive science, advanced networking technologies, edge-cloud computing platforms, and interoperable digital research services. These capabilities are intended to support priority application domains such as digital health and telemedicine, precision agriculture and IoT-based sensing, resilient digital education, sustainable management of water and energy resources, and data-driven public services. Together, these priorities provide the foundation for a future pan-African digital research infrastructure capable of supporting scientific excellence, innovation, digital sovereignty, and sustainable socio-economic development.

2.2 Mapping of Capacities and Gaps

Deliverable D1.1 provides a baseline assessment of the digital Research Infrastructure (RI) landscape across five core partner countries: Tunisia, Senegal, South Africa, Kenya, and Cameroon. It reveals a striking contrast between highly dynamic research communities and the significant material and infrastructural limitations that constrain their ability to fully realize their scientific and innovation potential.

Core Capacities include:

The assessment identifies several important strengths that can serve as foundations for the future DIGITAfrica ecosystem:

- **Theoretical and Academic Expertise:** Strong research capabilities exist across all partner countries in emerging digital technologies, particularly Artificial Intelligence (AI), Data Science, Internet of Things (IoT), and High-Performance Computing (HPC);
- **Strategic and Policy Alignment:** National research and innovation agendas are broadly aligned with major continental frameworks, including the African Union's Agenda 2063, the Digital Transformation Strategy for Africa (2020–2030), and STISA, creating a favorable environment for regional cooperation and infrastructure development;
- **Established Research and Education Networks:** National Research and Education Networks (NRENs) are operational in each partner country, providing an important foundation for connecting universities, research institutions, and future digital research infrastructure services.

Structural Gaps include:

Despite these strengths, several structural challenges continue to constrain the growth and sustainability of digital research infrastructures across the region:

- **Critical Infrastructure Deficits:** Access to advanced computing resources remains limited, including high-performance computing facilities, GPU-based platforms required for AI training and experimentation, and open testbeds for research and innovation;
- **Power and Connectivity Constraints:** High connectivity costs, limited bandwidth availability outside major urban centers, and recurring power supply disruptions continue to affect the reliability, accessibility, and operational continuity of digital infrastructures;
- **Human Capital and Talent Retention:** The shortage of highly specialized technical personnel remains a major challenge, exacerbated by the migration of skilled professionals toward international markets and private-sector opportunities;
- **Financial Sustainability Challenges:** Research infrastructures often depend heavily on short-term international project funding, while national public investment remains limited and private-sector participation is generally insufficient to ensure long-term sustainability.

2.3 Initial Directions for Pilot Actions

To support the transition from a fragmented landscape of national initiatives to a federated pan-African digital research infrastructure ecosystem, four initial directions for pilot actions are proposed based on the findings and recommendations of Deliverable D1.1.

2.3.1 Federated Infrastructure and Blueprints

A first direction focuses on the deployment and validation of a distributed, modular infrastructure architecture inspired by successful European Research Infrastructures such as SLICES and SoBigData, while adapting it to African realities and priorities. The approach will promote interoperability through standardized interfaces, lightweight deployment models, and reusable technical blueprints that facilitate adoption across countries and institutions. Emphasis will be placed on progressive deployment models that can operate under different levels of connectivity, infrastructure maturity, and resource availability. It goes beyond a coordination and support action by empowering the existing community by a common tailored playground that can be used, amplified and replicated as DIGITAfrica will grow.

2.3.2 Governance and Sustainable Funding Models

Establish transparent and inclusive governance frameworks adapted to African institutional and regulatory contexts. Attention will be given to long-term sustainability through a combination of national investments, public–private partnerships, international funding mechanisms, and other complementary revenue models capable of supporting the operation and evolution of the infrastructure.

2.3.3 Impact-Driven Co-Design and Open Science

Promote the development of real-world experimental testbeds addressing priority societal challenges in areas such as health, agriculture, climate resilience, and digital transformation. These pilot initiatives will be co-designed with researchers, universities, public institutions, industry stakeholders, and local communities through a participatory approach. They will also adhere to FAIR principles and internationally recognized Open Science practices.

2.3.4 Layered Capacity Building and Skills developments

A third direction focuses on strengthening human capital through modular training and capacity-building programmes tailored to the needs of different stakeholder groups, including early-career researchers, infrastructure operators, engineers, technical staff, and policymakers. The objective is to develop the skills required to deploy, operate, sustain, and effectively use advanced digital research infrastructures promoted by DIGITAfrica across the continent.

3 Stakeholder Ecosystem and Needs

Stakeholder engagement is an important component of DIGITAfrica and supports both the design of the research infrastructure and the definition of sustainability pathways. Given the diversity of institutional contexts, priorities, and levels of maturity across countries and organisations, continuous interaction with stakeholders is necessary to ensure that the proposed solutions remain relevant and applicable in different environments.

The engagement process has been organised around three complementary objectives:

- Enable Deployment (Technical and Regulatory): A first objective is to support the deployment of DIGITAfrica solutions and services in realistic contexts. This includes understanding technical requirements, identifying regulatory constraints, facilitating access to infrastructure and pilot environments, and ensuring that proposed solutions can be adopted within existing institutional settings;

- Ensure Adoption and Impact: A second objective is to ensure that the infrastructure responds to local needs and priorities. This includes engagement with universities, researchers, technical communities, and institutions to collect requirements, discuss use cases, and support training and capacity building activities;

- Support Policy Alignment and Sustainability: Stakeholder engagement also contributes to aligning the initiative with national and regional priorities and to understanding the conditions required for long-term sustainability. This includes interactions with policy makers, funding organisations, and institutional actors to discuss governance aspects, sustainability challenges, and possible long-term support mechanisms.

The engagement process follows a gradual approach that starts with stakeholder identification and mapping activities and progressively evolves towards consultation

workshops, bilateral meetings, technical discussions, and collaborative activities. This allows stakeholder engagement to move beyond initial outreach activities and support more structured collaboration throughout the project.

3.1 Identification of Stakeholders

As a first step, DIGITAfrica established a stakeholder mapping process to identify relevant actors across participating countries and structure subsequent engagement activities. The objective of this exercise was not only to create a catalogue of contacts, but also to provide a practical mechanism for monitoring engagement activities and supporting more targeted interaction strategies over time.

- The DIGITAfrica stakeholder ecosystem includes a diverse set of actors involved in digital research and innovation:
- Universities and higher education institutions;
- Research centres and laboratories;
- National and regional research infrastructures;
- Public authorities and policy institutions;
- Private sector actors (telecom operators, cloud providers, AI companies);
- International organisations and development partners.

Figure 2 provides an overview of the stakeholder landscape by region, influence, status, and category. The figures correspond to data as of late April 2026. Looking at regional distribution, Southern Africa and Northern Africa emerge as the two largest groups, together accounting for most mapped stakeholders, followed by Eastern Africa and Western Africa. Europe represents a marginal presence, with only two entries corresponding to France and an international organisation, reflecting the project's primary focus on the African continent.

The influence distribution reveals a deliberate targeting strategy: most stakeholders are classified as High influence, with Medium and Low influence stakeholders representing a much smaller share. This skew is intentional and consistent with a project at the design and early engagement phase, where building relationships with decision-makers and senior institutional actors is a priority.

The status breakdown shows that Pending Response is by far the most common engagement status across the stakeholder base, followed by Contacted and Interested. Meeting conducted represents a smaller but meaningful proportion, indicating that while the outreach effort has been broad, active two-way engagement is still developing. A small number of stakeholders remain in the to be Contacted category, suggesting that the outreach pipeline has not yet been fully exhausted.

Finally, the category distribution confirms that Research and Education is the dominant stakeholder type, reflecting the academic and institutional nature of the digital research infrastructure ecosystem that DIGITAfrica is building within. Government and Policy actors

form the second largest group, followed by Private Sector and Infrastructure Providers as minority categories, pointing to opportunities for deeper engagement with industry and connectivity actors in future phases.

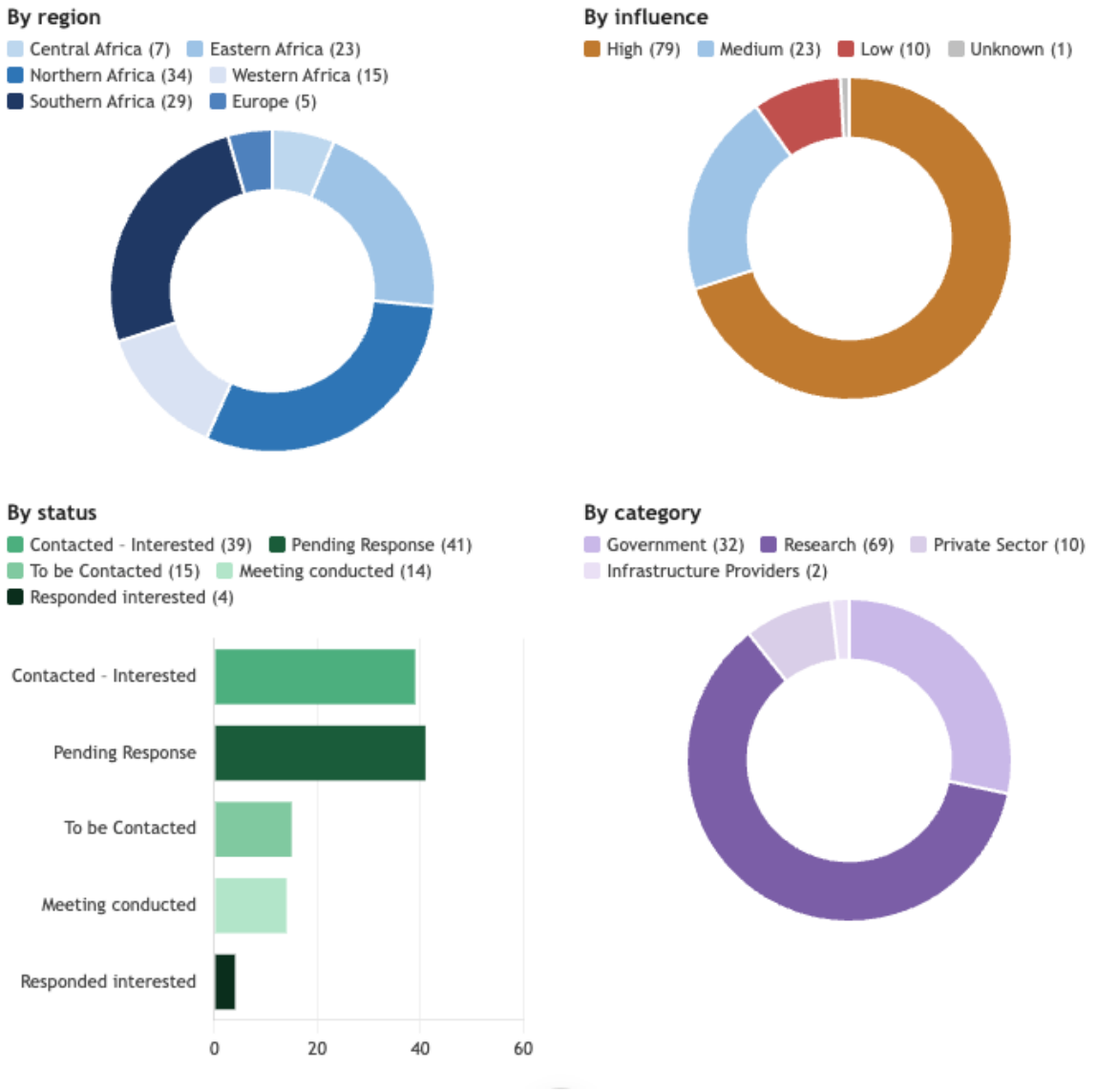

Figure 2: Stakeholder Landscape

Table 1 presents the stakeholder engagement funnel. The total stakeholder pool stands at 113, distributed across six country groups. South Africa (24) and the Other category (37) together account for more than half of the overall base, with Tunisia (23), Senegal (11), Kenya (11), and Cameroon (7) making up the remainder. This distribution reflects a deliberate geographic spread across Central, Eastern, Northern, Western, and Southern Africa, complemented by a substantial group of stakeholders from outside the six named countries.

The first contact round reached 85 of the 113 stakeholders, representing an 75% outreach rate. Coverage was broadly consistent across most countries, though Tunisia and Kenya saw

the most notable gaps, with 6 and 7 stakeholders respectively not yet contacted in the first round. Cameroon and Senegal achieved full outreach, with all identified stakeholders contacted.

Of the 113 stakeholders contacted, 55 replied with interest, corresponding to a 49% conversion rate at this stage. Senegal stands out as the strongest performer, achieving a 100% interest rate across all 10 contacted stakeholders. The Other group also showed strong engagement, with 23 of 37 contacted stakeholders expressing interest. South Africa generated the largest absolute number of interested replies among the named countries (8) and Kenya (4 of 11), while Tunisia (5 of 23) showed comparatively lower conversion rates.

The meeting stage represents the narrowest point of the funnel, with 30 stakeholders reached out of the 55 who had expressed interest, a conversion rate of 26%. The Other group accounts for the majority of meetings conducted (9), followed by Tunisia (9), Senegal (8) and South Africa (4). Cameroon and Kenya had no meetings recorded at the time of reporting. Overall, the engagement funnel reveals a progressively narrowing pipeline with considerable variation across countries, and suggests that targeted follow-up efforts, especially with Cameroon and Kenya, could meaningfully increase the meeting conversion rate in the next phase.

	Cameron	*Kenya*	*Tunisia*	*Senegal*	*South Africa*	*Other*	*Total*
Total stakeholders	*7*	*11*	*23*	*11*	*24*	*37*	*100*
Contacted	*7*	*4*	*17*	*10*	*24*	*32*	*85*
Reply interested	*4*	*4*	*5*	*11*	*8*	*23*	*48*
Meet	*0*	*0*	*9*	*0*	*4*	*9*	*14*

Table 1: Stakeholder engagement status per country

This diversity reflects the distributed nature of digital research infrastructure development in Africa, where no single actor covers the full value chain.

To support this process, a stakeholder map was developed and maintained by the consortium. For each stakeholder, the map includes information such as country, organisation, contact details, occupation or role, communication status, responsible consortium contact person, and an estimation of influence or relevance within the ecosystem. This information supports both operational coordination within the consortium and the progressive refinement of engagement activities. A visual representation of the

stakeholder map is available in the Annex of the web version (Figure 7) and can be accessed through the following link[4].

The stakeholder mapping exercise also highlighted the need for segmentation. Early interactions showed that stakeholders operate under different institutional constraints, priorities, and decision-making structures, making uniform engagement approaches difficult to apply in practice. As a result, stakeholders were grouped according to their profiles and expected contributions to the initiative, enabling more tailored engagement strategies.

Several considerations informed this segmentation process:

- Different stakeholders require different engagement approaches, a single engagement model is unlikely to be effective across all groups.
- Institutional hierarchy and decision-making structures are particularly relevant when engaging policy and governmental stakeholders.
- Formal and informal communication channels often coexist and may play different roles depending on the context.
- African partners frequently act as facilitators and intermediaries, helping establish trust and contextualise interactions within local environments.

The engagement process itself follows a set of general principles intended to support long-term collaboration:

- Context-aware, recognising differences across institutions and countries
- Role-specific, adapting engagement according to stakeholder type and expected contribution
- Progressive, avoiding high-commitment requests during early interactions
- Trust-based, recognising that collaboration often requires repeated interaction over time

Initial outreach activities are therefore intentionally lightweight and awareness-oriented. First contacts primarily aim to introduce DIGITAfrica, understand whether the initiative is relevant for the stakeholder, and establish initial communication channels rather than immediately seeking formal commitments.

This stakeholder mapping and segmentation exercise subsequently informed the definition of engagement roadmaps, outreach strategies, and collaboration mechanisms used throughout the project. Rather than treating engagement as a uniform activity, DIGITAfrica adopts a more adaptive approach where collaboration mechanisms evolve according to stakeholder type, maturity of interactions, and emerging project needs.

[4] https://fox-valley-451.faces.site/8gyhcwdlegfc

3.2 Stakeholder Engagement Roadmap

Following stakeholder identification and segmentation activities, DIGITAfrica defined a progressive engagement roadmap (*Figure 3*) to structure interactions and gradually move from initial outreach towards more concrete collaboration activities. The roadmap was designed to accommodate different stakeholder profiles while maintaining sufficient flexibility to adapt to national contexts and institutional constraints.

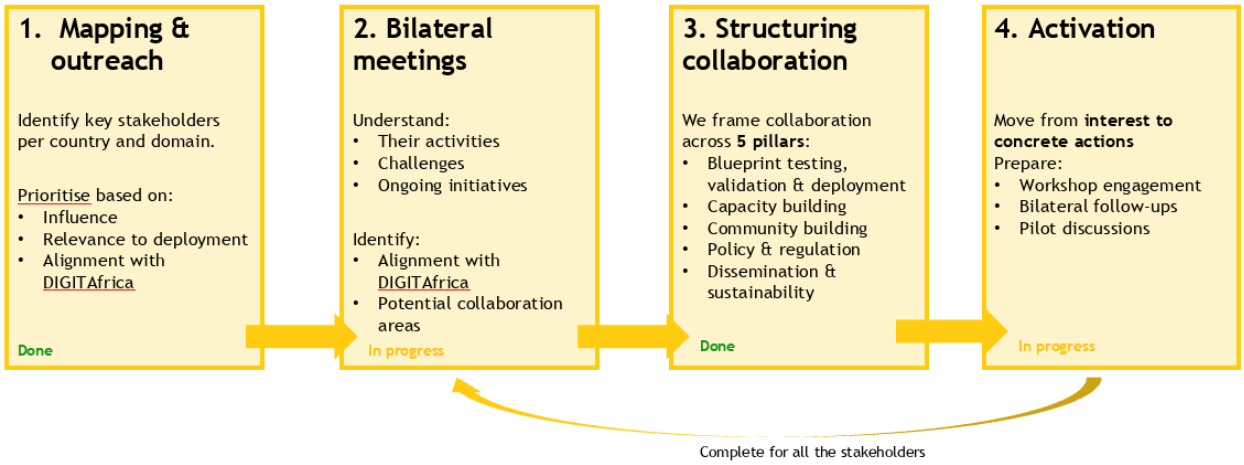

Figure 3: Stakeholder Roadmap

The roadmap is composed by four phases:

- Phase 1: Mapping and Initial outreach;
- Phase 2: Bilateral Discussions and Needs Assessment;
- Phase 3: Structuring Collaboration;
- Phase 4: Activation and Follow-up Activities.

3.2.1 Phase 1: Mapping and Initial Outreach

The first phase focused on identifying relevant stakeholders across participating countries and thematic domains. Stakeholders were prioritised according to several criteria, including:

- Relevance for infrastructure deployment and validation activities;
- Alignment with DIGITAfrica objectives and research priorities;
- Expected influence within their respective ecosystems.

Initial outreach activities were intentionally lightweight and awareness oriented. The objective at this stage was primarily to introduce DIGITAfrica, validate relevance, and establish communication channels rather than immediately seek formal commitments.

Because stakeholder groups have different priorities, incentives, and decision-making structures, outreach strategies were adapted accordingly.

Government and policy stakeholders, including ministries, national agencies, regional bodies, and continental organisations, were primarily engaged through bilateral meetings, policy discussions, and other high-level interactions. For government counterparts, this often started with an initial coordination meeting with the relevant project team or representative to align expectations and context before moving on to more strategic discussions. These exchanges focused on strategic alignment, sustainability considerations, and the role of digital infrastructures within broader national and regional priorities.

Infrastructure providers and operational actors, including research and education networks and infrastructure operators, were approached through technical discussions and co-design activities centered around infrastructure requirements, interoperability, and service delivery considerations.

Research and education stakeholders, including universities, research institutes, academic staff, and students, were engaged through workshops, surveys, information sessions, technical meetings, and training activities. These activities focused on identifying research priorities, training needs, pilot opportunities, and infrastructure requirements.

Private sector actors, innovation hubs, and industry stakeholders were engaged through bilateral interactions to better understand industry requirements, employability trends, and opportunities for collaboration around pilots and use cases.

International initiatives were engaged primarily through joint meetings, exchange activities, and collaborative discussions aimed at identifying good practices, sustainability approaches, and opportunities for knowledge transfer.

These differentiated engagement approaches reflect the understanding that stakeholder groups contribute differently to the infrastructure lifecycle and therefore require different interaction mechanisms.

3.2.2 Phase 2: Bilateral Discussions and Needs Assessment

After initial contact, engagement progressed towards bilateral meetings and more targeted discussions with interested stakeholders.

These interactions aimed to:

- Better understand institutional activities and priorities;
- Identify technical, operational, and organisational challenges;
- Discuss ongoing initiatives and potential complementarities;
- Explore possible areas of collaboration with DIGITAfrica.

This phase also aims to contribute to refining infrastructure requirements, identifying potential use cases, and validating assumptions made during the design process.

3.2.3 Phase 3: Structuring Collaboration

As interactions matured, collaboration activities were progressively organised around a common framework covering five complementary dimensions (Figure 4):

- Blueprint testing, validation, and deployment, includes technical discussions and pilot preparation;
- Capacity building, includes training activities, workshops, and skills development initiatives;
- Community building, supports networking and collaboration between institutions and individuals;
- Policy and regulatory aspects, includes alignment with national and regional priorities.

Dissemination and sustainability, supports visibility and exploring longer-term collaboration opportunities

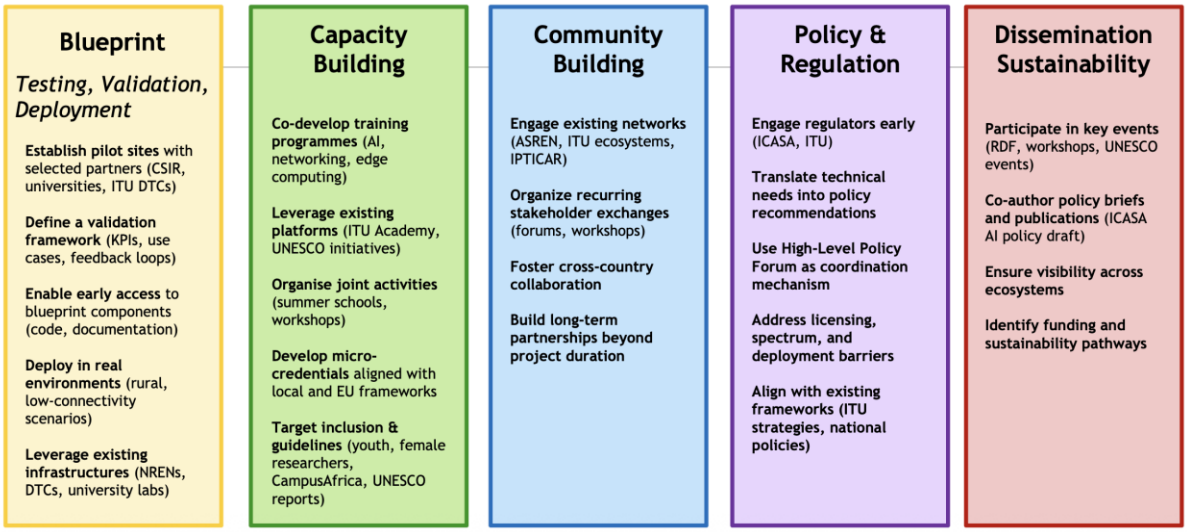

Figure 4: Collaboration Framework

This structure provides a common framework for collaboration while allowing stakeholders to participate according to their interests and institutional priorities.

3.2.4 Phase 4: Activation and Follow-up Activities

The final phase aims to progressively translate stakeholder interest into concrete activities and collaborations.

Examples of these activities include:

- Participation in workshops and technical meetings;
- Bilateral follow-up discussions;
- Technical validation activities;
- Pilot preparation and deployment discussions;
- Dissemination of DIGITAfrica at stakeholders' events.

The objective is not immediate formalisation of collaborations, but rather the gradual development of stronger engagement where relevant.

Supporting Materials and Communication Instruments

To facilitate engagement activities, several dissemination and communication materials were used throughout the process, including:

- Project one-page summary (*Figure 5*);
- White papers and technical material where relevant;
- The DIGITAfrica electronic brochure;
- Workshop information packages and event invitations;
- Information related to the High-Level Policy Forum;
- Project communication channels.

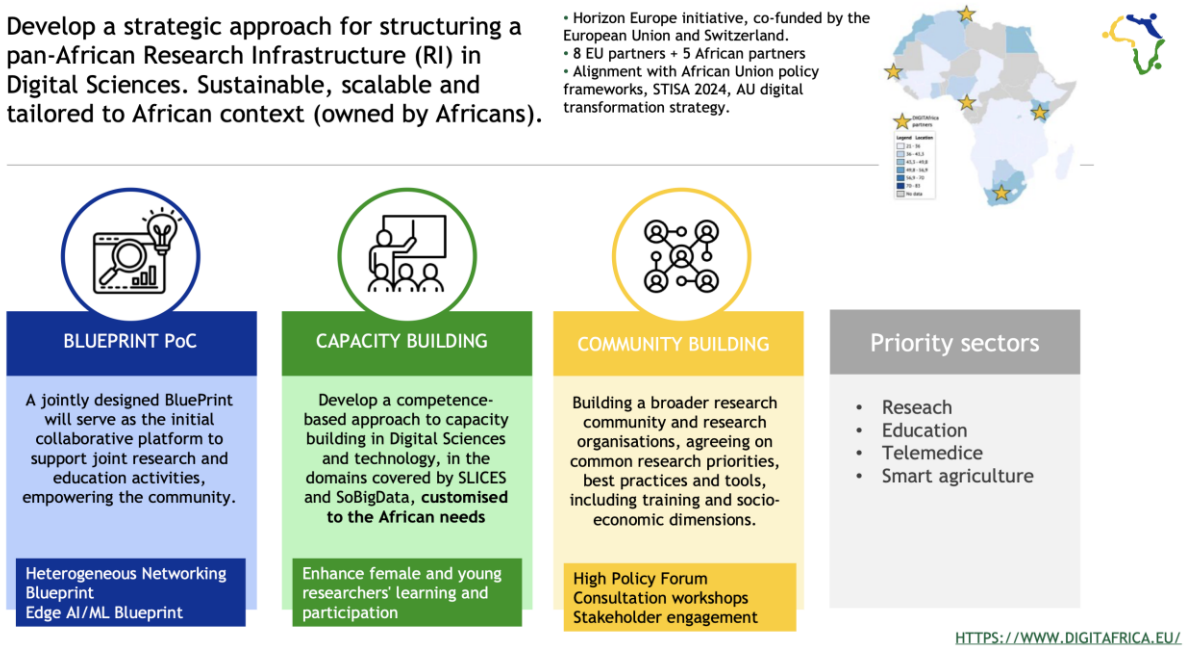

Figure 5: *One pager*

These materials support consistent communication while enabling stakeholders to engage with the project at different levels depending on their interests and role within the ecosystem.

3.3 Needs and Expectations

Across consultations, several recurring needs and expectations have emerged, showing a high degree of convergence across stakeholder groups and countries. A central finding is that infrastructure requirements are rarely expressed independently, but are closely linked to capacity building, governance, and long-term sustainability considerations.

3.3.1 Infrastructure and operational needs

Stakeholders consistently highlight the need for:

- Reliable access to compute and storage resources to support data-intensive research activities;
- Interoperable platforms that enable collaboration across institutions and national boundaries;
- Structured training pathways linked to infrastructure use, including applied and hands-on components;
- Support for applied research use cases in domains such as agriculture, health, education, and public services;
- Clear governance and sustainability frameworks to ensure continuity beyond project-based funding cycles.

3.3.2 Key insights from stakeholder consultations

Beyond specific technical requirements, the consultations reveal several broader cross-cutting insights.

There is a strong overall alignment across stakeholder groups, particularly regarding the importance of collaboration, capacity building, and policy engagement as essential components of any research infrastructure ecosystem.

At the same time, several structural challenges are repeatedly highlighted:

- Regulatory complexity across countries and institutions;
- Fragmentation of existing initiatives and infrastructures;
- General need for improved coordination across ongoing programmes and platforms.

In response to these challenges, stakeholders consistently express a set of shared objectives. These include:

- Avoiding duplication of efforts across initiatives;
- Ensuring more efficient use of available resources;
- Strengthening coordination mechanisms between institutions and programmes.

Overall, these findings suggest that future infrastructure development in the DIGITAfrica context should not focus solely on technical deployment, but also on creating stronger linkages between infrastructure access, skills development, and coordination mechanisms.

3.4 Building a Sustainable Community

To further address these priorities, a High-Level Policy Forum (planned for Q4 2027 and currently under preparation) has been initiated to bring together policymakers, regulators, research organisations, funding agencies, infrastructure providers, international organisations, and other relevant stakeholders from Africa and Europe. The Forum will serve as a platform to discuss the strategic, governance, regulatory, and sustainability dimensions of a future Pan-African Digital Research Infrastructure. Building on the outcomes of the stakeholder engagement activities conducted throughout the project, it will facilitate the exchange of perspectives, identify common priorities and challenges, and promote coordination across existing initiatives and programmes. The Forum will also provide an opportunity to validate policy recommendations emerging from DIGITAfrica, strengthen institutional partnerships, and explore pathways for long-term collaboration, investment, and capacity building beyond the project duration.

In this work, the stakeholder community is understood as the broader ecosystem of actors involved in the development, use, and governance of the emerging foundations for the research infrastructure, rather than a narrowly defined group of end users. It encompasses researchers, students, technical operators, trainers, policy actors, and institutional

stakeholders, each contributing to different layers of the system across design, implementation, and long-term sustainability.

Within this ecosystem, different functional roles can be identified. (1) Users primarily interact with infrastructure services and outputs, (2) contributors participate in testing, feedback, and co-development activities, (3) adopters integrate tools, blueprints, and training components into their institutional environments, and (4) governance actors contribute to defining strategic directions, priorities, and standards. These roles are not fixed and may evolve over time as engagement deepens and capacities mature.

The community is therefore not external to the infrastructure but an integral part of its operational and sustainability model. Its continuous involvement supports system evolution, uptake, and scaling, and is closely connected to the approach developed in WP4, where training pathways, competence frameworks, and micro-credentials act as mechanisms to sustain long-term engagement and participation.

The stakeholder community can be structured into several interconnected layers, reflecting different functions within the ecosystem (*Figure 6*):

- Academic and research community: universities, research centres, PhD candidates, and students involved in research, experimentation, and training activities;
- Infrastructure operators: National Research and Education Networks (NRENs), data centres, and technical teams responsible for deploying and maintaining infrastructure components;
- Policy and governance stakeholders: ministries, regulators, and regional or continental bodies contributing to strategic alignment, regulation, and long-term sustainability;
- Industry and innovation actors: SMEs, AI companies, and technology hubs supporting applied use cases, innovation, and deployment in real-world contexts;
- Training and capacity-building actors: universities, academies, summer schools, and trainers involved in developing and delivering structured learning pathways.

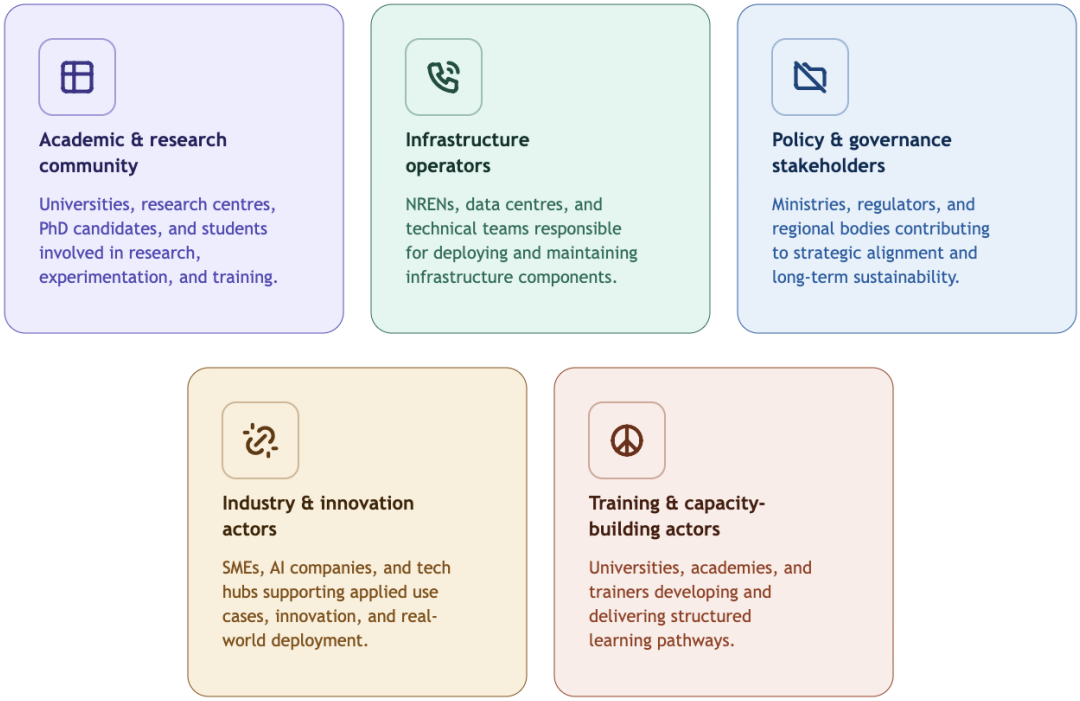

Figure 6: Stakeholder community layers

3.4.1 Community engagement mechanisms

Engagement with this community is supported through a combination of complementary mechanisms designed to ensure continuity beyond isolated interactions. These include:

- Workshops and co-design sessions for requirement validation and blueprint development;
- Training activities and micro-credential pathways aligned with WP4 competence frameworks;
- Pilot environments and testbeds for experimentation and validation;
- Bilateral exchanges for targeted collaboration, and digital collaboration spaces that support ongoing communication;
- Documentation, and knowledge exchange.

In addition, project dissemination activities are carried out to increase visibility and ensure broader awareness of DIGITAfrica outcomes and activities across relevant stakeholder communities.

3.4.2 Incentives for participation

Sustained engagement also depends on clearly defined and differentiated value propositions for stakeholders. These include recognition mechanisms such as micro-credentials and certificates, visibility through contributions to reports and co-authored outputs, WP2 support for the deployment of stakeholder's use cases, and early access to RI code repositories. Additional value is provided through opportunities for networking and participation in collaborative initiatives, as well as the co-organisation of capacity-building

events such as summer schools, which contribute to skills development and community building across the ecosystem.

3.4.3 Knowledge sharing and reuse model

Knowledge sharing within the community is structured around reuse and iterative co-development principles. This includes the development of reusable technical blueprints and documentation, open training materials aligned with WP4, structured feedback loops to improve tools and methodologies, and the integration of use cases and operational experiences from participating institutions. This approach supports continuous improvement while ensuring that outputs remain accessible and adaptable across different contexts.

3.4.4 Governance and community ownership

Governance of the community is based on shared responsibility across institutions and stakeholder groups. Universities and research institutions provide an anchoring role ensuring continuity and institutional legitimacy, while coordination mechanisms support strategic alignment and interoperability across actors. In this context, a Memorandum of Understanding (MoU) is being drafted to formalise collaboration principles and support longer-term institutional engagement. Over time, the governance approach is expected to evolve from a project-led structure towards a more distributed model embedded in participating institutions and supported by community-driven coordination practices.

3.4.5 Sustainability for the community

The long-term sustainability of the community is closely linked to the broader sustainability approach developed in WP5. This includes institutional anchoring, shared financing mechanisms such as membership or subscription models, and service-based approaches linked to training, infrastructure access, and collaborative activities. In this way, the community is expected to evolve beyond the project lifecycle and become embedded in broader research and innovation ecosystems supported through a combination of institutional, financial, and collaborative mechanisms.

3.4.6 Risks and challenges

Finally, there are several challenges that could affect the development and continuity of the community. These include fragmentation across institutions and countries, uneven levels of technical capacity and connectivity, and varying degrees of institutional readiness. Sustaining engagement beyond project funding cycles is also a key concern. These risks can be mitigated through more diversified engagement approaches, ongoing capacity-building activities, and lightweight but persistent governance structures that reduce reliance on individual funding streams while helping to maintain continuity of collaboration.

4 Overview of the Target Research Infrastructure

4.1 Vision and Objectives

DIGITAfrica's vision is to establish a sustainable, interoperable, and sovereign pan-African digital research infrastructure that empowers African countries to accelerate digital transformation, strengthen research and innovation capacities, and promote inclusive socio-economic development. The infrastructure aims to connect research institutions, universities, industry, policymakers, and communities through shared digital services, advanced computing resources, and collaborative innovation environments.

By overcoming skills gap, fragmented digital ecosystems and isolated infrastructures, DIGITAfrica seeks to create a unified African digital ecosystem that enables local ownership of technologies, supports evidence-based decision-making, and fosters the emergence of a new generation of African digital scientists, engineers, entrepreneurs, and policymakers capable of designing and governing Africa's digital future.

4.2 Expected Services and Core Capabilities

Multi-country assessments conducted in Cameroon, Kenya, Senegal, South Africa, and Tunisia reveal persistent weaknesses in urban digital ecosystems, including fragmented infrastructures, limited interoperability, unreliable connectivity, insufficient computing resources, and shortages in digital skills. These studies further indicate that many existing digital infrastructures operate as isolated "islands of excellence", with limited scalability, sustainability, and integration into broader innovation ecosystems.

To address these challenges, the DIGITAfrica Research Infrastructure (RI) aims to provide a common set of digital services and core capabilities that can be adapted to local priorities while ensuring interoperability across participating countries. The proposed infrastructure combines heterogeneous networking, edge/cloud computing, AI/ML services, data platforms, and digital skills development environments into a unified socio-technical framework.

The core capabilities of the infrastructure include:

- Reliable and resilient connectivity, leveraging heterogeneous networking technologies (5G, Wi-Fi, community networks, satellite, and fiber) to ensure service continuity in constrained environments;
- Edge and cloud computing resources, enabling local processing, low-latency applications, and reduced dependence on remote infrastructures;
- Data management and sharing services, supporting secure data collection, storage, interoperability, governance, and analytics;

- AI/ML experimentation platforms, including federated learning, edge AI, and decision-support systems;
- Digital education and skills development environments, providing virtual laboratories, cloud automation platforms, AI/ML training, and hands-on experimentation facilities;
- Open and sovereign digital infrastructures, promoting local ownership, sustainability, and alignment with national and regional digital transformation strategies.

Building upon these common capabilities, country-specific deployments address strategic societal challenges:

- South Africa – Digital Health and Telemedicine. The infrastructure will support telemedicine services, remote diagnostics, surgical telementoring, and connected mobile clinics. These applications require reliable connectivity, secure health data exchange, high-definition video streaming, and edge computing capabilities to extend healthcare access to underserved populations;
- Senegal – Digital Education and Skills Development. The infrastructure will support mobile-first digital education services optimized for smartphone access and low-bandwidth environments. It will provide virtual laboratories, cloud orchestration platforms, AI/ML training environments, and practical 5G networking hands-on. The deployment will rely on a heterogeneous low-cost networking blueprint integrating Wi-Fi, 5G, and edge computing resources;
- Kenya – Smart Agriculture and Environmental Monitoring. The infrastructure will provide sensing, data analytics, and decision-support capabilities for soil monitoring, plant health assessment, and water resource management. These services will support data-driven agricultural practices and sustainable resource utilization;
- Tunisia – Water and Energy Sustainability. The infrastructure will transform existing water and energy systems into a living research testbed capable of supporting leak detection, anomaly identification, predictive maintenance, and digital twin applications for sustainable resource management;
- Cameroon – Edge AI for Agriculture. The infrastructure will support federated learning applications that leverage farmers' smartphones as edge devices while aggregating AI models at the community level. This approach reduces hardware requirements while enabling collaborative AI services adapted to local agricultural needs;
- Germany – Advanced 5G Training and Open Testbeds (TUB and INRIA). TU Berlin, with technical support from INRIA, conducted a SLICES-RI-based hands-on workshop to assess the feasibility of involving students in deploying and testing open-source 5G technologies. The activity demonstrated that open source 5G stacks and reproducible workflows can be effectively used for education, experimentation, and prototyping,

and that the model can be replicated across African universities. The results provided key inputs for the design study, informing the development of low-cost, interoperable 5G blueprints for DIGITAfrica.

Together, these deployments demonstrate how a shared digital infrastructure can support diverse application domains while promoting interoperability, knowledge transfer, and the development of a sustainable pan-African digital research ecosystem.

4.3 Target User Communities

The DIGITAfrica Research Infrastructure is designed to serve a broad range of stakeholders involved in digital transformation, research, innovation, education, and public service delivery across Africa. The initiative aims to create an inclusive ecosystem that strengthens digital capacities while ensuring equitable access to infrastructure, knowledge, and opportunities.

The primary target user communities include:

- Researchers and academics, who will benefit from access to shared digital infrastructures, datasets, experimentation platforms, and collaborative research environments;
- Students and early-career researchers, who will gain hands-on experience through virtual laboratories, living labs, micro-credentials, and advanced digital skills training;
- Engineers and technical professionals, who will access practical training and testbeds in areas such as networking, cloud computing, cybersecurity, artificial intelligence, and data science;
- Policymakers and public institutions, who will leverage data-driven tools, digital services, and research outputs to support evidence-based decision-making;
- Industry stakeholders, startups, and entrepreneurs, who will benefit from innovation platforms, technology transfer opportunities, and access to skilled human resources;
- Local communities and civil society organizations, who will indirectly benefit from digital services developed in key sectors such as education, healthcare, agriculture, mobility, and environmental sustainability.

A particular focus of DIGITAfrica is the enhanced participation of women and young researchers in Digital Sciences. Although digital transformation offers unprecedented opportunities for social and economic inclusion, significant disparities remain across the continent. In Africa, women continue to face barriers related to affordability, access to infrastructure, digital literacy, socio-cultural norms, and participation in decision-making

processes[5]. These challenges are especially pronounced for women living in rural and underserved areas.

To better understand these needs, DIGITAfrica conducted a survey among professors[6] and students[7] from participating countries representing Central, East, West, Southern, and North Africa. The findings confirmed the need for targeted interventions that go beyond basic digital access and address structural factors affecting participation in the digital economy.

Consequently, DIGITAfrica will implement a comprehensive inclusion strategy focusing on four priority areas:

- Access and Infrastructure: improving access to affordable connectivity, digital services, and experimentation platforms;
- Education and Skills Development: providing targeted training, mentoring, micro-credentials, and practical learning opportunities;
- Policies and Governance: promoting inclusive policies and institutional practices that support gender equity and youth participation;
- Continuous Support and Empowerment: establishing mentorship networks, communities of practice, leadership opportunities, and innovation support mechanisms.

Through these actions, DIGITAfrica aims to contribute to a more inclusive African digital ecosystem where women, youth, and underrepresented groups can actively participate in research, innovation, entrepreneurship, and digital transformation. The long-term objective is to strengthen Africa's digital human capital while ensuring that the benefits of digitalization are shared equitably across regions, genders, and socio-economic groups.

4.4 Potential Value for the African

At a time calling for mastering AI and the digital infrastructure, the DIGITAfrica Research Infrastructure is expected to generate significant value for African countries by addressing critical gaps in digital skills, research capacity, innovation ecosystems, and digital sovereignty. Beyond providing a shared digital infrastructure, DIGITAfrica aims to develop the human capital, knowledge networks, and technological capabilities required to support Africa's digital transformation agenda.

[5] UN Women Africa Strategy 2022-2025, Website: https://africa.unwomen.org/sites/default/files/2024-12/un_women_africa_strategy_2022_-2025_0.pdf (Accessed: 15/12/2025)

[6] Survey title: "DIGITAfrica Project: Digital Skills Needs Assessment for University Curricula - Professors/Lecturers"

[7] Survey title: "DIGITAfrica Project: Digital Skills Needs Assessment for University Curricula - Students and Graduates"

Based on the outcomes of the skills gap analysis conducted across partner countries, a portfolio of targeted micro-credentials has been identified to strengthen competencies in key domains of Digital Sciences, including:

- Data Governance and Data Management: data collection and integrity, ethical data stewardship, digitization processes, and modern data analytics tools;
- Artificial Intelligence and Data-Driven Innovation: data preparation, machine learning applications for African contexts, and visual storytelling for decision-making;
- Cloud Computing and Digital Services: cloud architectures, service deployment, affordable cloud infrastructures, and connectivity in low-bandwidth environments;
- Research Design and Methodology: research problem formulation, methodological approaches, research ethics, and scientific rigor.

To ensure long-term sustainability and scalability, DIGITAfrica proposes a curriculum innovation framework centered on three strategic pillars:

- Inclusive Connectivity and Shared Digital Infrastructure, enabling research institutions across Africa to access digital resources, services, and experimentation platforms through a common infrastructure;
- Capacity Building and Skills Development, through modular and layered training pathways adapted to researchers, engineers, technicians, students, and policymakers;
- The DIGITAfrica Academy, a continental capacity-building initiative designed to deliver advanced digital skills, support infrastructure deployment, foster industry collaboration, and strengthen institutional capabilities.

Through this framework, African higher education institutions will be empowered to:

- Develop and deliver industry-aligned micro-credentials in Artificial Intelligence, Data Science, Cybersecurity, Cloud Computing, and Software Engineering;
- Provide hands-on learning experiences through access to experimental platforms, virtual laboratories, living labs, and research infrastructures inspired by international initiatives such as SLICES-RI and SoBigData;
- Strengthen innovation ecosystems by connecting research, education, industry, and public-sector stakeholders;
- Support faculty development and knowledge transfer to ensure the sustainable delivery of advanced digital competencies;
- Promote digital sovereignty through local capacity building, open technologies, and African-led innovation.

Ultimately, DIGITAfrica aims to contribute to the emergence of a new generation of African digital scientists, engineers, entrepreneurs, and policymakers capable of designing, deploying, and governing the digital infrastructures that will underpin Africa's socio-economic transformation. By combining infrastructure, skills development, and innovation support, the initiative will strengthen the continent's ability to create, own, and scale digital solutions adapted to its specific needs and realities.

5 Research Ecosystem Preliminary Requirements for the Design Study

The DIGITAfrica RI is envisaged as a common, federated and progressively deployable environment, that will provide digital services for digital science research, experimentation, training and innovation across participating African institutions. The choices of progressive deployment and federation of services come from the unique characteristics and connectivity requirements that each participating institute has. Following an analysis of these characteristics, as well as partner consultations and stakeholder workshops, and the definition and first implementation of two key blueprints that serve the respective communities, some preliminary requirements have been sketched out below to define the functional, operational, training, legal and ethical requirements for a pan-African RI.

The requirements collectively reflect the ambition to move beyond isolated institutional infrastructure towards an interoperable and sustainable continent-wide research environment capable of supporting multiple use cases, including digital health, precision agriculture, digital education, AI/ML experimentation, networking testbeds and data-driven public services. Each of the different areas that define requirements (as shown in Table 2) should be understood as interdependent rather than separate workstreams, as all of them have been jointly defined, and any shortcomings in one domain will have direct impacts on others.

Table 2: Overall requirements and their focus

Requirement	**Requirement Focus**
Functional Requirements	User-facing services, workflows, collaboration and research
Technical Requirements	DigitAfrica RI architecture, interoperability with other RIs, deployment, security and operations
Organizational and governance requirements	Roles, responsibilities, coordination, overall decision making

Legal, ethical and regulatory considerations	Data protection, research outcome management and access scheme, ethics, regulatory compliance
Inclusiveness and gender consirerations	Gender-balanced access and participation, representation and accessibility of the RI (GEDI - Gender Equality, Diversity, and Inclusion)

5.1 Functional Requirements

The research ecosystem must support a core set of functions that can be reused across all participating infrastructures, appropriately adapted to meet local site limitations. At the bare minimum, the RI should provide a common entry point for users, service access and collaboration, as well as the means to host research workflows, datasets and experiments dealing with digital services. Functionality should be designed around the actual operational practices of each institute and users (researchers, students, site administrators), so as the platform is able to provide a highly-available and scalable environment.

The following set of preliminary functional requirements, shown in Table 3, have been defined:

Table 3: Preliminary functional requirements

Functional Requirement	**Description**
Common Access and single-point of authorization	The RI should provide unified access, including single sign-in capabilities, common authentication and authorization for accessing the distributed infrastructure, and role-based access control (RBAC) across all provided services.
User portal and access for users	The RI should be provisioned through a highly-available portal, able to provide a single interface for access to external users. Users should get access to resources (e.g. through notebooks for enhancing the user-friendly access to novice users), datasets, research services and common storage across all sites.
Support for user-friendly research environments	The infrastructure should lower the barrier for entry to external novice users, especially if they are coming from different disciplines, in order to accelerate the adoption of the platform for the different use cases. To this purpose, user-friendly entry mechanisms shall be implemented (e.g. notebook-based access for the initial blueprints), while also ensuring reproducibility and replicability of experiments across different sites.

(Long-term) Data Storage	The infrastructure shall provide the capability for users to share, version, process, and preserve datasets and research outcomes for long periods of time. These should be shared according to the access policy for the infrastructure and be able to attach to new experiments across sites.
Connectivity service	The respective services should be implemented to support the inter-connectivity of different sites with dedicated networks, isolated from the public Internet. Given the constraints in connectivity for some sites, solutions for intermittent-connectivity and offline operation should be supported (e.g. through the deployment of appropriate caches).
Support for experimentation with emerging networking technologies	The infrastructure shall support experimentation with emerging networking technologies (e.g. 6G Telecommunication networks, WiFi 7, Private 5G, Software Defined Networking and SD-WAN).
Support for experimentation with AI/ML technologies	The infrastructure should inherently support AI/ML experimentation, including full pipeline control over training, inference, and model tracking. Where relevant, concepts such as AIOps, federated learning and transfer learning are apt.
Support for multiple inter-disciplinary use cases	The infrastructure should provide the support for on-boarding experiments and use cases coming from different disciplines, e.g. digital health, education, precision architecture, mobility, environmental monitoring, etc.
Support for collaboration across different stakeholders	The infrastructure should provide the appropriate mechanisms for collaboration across different institutions and stakeholders, e.g. by allowing experiment workspaces to be shared, across different sites.
Monitoring and traceability of experiments	The infrastructure should provide the features for users to monitor the lifecycle of their experiment, and the administrators to track service usage, data provenance, system state, etc.

5.2 Technical Requirements

The technical requirements, described in Table 4, reflect the technical architecture that will support research activity. In order to remain affordable, maintainable and adaptable to diverse institutional contexts, the infrastructure should be able to progressively extend. Each site should be able to start at a limited scale, operate reliably under constrained

conditions and evolve as capacity grows, without the need to re-implement architectural services. The preferred model is a layered and heterogeneous architecture capable of scaling from small local deployments to larger national or regional facilities.

Table 4: Technical requirements

Technical Requirement	**Description**
Modular architecture based on open-source platforms	The RI should support a modular architecture, that can be progressively built. The infrastructure should be based on open-source platforms and code, in order to avoid any future vendor lock-ins.
Support for heterogeneous compute environments	The infrastructure architecture should cover heterogeneous compute environments, from resource-constrained devices to NPU/GPU-enabled systems and other large-scale accelerators. The technical choices for the architecture should be able to accommodate all these types of devices.
Support for service portability across sites	The RI should be able to orchestrate workloads regardless of the site, and enable portability of services across different sites. To this aim, all services should be cloud-native and containerized (where applicable).
APIs for integration of services	As the RI functional requirements require separate handling for identity management, storage, networking and compute services, they should be integrated to the overall architecture through well-defined APIs. Example of such APIs are REST-based interfaces, where security can be enforced through web tokens.
Support for storage	The architecture should support attaching either ephemeral or long-term storage to experiments. To this aim, file-based and object-based storage options should be supported during an experiment lifecycle, to support datasets, notebooks, AI models and research artefacts.
Secure networking and remote access	The infrastructure should support remote access to external users (e.g. notebook based HTTP access or SSH access), while also enforcing security and isolating users from each other.
Logging and observability	Logging, infrastructure monitoring and recovery capabilities (e.g. through backups) shall be supported to improve reliability and operation of the RI.

Secure by design access control	RBAC and token-based HTTP access should be supported on all the services, authenticated through the RI portal, to enforce security. Users should be isolated from each other (e.g. using namespaces and/or VLANs) so as a user's experiment does not interfere with others.
Energy-aware and resource-efficient operation	The infrastructure should be able to orchestrate experiments with an energy-aware aspect, as energy availability might be limited on several sites. Moreover, the orchestrator should ensure that the most energy efficient resources are used for each experiment.

5.3 Organisational and Governance Requirements

The sustainability of the DIGITAfrica RI requires an organisational framework that clarifies responsibilities, supports coordination across partners and preserves both local autonomy and shared standards. The following Table 5 summarizes the related main requirements.

Table 5: Organisational and governance requirements

Organizational and Governance Requirements	**Description**
Partner roles and responsibilities	Each participating party within the RI should be accompanied by a clear definition of their role and responsibilities to other participating partners, site owners, and overall RI governance.
Governance model	The governance model shall be relaxed enough to allow institutions to manage their own deployments while adhering to shared technical and policy principles.
Common Services	Common infrastructure services that are available on all the sites, such as service onboarding and orchestration, access management, maintenance, incident handling should be well described, and each partner should adhere to them.
Operational Services	All the partners should agree on the baseline operational services and processes for setting up a new node, or adding a new site to the RI offering.

Decision Making	Decision making should be transparent to all users, especially the ones regarding platform evolution, service retirement, and the introduction of new tools or use cases.
Platform Usage	The RI should provide a mechanism for reporting usage, needs, potential risks and sustainability concerns across the consortium.
National priorities	The overall offering of the RI should be aligned with national and local institutional priorities so that the RI complements rather than duplicates existing capacities.

In practice, the governance model should balance the central coordination with distributed ownership of resources, as in the context of DIGITAfrica, legal frameworks and infrastructure maturity differs significantly between sites. As such, common standards and coordination mechanisms are established at consortium level, while operational control and contextual adaptation remain with the partner institutions.

5.4 Training and Capacity Building Requirements

The platform should implement a structured training approach, that enables researchers, engineers and students to use, maintain and extend the infrastructure. As the users of the platform are from diverse backgrounds, training and capacity building should address at least four levels as detailed in Table 6.

Table 6: Training and capacity building requirements

Training group	**Description**
End-users	Training for the users of this group should focus on providing support for onboarding new users to the platform, how to access notebooks and extend them, access data, run experiments and share results with other users.
Researchers and experienced users	The training activities for this group should focus on providing guidance for advanced experiments, use AI/ML tools, how to ensure reproducibility for experiments, and how to run their experiment across different sites.
Technical administrators	Training activities on this group cover the system side of the infrastructure, supporting the deployment of a new site,

	configuration of the site, updates, monitoring and security practices.
Institutional leaders & policy stakeholders	Training for this group should cover activities to showcase the governance of the RI model, sustainability requirements and strategic value of the platform.

The RI should prioritize a modular and flexible learning model, with components such as hands-on workshops, virtual labs, micro-credentials and mentoring. Training content should be reusable across partner institutions and support multiple sites, while also being designed to support student and early-career researchers. Capacity building should also be linked to the concrete use cases of the project. Practical exercises in telemedicine, digital education, smart agriculture, AI/ML and networking testbeds will make the infrastructure more relevant and help consolidate skills through real research tasks running over real infrastructure. These requirements stem from real surveys conducted through the DIGITAfrica project as follows below.

Stakeholder surveys of professors[8] and students[9] from African partner countries (Cameroun, Kenya, Senegal, South Africa, and Tunisia) administered in 2025 were used to establish training requirements to support capacity building in digital sciences. This survey was carried out from 15th September 2025 to 20th November 2025. The survey was conducted using Google forms; participants were contacted by emails sent to mailing lists of universities. More than 1500 students and more than 200 professors were contacted; they were invited to access a link to the Google form. The survey for professors comprised two forms: one in English and the other in French. The same applied to the survey for students. The English form targeted participants in Kenya and South Africa, while the French form targeted participants from Cameroon, Senegal, and Tunisia. In addition, feedback was collected from students who attended a winter school in Kenya in March 2026[10]. Data gathered through these instruments was adopted in further stakeholder engagement with policy makers.

With respect to the survey on professors and students, the responders were as follows:

- Professors/Lecturers/Researchers – 24 responses;
- Students and graduates – 48 responses.

[8] Survey title: "DIGITAfrica Project: Digital Skills Needs Assessment for University Curricula - Professors/Lecturers"
[9] Survey title: "DIGITAfrica Project: Digital Skills Needs Assessment for University Curricula - Students and Graduates"
[10] Survey title: "DIGITAfrica Project: Feedback From Participants of the 2026 Winter School in Kenya - Students"

These are top areas where students require training and skills development:

- AI & Machine Learning;
- Data Science & Analytics / Big Data;
- Cloud Computing;
- Cybersecurity;
- Digital Marketing & Entrepreneurship;
- Programming (Python, software engineering).

These skills are seen as the main levers of employability for graduates. In addition, students want micro-credits in exactly the high-value emerging areas: Advanced programming, cloud, AI ethics, cybersecurity, blockchain, advanced analytics, digital entrepreneurship, UI/UX. Critical challenges that need to be overcome in order to achieve capacity development include, aligning university curricula with industry needs, and providing suitable equipment (computers/software) that is required for practical learning. This is because infrastructure limitations (connectivity, equipment, advanced labs) remain significant bottlenecks.

Regarding training format for capacity development, students prefer practical, project-based, industry-linked formats, followed by flexible online delivery. This will equip students with industry relevant practical hands-on skills. There is a need for stronger industry engagement, project-based learning, and work-integrated training.

The winter school held from 23 to 27 March 2026 was attended by 44 learners. 59% of the learners responded to the feedback survey. Key training requirements specified by students included making the program more practical, including more coding, allocating a full day for practical, and increasing the overall duration (suggesting two weeks or a slightly extended period).

5.5 Legal, Ethical and Regulatory Considerations

The RI should comply with the national and African legal and ethical obligations that arise from handling research data, personal data, sensitive data and cross-border collaborations. As the platform will support experimentation from real use cases, and in domains such as health, education and agriculture, these considerations should be embedded from the design phase. Table 7 provides an overview of the legal, ethical and regulatory requirements.

Table 7: Legal, Ethical and Regulatory Requirements

Legal, Ethical and Regulatory Requirements	**Description**

GDPR compliance	The RI services and data acquisition should be compliant with any applicable national and institutional data protection frameworks, along with GDPR.
Informed consent for data	All services that collect user data should comply with governance-specified clear rules for informed consent, data collection, secondary use, and anonymisation.
Ethics compliance	All services should provide (where applicable) ethical review processes for activities involving human participants, patient data, student data or other sensitive information/datasets.
Data sharing	As the RI should enable data sharing across institutions, data sharing agreements and access policies that define ownership, permitted uses, responsibilities and restrictions should be described.
Intellectual Property	The RI should deal with aspects regarding intellectual property, licensing for code produced within the project and reuse conditions for software, data, models and training materials.
Cross-border compliance	As the institutions cover different countries with different regulations, cross-border data transfer safeguard should be implemented in case that they violate any policy (defined by the RI governance).
AI ACT compliance	For the use of AI, all services should comply with the EU AI Act, in order to provide responsible AI practices, including transparency, documentation, fairness, accountability and human-in-the-loop intervention/oversight where automated decision support is used.

5.6 Inclusiveness and Gender Considerations

The RI should be designed to broaden and stimulate the participation of under-represented groups to digital science. Particular attention is given to youth, women and under-represented minorities (e.g. rural and marginalized communities, indigenous minorities) from different African regions in order to access the infrastructure on equal terms. Table 8 draws the inclusiveness requirements.

Table 8: Inclusiveness Requirements

Inclusiveness Requirements	**Description**
Ease of access	Toward enabling ease of access, interfaces that allow access from mobile devices and require low-bandwidth should be developed. Such will allow users in environments with limited connectivity to participate equally.

Accessibility and learning material	Accessible interfaces and learning materials should be implemented, allowing easy indexing in the web and offering easy access for users with diverse levels of background in digital sciences.
Inclusivity	Support for participation from women, young researchers, early-career staff and institutions outside major urban centres. This should be implemented by targeted dissemination actions, and liaisons with target communities that promote such participation.
Flexible training formats	The training for the use of the RI should be highly flexible, allowing different users with different time constraints to be accommodated. The training should also support varying teaching loads and levels of prior experience.
Community-building	The activities around the RI should establish community-building mechanisms such as mentoring, peer learning, etc. so as to ensure participation from diverse groups.

6 Context and Sustainability Challenges

6.1 Digital Research Infrastructures in Africa

Africa's digital transformation and scientific development increasingly depend on the availability of robust digital research infrastructures capable of supporting research, innovation, advanced education, and data-intensive applications. Over the past decade, significant progress has been achieved through investments in High-Performance Computing (HPC), research and education networking, cloud services, and regional connectivity initiatives. Although the landscape remains uneven across countries and regions, a number of strategic initiatives and infrastructures have emerged that provide a solid foundation for the development of a future pan-African digital research infrastructure ecosystem.

6.1.1 Current Landscape

6.1.1.1 High-Performance Computing

HPC has become a strategic capability for scientific research, artificial intelligence, climate modelling, bioinformatics, engineering simulation, and data-intensive applications. Several African countries have established national or institutional HPC facilities, including South Africa (CHPC–Lengau), Morocco (UM6P–Toubkal), Egypt (Bibliotheca Alexandrina), Algeria (CERIST), and Tunisia (CCK). While the distribution of resources remains uneven, these initiatives demonstrate a growing commitment to advanced computing infrastructures across the continent.

6.1.1.2 Research and Education Networks (RENs)

Research and Education Networks constitute the backbone of the African research and education ecosystem. Three regional organizations play a central role in supporting connectivity and digital services:

- WACREN (West and Central Africa);
- ASREN (North Africa and the Arab region);
- UbuntuNet Alliance (Eastern and Southern Africa).

Together with national research and education networks (NRENs), these organizations provide connectivity, trust and identity services, collaboration platforms, cloud services, and capacity-building activities for universities and research institutions.

6.1.1.3 Regional and International Connectivity

A major milestone in the development of African research connectivity has been the AfricaConnect programme, implemented through a partnership involving the European Union, GÉANT, WACREN, ASREN, and UbuntuNet Alliance. The programme has significantly strengthened regional research networks and improved connectivity between Africa and the global research and education community.

The growing deployment of Internet Exchange Points (IXPs) across Africa has further contributed to reducing latency, improving resilience, and strengthening digital sovereignty through increased local and regional traffic exchange.

6.1.2 Key Infrastructure Gaps

Despite the significant progress achieved in recent years, several technical gaps continue to limit the full potential of digital research infrastructures across Africa:

- Uneven distribution of HPC resources and limited access to advanced GPU-enabled platforms;
- Persistent disparities in network connectivity and service quality across countries and regions;
- Limited interoperability and federation between existing infrastructures;
- Uneven development of cloud, data, and digital research services;
- Limited availability of large-scale research data platforms and Open Science services.

A recurring observation across many African countries is the existence of a **talent-infrastructure paradox**. While research communities possess significant expertise in areas such as Artificial Intelligence (AI), Data Science, and the Internet of Things (IoT), their ability to innovate and scale research activities is often constrained by limited access to advanced computing resources, GPU-enabled platforms, and experimental facilities.

At the same time, although investments in commercial data centres and cloud infrastructures are expanding rapidly across the continent, these resources remain only partially accessible to public research and education communities. Existing disparities are further compounded by the uneven geographical distribution of digital resources, persistent connectivity and power constraints, and shortages of specialized technical personnel required to deploy and operate advanced digital infrastructures.

6.1.3 Opportunities

At the same time, Africa possesses important assets that can support future developments:

- Established regional REN organizations and growing NREN ecosystems;
- Emerging HPC and cloud infrastructures;
- Expanding regional and international connectivity through AfricaConnect and GÉANT;
- Increasing interest in Open Science and FAIR data practices;
- Strong policy support through Agenda 2063, STISA, and the Digital Transformation Strategy for Africa;
- Opportunities to leverage experience from established international Research Infrastructures such as SLICES and SoBigData.

6.1.4 Implications for DIGITAfrica

The analysis highlights that Africa already possesses significant digital research infrastructure assets. However, these assets remain fragmented and unevenly distributed.

The objective of DIGITAfrica is therefore not to create a completely new infrastructure from scratch, but rather to build upon existing African and international assets by promoting their federation, interoperability, and accessibility.

In this context, the DIGITAfrica Design Study should focus on:

- Federating existing computing, networking, cloud, and data infrastructures;
- Promoting interoperability and service integration across regions;
- Facilitating access to advanced digital services for research and innovation communities;
- Supporting Open Science and collaborative research practices;
- Leveraging successful experiences from African and European infrastructure initiatives.

Such an approach would contribute to the progressive development of a sustainable, scalable, and African-owned digital research infrastructure ecosystem capable of supporting research, innovation, and socio-economic development across the continent.

6.2 Key Sustainability Challenges

The analysis of stakeholder consultations, together with existing African and European research infrastructure literature, highlights a set of interrelated structural challenges affecting the long-term sustainability of digital and research infrastructure ecosystems.

From the consultations, several recurring issues emerge:

- Fragmentation of infrastructure initiatives, leading to duplication and limited interoperability;
- Dependence on short-term funding cycles, which affects continuity of services and platforms;
- Unequal access to compute and digital resources, particularly in under-resourced regions;
- Limited institutionalisation of training mechanisms, reducing long-term skills retention;
- Complex governance arrangements, especially in multi-country infrastructures.

These findings are consistent with broader literature on research and digital infrastructure in Africa, which identifies three reinforcing structural dimensions of sustainability challenges:

6.2.1 Infrastructure and Connectivity Barriers

- The Digital and Broadband Divide: A massive connectivity gap persists where approximately 71% of Africans (roughly 860 million people) remain offline, and only 22% of rural residents use the internet (UNECA 2025). This divide is exacerbated by the fact that rapid global transitions like Artificial Intelligence are occurring mainly in the global North while the South remains behind (Kaydor, 2025). For the African Open Science Platform (AOSP), this divide is further complicated by widespread "data illiteracy," which hinders the ability of African scientists to adopt data-intensive research practices (AOSP 2025).
- Physical Infrastructure Deficits: Many regions suffer from a lack of high-speed internet accessibility, poor road connectivity, and a total absence of digital infrastructure in remote rural areas (Kaydor, 2025). Furthermore, inadequate infrastructure and "data integration" gaps are cited as significant barriers to modernizing sectors like agriculture (EC JRC 2025). The AOSP specifically identifies deficiencies in physical infrastructure and a lack of federated e-infrastructure access as primary hurdles to achieving its continental vision (AOSP 2025).
- Energy Constraints and Instability: Development is hindered by a heavy reliance on imported fossil fuels and inefficient generation infrastructure (Kaydor, 2025, EC JRC 2025). Unreliable electricity and a lack of adequate clean energy supply prevent the

continent from effectively "leapfrogging" traditional technologies and increase the costs of maintaining digital networks. (Kaydor, 2025, UNECA 2025).

6.2.2 Governance and Policy Hurdles

- Policy Coordination and Directionality Failures: Countries often suffer from weak institutional coordination and a lack of vertical and horizontal alignment between different government ministries. There is also a “directionality failure,” which is a lack of shared vision or consensus on the goals and direction of societal transformation (EC JRC 2025). For the African Open Science Platform (AOSP), these failures are further compounded by significant deficiencies in policy frameworks and a specific lack of incentive structures for researchers to adopt open science practices (AOSP 2025).

- The “Paper Reality” Gap: Many digital and developmental strategies exist only "on paper" because nations lack the institutional capacity, dedicated budgets, or political commitment required to execute them (EC JRC 2025, UNECA 2025). Similar implementation hurdles, specifically regarding the urgent need for resource mobilisation and collective planning to transition existing initiatives from paper-based strategies into operational realities (AOSP 2025).

- Political Instability and Corruption: Widespread insecurity, civil disorder, and war in various regions disrupt peace and make inclusive development processes nearly impossible. Innovation is further stifled by weak regulatory enforcement systems and pervasive public corruption (Kaydor, 2025). Additionally, (AOSP 2025) identifies that existing historical and cultural context on the continent can pose significant barriers to shifting towards the open and collaborative agendas required for modern scientific progress.

6.2.3 Economic and Financial Limitations

- Chronic Underfunding of STI: Science, Technology, and Innovation (STI) are severely under-resourced; most African countries fall far below the target of spending 1% of GDP on R&D (Kaydor, 2025). This environment of resource scarcity makes high-level initiatives like the African Open Science Platform (AOSP) heavily dependent on seed funding from specific government departments and initial support from international science councils.

- ICT Financing Shortfalls: There is an estimated US$ 100 billion annual shortfall in the financing required to build necessary ICT infrastructure (UNECA 2025). For the AOSP, the need to overcome these financial gaps is a core governance priority, with its Governing Council tasked specifically with finding “avenues for resource mobilisation” to sustain long-term operations and resource new initiatives (AOSP 2025).

- Debt and External Shocks: Africa faces a huge debt burden and increased vulnerability due to global shocks beyond its borders, such as the 2008 financial crisis, the COVID-19 pandemic, and the war in Ukraine (Kaydor, 2025).

- Prohibitive Costs: Data plans remain extremely expensive, costing up to 10% of monthly GNI per capita in some regions, five times the global affordability target of 2% (UNECA 2025).

6.2.4 Data, Trust, and Inclusion Issues

- Evidence and Data Gaps: Many countries lack basic or up-to-date Science, Technology, and Innovation data, leading to their exclusion from global innovation indices and hindering evidence-based policymaking (EC JRC 2025, UNECA 2025). These gaps are compounded by widespread data "illiteracy", which remains a primary barrier to scientists adopting data-intensive research practices (AOSP 2025).

- Cybersecurity and Ethical Risks: A low level of cybersecurity maturity and a lack of ethical frameworks for emerging technologies leave personal data and critical infrastructure exposed to fraud and surveillance (UNECA 2025). To counter these risks, the AOSP emphasizes the urgent need for research data management tools and the implementation of FAIR (Findable, Accessible, Interoperable, and Reusable) principles to ensure scientific data is handled ethically and securely.

- Linguistic and Cultural Marginalization: The continent's more than 2,000 indigenous languages are overwhelmingly absent online, reinforcing informational exclusion. Additionally, historical and cultural contexts sometimes pose barriers to the adoption of open science models (UNECA 2025).

Other broader categories of challenges, including environmental and climate-related threats as well as socio-economic and human development gaps, have been identified in the wider literature but are considered outside the scope of this analysis and are therefore not addressed in detail in this section.

Taken together, these challenges point to the interconnected nature of the barriers affecting research and digital infrastructure ecosystems. Addressing them requires coordinated efforts across infrastructure provision, governance frameworks, and capacity development, so that technical solutions are supported by appropriate institutional and skills-based systems. In this context, DIGITAfrica contributes to ongoing work in this area by supporting more integrated and sustainable approaches to digital infrastructure development.

6.3 Opportunities for EU–Africa Collaboration

Strengthening AU–EU collaboration in the field of digital RIs is one of the core objectives of DIGITAfrica. The project builds on existing cooperation between European and African partners and aims to consolidate partnerships between research institutions across both regions, fostering dialogue with key stakeholders and leveraging established collaborative frameworks.

In this context, DIGITAfrica relies on established European RIs such as SoBigData and SLICES-RI, which serve as reference environments for capacity building, technical development, and knowledge transfer. By leveraging these infrastructures, DIGITAfrica aims to support

the development of innovative workflows that enhance research efficiency, foster inclusivity, and contribute to sustainable development.

Project activities have already started to generate new connections between European and African partners through workshops, joint activities, and stakeholder consultations. African partners benefit from increased and more structured access to European research infrastructures and training environments, while European partners gain new collaboration opportunities and exposure to emerging use cases and contexts. Initial mobility and training activities, including winter schools and participation in RI programmes, are also contributing to strengthening knowledge exchange.

These collaborations are still at an early and not fully structured stage, with cooperation mainly driven by EU–Africa linkages and more limited intra-African structuring. DIGITAfrica nevertheless aims to contribute to strengthening AU–EU collaboration opportunities in the field of digital research infrastructures, supporting a more integrated and sustainable ecosystem through enhanced cooperation, shared access to advanced resources, and the progressive development of scientific and technical capacities.

7 Funding and Sustainability Considerations

The long-term sustainability of DIGITAfrica relies on the integration of various funding and resource mobilisation mechanisms throughout the project lifecycle. Instead of depending on a single source of support, this approach utilises a diverse set of instruments that cater to different phases, ranging from early validation and pilot activities to scaling and long-term operational implementation.

This section presents the main funding landscapes relevant to DIGITAfrica, including EU-Africa strategic partnerships, private sector engagement, blended finance instruments, development cooperation, bilateral programmes, and philanthropic support. It also summarises key cost and resource considerations emerging from stakeholder consultations and comparable research infrastructure initiatives and outlines initial reflections on possible hybrid approaches to long-term sustainability.

7.1 Funding Landscape and Opportunities

DIGITAfrica's transition from a project-based initiative to a self-sustaining infrastructure ecosystem depends on the strategic mobilisation of a diverse and complementary set of funding mechanisms. Rather than relying on any single source, the project is actively exploring a layered funding landscape in which different instruments activate at different phases of the project lifecycle, collectively ensuring continuity from early validation through to long-term scaling.

EU-Africa Strategic Partnerships and Programmes

EU–Africa strategic partnership frameworks form the broad policy and funding architecture within which DIGITAfrica is positioned. Instruments such as the African Union–European Union Innovation Agenda, the Science, Technology and Innovation (STI) framework, and the

Africa Initiative open pathways to joint programmes, coordination frameworks, policy alignment, and downstream funding pipelines. Because of their cross-cutting nature, these mechanisms remain relevant throughout the entire project lifecycle and provide the political grounding that makes engagement with other funding actors more credible and tractable.

Private Sector and Big Tech Support

Collaboration with major technology companies, including Google, Microsoft, and Amazon Web Services, constitutes a continuous stream of both financial and in-kind support across all project phases. What these actors bring is primarily practical: cloud infrastructure, compute resources, AI-based tools, platforms, and technical expertise that public funding alone is rarely structured to cover. Rather than seeking occasional contributions, DIGITAfrica aims to develop genuine co-investment relationships that can grow over time, fostering a sense of stability and mutual commitment for the audience.

Infrastructure Investment and Blended Finance

Securing infrastructure investment and blended finance is a clear priority for the period immediately following validation. Institutions such as the EU Global Gateway, the African Development Bank, the World Bank, and the European Investment Bank operate at the scale required for data centres, cloud nodes, data platforms, connectivity infrastructure, and large-scale digital deployment. Blended finance, combining public and private capital, is well suited to this context, given that African digital infrastructure investments often involve risk profiles and return timelines that sit outside the scope of conventional grant instruments.

Development Cooperation and Country Deployment Funding

As DIGITAfrica progresses from infrastructure validation toward national deployment, development cooperation mechanisms become an increasingly natural fit. Instruments such as NDICI, Global Europe and Team Europe Initiatives, working alongside national development agencies, can support government systems integration, institutional capacity building, and national digital transformation programmes. The most productive activation window for these streams is the early post-project phase, when sustained financial and technical support is needed to bridge the gap between validated research infrastructure and operational public sector adoption.

Bilateral Cooperation

Bilateral cooperation between countries offers a practical and flexible pathway for regional scaling and deeper institutional partnerships. Agencies such as France's AFD, Germany's BMBF, Spain's AECID, and the Netherlands' NWO-WOTRO are well positioned to support pilot extensions, applied scaling, and the consolidation of institutional relationships across partner countries. Engagement with these actors is envisaged as a continuous thread throughout the project, connecting core EU funding with the broader regional ambitions that DIGITAfrica is working toward.

Philanthropic and Public-Good Funding

Philanthropic foundations, among them the Gates Foundation, Wellcome Trust, and Rockefeller Foundation, offer a meaningful complementary source of support, particularly for components of DIGITAfrica's infrastructure that serve clear public-good purposes: digital public infrastructure, health and climate data systems, governance frameworks, and open-access platforms. These actors tend to be most relevant during the transition from pilot to scaling, and in sustaining those parts of the infrastructure that are essential for equitable access but unlikely to attract purely commercial investment.

The described funding mechanisms are not merely prospective. Table 9 below documents a selection of active or recently completed initiatives that demonstrate the viability of each funding stream in the African context.

Table 9: Selection of active funding initiatives

Funding type	***Success story***	***Key outcome***
Eu-Africa strategic partnerships	Horizon Europe Africa Initiative I, II & III (2021–2025) (EEAS - Africa Initiative III 2025)	Increased African participation in EU research calls, improved proposal success rates vs. Horizon 2020. Africa Initiative III (2025) allocated €500.5M across 24 call topics.
	EU–Smart Africa Digital Partnership Agreement (2024) (EC International Partnerships, 2024)	Agreement between the European Commission and Smart Africa to accelerate digital transformation and boost innovation across the continent.
	Google Johannesburg cloud region & Microsoft South Africa (Google cloud Blog, 2024) (Microsoft Company News, 2025)	Google launched its Johannesburg cloud region ($1 billion, 2024). Microsoft committed ~$290M to expand cloud and AI infrastructure in South Africa by 2027.
	Microsoft Skills for Jobs, South Africa (Microsoft Company News, 2025)	150,000+ people trained in digital and AI skills in 2024. 95,000 certified. 1,800 secured employment through the programme.

Private sector / Big Tech	Gates Foundation – University of Nairobi & Kenyatta University AI (Africa.com, 2026)	Investment in data analytics and AI capacity in Kenya, tools deployed for smallholder farmers covering weather prediction, soil mapping, and market price transparency.
Infrastructure & blended finance	EC–African Development Bank Partnership Agreement (African Development Bank Group, 2024)	€972M in blending operations and guarantees, enables investment in transport corridors, energy, and digital connectivity across Sub-Saharan Africa.
	Global Gateway Africa–EU Investment Package (EC International Partnerships, 2025)	99 Team Europe initiatives in energy, transport, digitalisation, and health, 138 Global Gateway flagship projects adopted between 2023 and 2025.
	World Bank IDEA – Eastern & Southern Africa (World Bank Group, 2024)	$2.48B programme expanding broadband access, 900,000+ poor Ethiopian households received electronic benefit transfers in 2023, 43% owned by women.
Development cooperation	Germany GIZ – Digital Skills Accelerator Africa & Make-IT in Africa (Giga Digital cooperation with global partners, 2025)	Continent-wide digital skills and entrepreneurship programmes implemented with African partner countries and complemented by the Digital Transformation Centres initiative.
	France AFD – Digital Africa programme (Giga Digital cooperation with global partners, 2025)	AFD supports African tech entrepreneurship through the Digital Africa programme, scaling digital innovation ecosystems across the continent.

Bilateral cooperation	Netherlands FMO & Germany KfW – African digital startups (Giga Digital cooperation with global partners, 2025)	Both DFIs have become significant investors in African digital startups and funds, complementing bilateral programme funding with direct equity investment.
	Wellcome Trust – University of Johannesburg (International Higher Education, issue 122, 2025)	In 2023, the university secured R934.2M in research income; international sources including Wellcome Trust accounted for 32.2% of total institutional income.
Philanthropic / public-good	Gates Foundation & Wellcome Trust – South Africa research infrastructure (Africa Solutions Media, 2025)	Joint R100M commitment each (total R600M package) to sustain critical health research capacity and infrastructure continuity in South Africa.
	Gates Foundation – Digital Public Infrastructure mapping, Africa (Digital Frontiers, 2025)	Landscaping study across 13 African countries and the WAEMU block mapping digital identity, instant payments, data exchange, and policy frameworks.
	Gates Foundation – Carnegie Mellon University Africa, Rwanda (Carnegie Mellon University Africa, 2022)	Investment in equitable digital financial services research at CMU-Africa in Kigali, bringing together academia, government, and private sector.

Overall, the funding landscape for DIGITAfrica brings together a range of complementary instruments rather than a single financing pathway. Each of these plays a different role across the project lifecycle, from early validation and capacity-building activities to later

stages of scaling and longer-term sustainability. This mix of public, private, development, and philanthropic sources provides the flexibility needed to respond to different infrastructure needs and institutional contexts across participating regions.

Although these mechanisms follow different priorities and timelines, their combined use is important to ensure continuity beyond the project phase. Continued coordination across funding streams, and alignment with evolving infrastructure and governance needs, will be key to supporting DIGITAfrica's transition towards a more sustainable and widely adopted digital research infrastructure ecosystem.

7.2 Cost and Resource Considerations

The sustainable operation of digital research infrastructures requires continuous investment across several interdependent cost categories. While precise cost estimates will be further refined in the design phase, the consultation process and analysis of comparable research infrastructure initiatives allow for the identification of the main cost drivers. This methodology is strongly based on the experience accumulated by existing research infrastructure.

A first category relates to core infrastructure and operational costs, including compute, storage, data management systems, network connectivity, and platform hosting environments. These costs typically cover both initial deployment and ongoing updates, maintenance, security, and performance optimisation of the infrastructure components. The above is directed by the governance, its office and support team to rule them all.

A second category concerns a distributed, node-based operational model, in which participating countries and institutions may host and operate local infrastructure nodes depending on their role, capacity, and level of engagement. In this configuration, costs are expected to vary significantly across partners and may include:

- Technical staff (system administrators, DevOps engineers, infrastructure operators);
- Research staff involved in use case development and validation;
- Administrative and coordination staff supporting local implementation;
- Institutional overheads linked to hosting and governance responsibilities.

This decentralised model implies that resource requirements will not be uniform, but rather distributed according to national contexts, institutional maturity, and level of infrastructure participation.

A third category focuses on training and capacity-building activities, which are vital for promoting infrastructure adoption and sustainability across Africa. By enhancing local expertise and skills, these initiatives empower communities to manage and maintain infrastructure effectively, ensuring its long-term viability and supporting economic development throughout the continent.

A fourth category concerns service-related operational costs, particularly those associated with the provision of digital services. These include:

- Cloud and high-performance computing services;
- Containerised execution environments and orchestration tools;
- Data storage, curation, and management services;
- Visualisation platforms and analytical services;
- API-based and user-facing application services.

Finally, governance and coordination costs should also be considered as a structural component of the model. These include costs related to coordination bodies, technical committees, stakeholder engagement mechanisms, interoperability activities, and cross-institutional alignment processes.

At this stage, these cost categories should be understood as indicative rather than final. The actual distribution of costs will depend on the final architecture of the infrastructure, the degree of decentralisation across nodes, and the selected sustainability model (including public funding, institutional contributions, and service-based mechanisms).

7.3 Initial Business Model Perspectives

Based on stakeholder consultations and an analysis of established research infrastructure models in Europe and Africa, a hybrid sustainability model emerges as the most realistic and robust approach for ensuring long-term continuity. This approach reflects the understanding that no single funding or governance mechanism is sufficient on its own to sustain complex, distributed digital research infrastructures over time.

Instead, sustainability is achieved through the combination of complementary layers that distribute responsibility across public, institutional, service, and private actors, in line with emerging European research infrastructure practices (e.g., ESFRI frameworks, SoBigData RI, SLICES-RI) and international guidance on digital ecosystems (GPAI, OECD, 2024).

The model is structured around five mutually reinforcing components:

7.3.1 Public anchoring

Public institutions play a foundational role by providing baseline funding, policy legitimacy, and long-term continuity for core infrastructure services. This includes ensuring alignment with national and regional strategies, as well as guaranteeing equitable access to essential digital research capabilities. This layer is essential to avoid fragmentation and to ensure that infrastructure components remain public-interest oriented.

In the African context, this layer is often complemented by regional coordination mechanisms and policy bodies such as the African Union, Smart Africa, and Regional

Economic Communities, which support harmonisation, strategic alignment, and cross-border interoperability rather than direct operational control.

7.3.2 Institutional co-financing and shared governance

Universities and research networks contribute through membership-based arrangements, shared governance structures, and co-financing of operational activities. This model mirrors established practices in European RIs such as SoBigData and SLICES-RI, where distributed institutional contributions ensure both ownership and long-term engagement of the user and provider communities.

In African research infrastructure ecosystems (e.g. H3ABioNet, WACREN-related initiatives, and regional training networks), institutional participation is often complemented by in-kind contributions, including staff time, local infrastructure hosting, and access to institutional compute and data resources, which are essential for sustainability in resource-constrained environments.

It also supports a transition from project-based participation towards sustained institutional embedding of infrastructure services and training activities.

7.3.3 Service-based sustainability mechanisms

A progressive introduction of service-oriented models supports operational sustainability over time. These include pay-per-use compute and storage services, managed access to experimental environments and platforms, and certified training and micro-credential programmes (closely linked to WP4).

In many African digital research initiatives, service-based sustainability is often implemented in hybrid form rather than full cost-recovery, combining subsidised access with tiered service models to ensure inclusiveness while enabling gradual financial contribution mechanisms.

This approach is consistent with emerging "*research infrastructure-as-a-service*" models (RIaaS) increasingly adopted in European infrastructures, where service provision contributes to partial cost recovery while expanding accessibility and scalability (CORDIS, European Commission, 2025).

7.3.4 Private sector participation and public–private partnerships

Private sector engagement is considered a challenging but critical enabler across the lifecycle of the infrastructure. Three complementary roles are identified: (i) deployment, where operators and technology providers contribute to connectivity and infrastructure roll-out, (ii) validation, through joint pilots and applied research collaborations, and (iii) scaling, through co-investment and expansion of services once solutions are validated.

This mirrors patterns observed in digital infrastructure ecosystems where PPPs help bridge the gap between research prototyping and real-world deployment. In African contexts, PPP models are often particularly important for connectivity infrastructure, cloud services, and

applied AI deployments, where telecom operators, technology hubs, and emerging innovation ecosystems contribute both infrastructure and use-case validation capacity.

7.3.5 Regional networks, donor funding, and in-kind resource ecosystems

In addition to the four core pillars, African research infrastructure sustainability typically relies on a transversal layer combining donor funding, regional research and education networks, and in-kind contributions (e.g. WACREN, ASREN, UbuntuNet Alliance).

This includes:

- Development and innovation funding (*e.g.* African Development Bank, World Bank, bilateral cooperation, EU instruments);
- Regional research and education networks (e.g. WACREN, UbuntuNet Alliance) providing connectivity, coordination, and shared services;
- In-kind contributions such as compute resources, cloud credits, technical staff, and hosting infrastructure provided by partner institutions.

This layer is particularly important during early-stage deployment and scaling phases, where full service-based sustainability is not yet achievable.

Overall, this model reflects a gradual shift from reliance on time-bound project funding towards a more distributed, ecosystem-based approach to sustainability, where financial responsibilities, operational roles, and governance are shared across multiple actors. These diversification and mutualization are widely recognized as an important factor for research infrastructure sustainability, particularly in contexts of growing demand and constrained public resources.

8 A Roadmap Towards the Design Study

8.1 Transition to the Design Phase

This deliverable marks the transition between the initial assessment and consultation phase of DIGITAfrica and the design phase that will guide the project during its second half. During the first 18 months, the consortium focused on identifying needs and priorities, analysing existing capacities and gaps, engaging stakeholders, developing initial infrastructure blueprints, and defining training and capacity-building approaches adapted to the African context.

The next stage of the project is centred around Task 5.3, Design Study for an EU–African DIGIT RI (M18–M36). Building upon the findings presented in this deliverable, the design study will consolidate the technical, organisational, governance, training, sustainability, and inclusiveness dimensions of the future DIGITAfrica Research Infrastructure into a coherent framework.

The objective is not only to define the characteristics of the future infrastructure but also to identify the conditions required for its long-term implementation and operation. Particular attention will be given to governance mechanisms, sustainability pathways, institutional commitments, and the articulation between African and European stakeholders. The design study will therefore serve as a framework for assessing possible pathways towards a sustainable pan-African digital research infrastructure and for identifying the steps needed to pave the way for its future establishment.

The work will also integrate cross-cutting considerations, including gender aspects, capacity development, policy alignment, and the strategic positioning of DIGITAfrica within the broader AU–EU cooperation landscape.

8.2 Key Milestones and Next Steps

The activities planned for the remaining project period aim to consolidate the findings gathered so far and support the development of the DIGITAfrica design study, providing a clearer vision of the possible pathways, requirements, and conditions for the future establishment of a pan-African digital research infrastructure. The first priority will be the consolidation and validation of the DIGITAfrica blueprint through the deployment and assessment of initial infrastructure components in participating countries. This work will contribute to establishing a common reference architecture that can support future expansion and replication across different national contexts. In this perspective, the project aims to reach a stage where the African RI Blueprint is sufficiently consolidated and ready for deployment in selected African countries (MS5).

In parallel, capacity-building activities initiated through WP4 will continue to strengthen the human and institutional capabilities required to operate, maintain, and further develop the infrastructure. Training programmes, micro-credentials, community-building initiatives, and knowledge-transfer activities will remain essential components of the infrastructure ecosystem.

A major focus of the second half of the project will be sustainability and governance. Building on the preliminary analyses presented in this deliverable, the consortium will elaborate the design study, refine sustainability scenarios, and explore potential governance approaches that could support the long-term development of the initiative. This process will also examine funding perspectives, operational responsibilities, and institutional arrangements that may contribute to continuity beyond the project lifetime.

Finally, the project will seek to strengthen stakeholder commitment through the progressive establishment of cooperation mechanisms and work towards a Memorandum of Understanding (MoU). Together with the continued development of a common research agenda and the deployment of the DIGITAfrica blueprint in multiple African countries, these activities are expected to contribute to a more structured basis for cooperation and provide important inputs to the next stages of the design study (MS6).

8.3 Dependencies and Risks

As identified in the DIGITAfrica Description of Action (DoA), the implementation of the project and the preparation of the design study are subject to several technical, organisational, financial, and strategic risks. These risks are monitored throughout the project and appropriate mitigation measures are implemented when necessary.

This Table 10 summarises the main risks identified in the DoA:

Table 10: Main risks identified

Risk ID	***Risk Description***	***Likelihood***	***Severity***
R1	*Not enough time to reach the objectives as designing a pan-African RI is a long process involving political and intercontinental cooperation*	*Medium*	*Medium*
R2	*Diverging interests, starting points and objectives between African partners and countries*	*Low*	*High*
R3	*Lack of contacts at the political level in Africa*	*Medium*	*High*
R4	*Unreachable sustainability plan and unrealistic financial resources*	*High*	*Medium*
R5	*Difficulties for African partners to travel within Africa*	*Medium*	*Medium*
R6	*Lack of co-construction resulting in an infrastructure not adapted to African contexts*	*Low*	*High*
R7	*Specifications and services not matching stakeholder needs*	*Low*	*High*
R8	*Training and capacity-building activities not matching local demand*	*Low*	*High*
R9	*Lack of interactions between EU and African partners*	*Low*	*High*
R10	*Delays, over/under spending, or insufficient progress against objectives*	*High*	*Medium*
R11	*Non-compliance with the DNSH principle*	*Low*	*Medium*

These risks provide the reference framework for risk monitoring during the remainder of the project and will be reassessed as part of future project reporting activities and the development of the DIGITAfrica design study.

9 Conclusions

Deliverable D5.1 establishes the preliminary requirements that will guide the design of a federated, inclusive, and sustainable digital research infrastructure for Africa. Through extensive stakeholder engagement, landscape analysis, and policy review, the document provides a structured and evidence-based foundation across functional, technical, organisational, legal, and capacity-building dimensions.

The analysis confirms both the urgency of the need and the existence of a committed stakeholder ecosystem ready to engage in co-design. While significant challenges persist — spanning connectivity, governance, funding, and digital inclusion — the convergence of African political commitment, EU cooperation frameworks, and growing research community demand creates a genuine opportunity for transformative action.

The fast emergence of AI and the critical need of advanced reliable digital infrastructures are vital for Africa. They will definitely have a transformative effect on all sectors of their society. A coordination effort and a mutualization of resources are mandatory to cope with the scale of investment needed. It is recognized that if not done on time, the digital divide will increased even further.

For that purpose, we have been working on building the community, defining a common research agenda for the African community in their local context. The governance and business models have been explored and will be consolidated in the future.

The findings and requirements set out here will directly inform the Design Study phase, ensuring that the resulting infrastructure is grounded in real needs, co-owned by its communities, and built for long-term sustainability.

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11 Annex

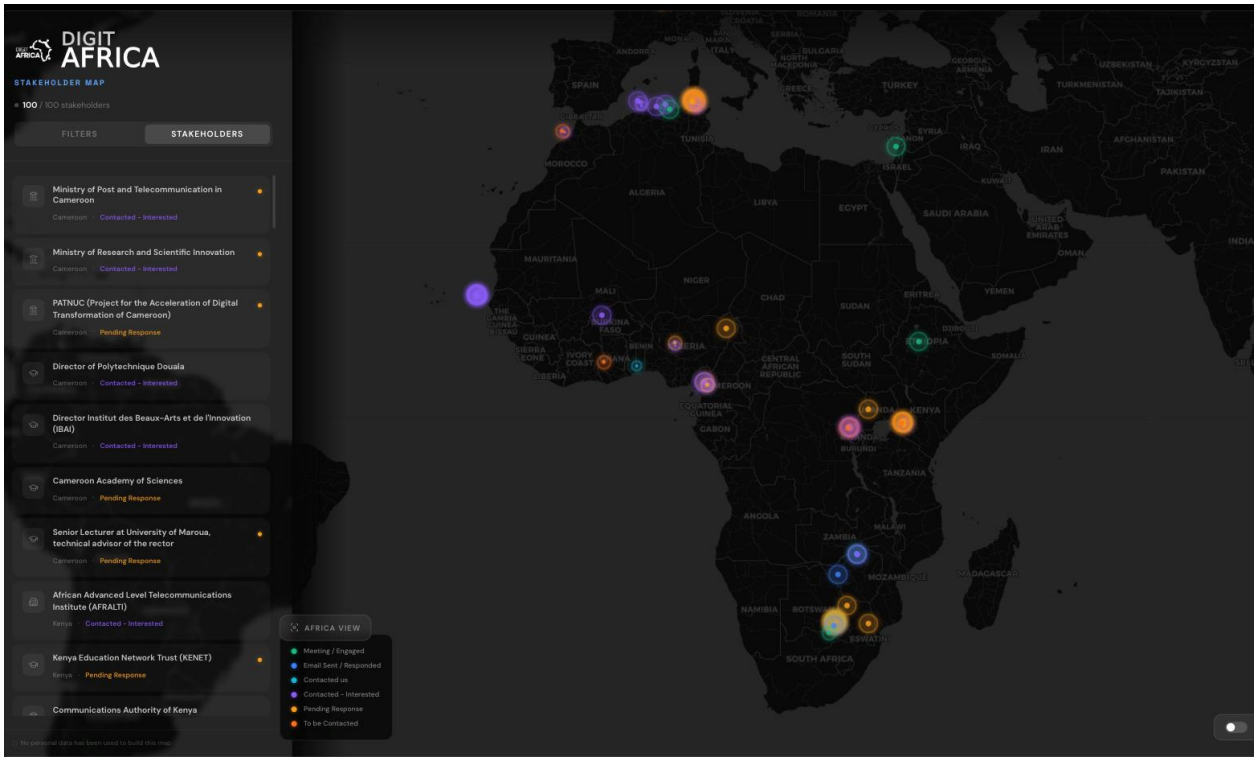

Figure 7: Stakeholder map web version