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Évènement National Africa-BB-Maps

Systèmes nationaux de cartographie à large bande au Burundi

28—30 Octobre 2025

Bujumbura, Burundi

africabbmaps.itu.int/bi-kickoff/

Africa Broadband Maps

Africa-BB-Maps in Burundi: Objectives, TechnicalFramework, Timeline

Mr. Dana Jon Kamason

Project Manager, Africa-BB-Maps, ITU

Mr. Elind Sulmina

Project Officer, Africa-BB-Maps, ITU

Stakeholder Mapping – Roles & Responsibilities

Mr. Dana Jon Kamason

Project Manager, Africa-BB-Maps, ITU

Africa-BB-Maps – Project Objectives for Burundi

To **establish** and **operationalise sustainable** national **broadband mapping systems** to enable:

- **Validated**, **publicly accessible** broadband data
- **Evidence-based** policy and regulation
- Targeted **infrastructure investment**
- Universal and **meaningful connectivity**
- Accelerated **digital transformation**
- **Regional harmonisation**
- Alignment with **international standards**

Africa-BB-Maps – 3 Strategic Pillars for Burundi

Africa-BB-Maps

Policy & Regulations

Creating the enabling environment for broadband mapping to thrive:

- Governance frameworks aligned with EU best practices
- Policy and regulatory integration
- Common data standards and interoperability
- Monitoring and evaluation mechanisms

Technology

Delivering state-of-the-art mapping platform:

- Geospatial platform (proprietary, open-source, or hybrid)
- Integration of infrastructure and service data
- Geoportals for public access and planning
- Tools for network analysis and policy formulation

Capacity Development

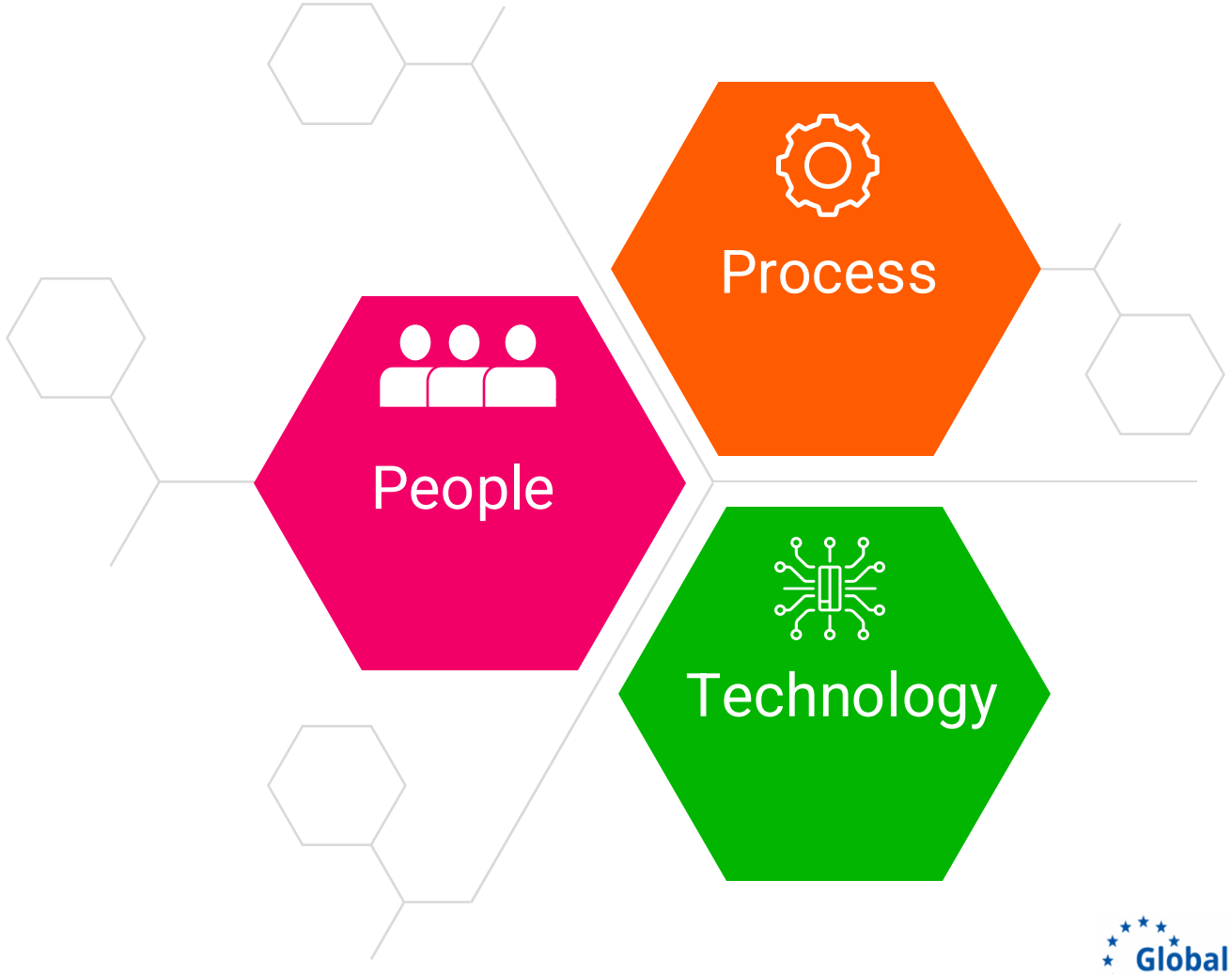
Empowering people and institutions to lead:

- Structured training through ITU Academy
- Hands-on learning in GIS, broadband policy, and data governance
- Support for ARCT and stakeholders
- Burundi-EU collaboration and regional knowledge exchange

National Ownership for Sustainability

Africa-BB-Maps – Technical Framework for Burundi

People, Process, and Technology for Sustainable Broadband Mapping



Africa-BB-Maps – Expected Outcome for Burundi

01
Low
Status: No system, no capacity, no coordination.

Focus: Raise awareness and assess digital readiness.

02
Medium (Emerging)
Status: Foundations forming, but data and systems are minimal.

Focus: Build mandates, standards, and system blueprint.

03
Medium (Functional)
Status: Basic system running with limited features and data.

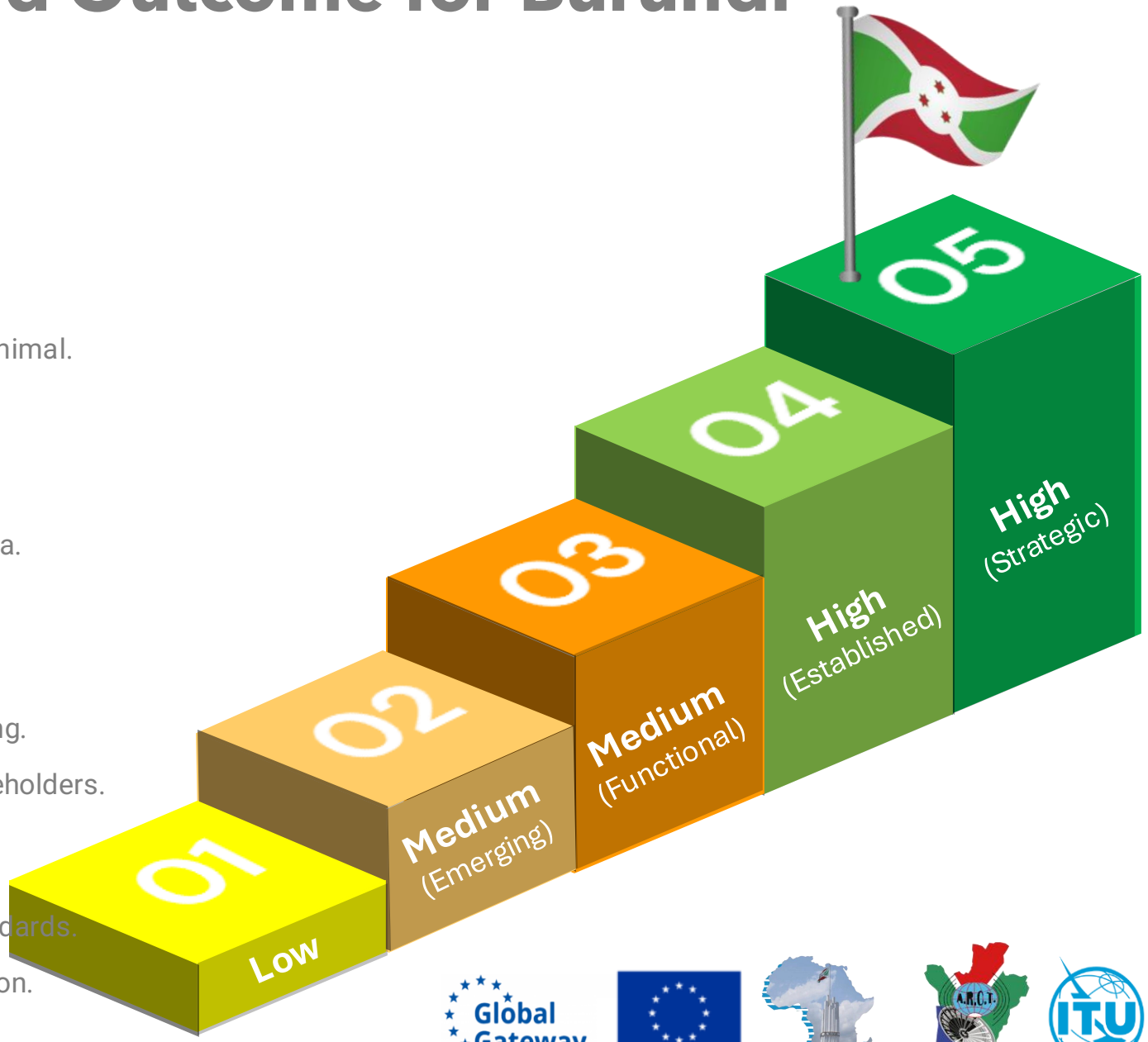
Focus: Deploy core components and train initial users.

04
High (Established)
Status: Operational system integrated into national planning.

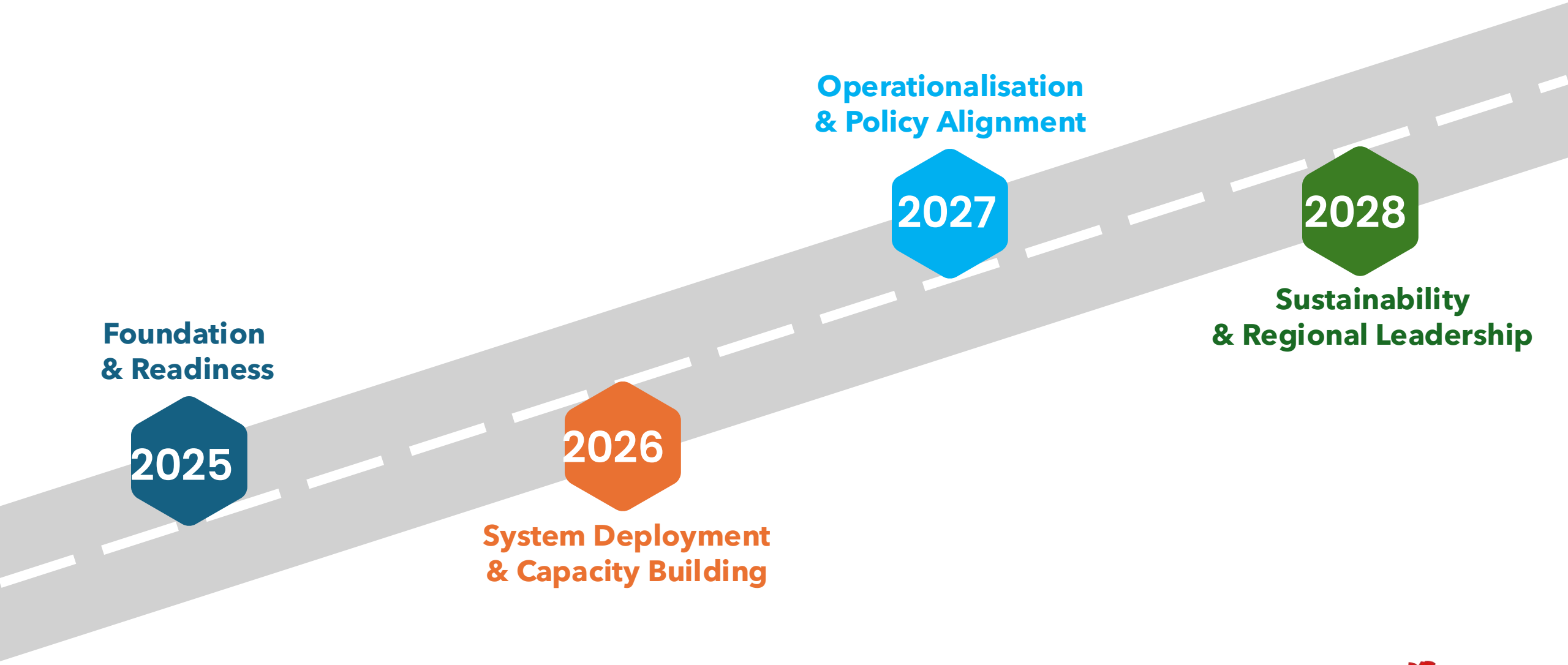
Focus: Institutionalise platform and scale use across stakeholders.

05
High (Strategic)
Status: Strategic tool aligned with regional and global standards.

Focus: Drive decision-making, enable regional harmonisation.



Africa-BB-Maps – Roadmap for Burundi



Thank you

Any question?

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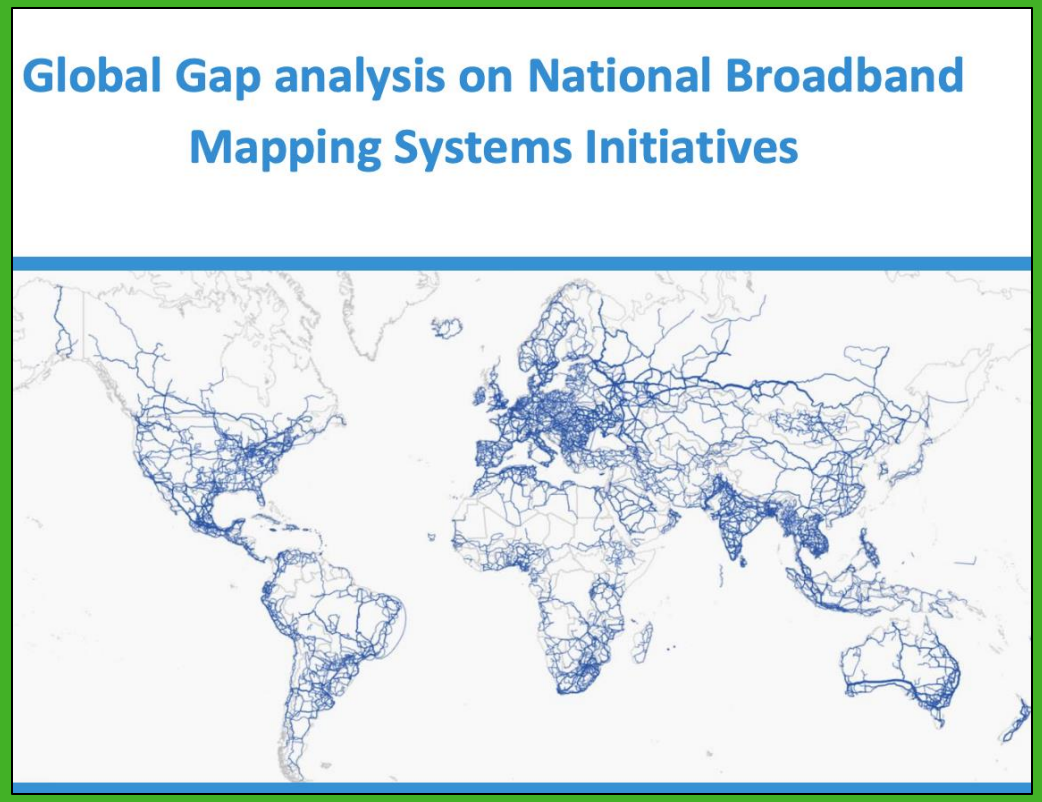
Africa Broadband Maps

Africa-BB-Maps au Burundi: Travail reglementaire

Mr. Elind Sulmina

Project Officer, Africa-BB-Maps, ITU

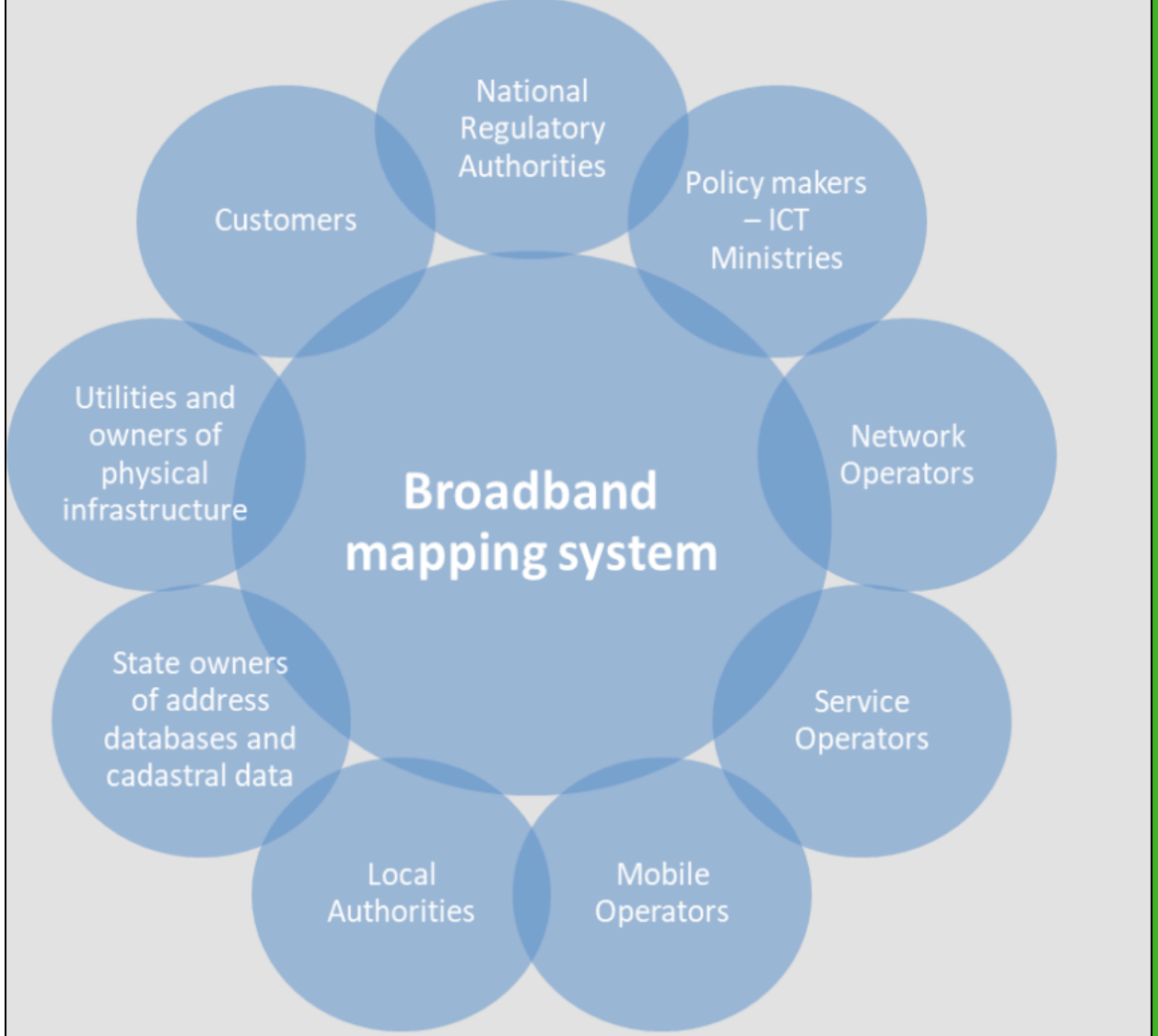
Framework for our policy action



Global Gateway

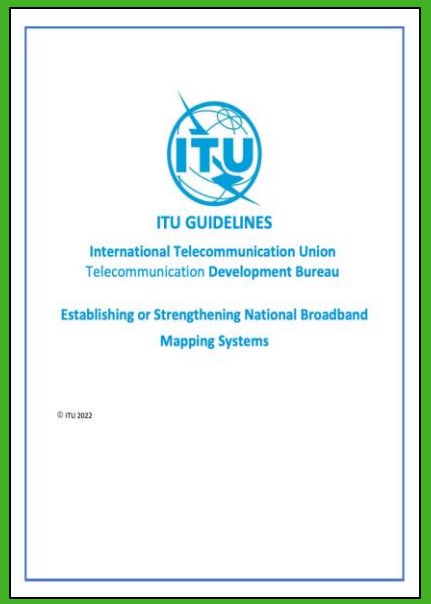
Infrastructure Mapping	Service Mapping
The activity entailing the gathering, structuring and representing: georeferenced data on passive physical infrastructure (e.g., pipes, ducts, poles, manholes, base stations, mobile towers, etc.) represented in lines and nodes; information about the type of infrastructure deployed (fiber/copper, water pipes, electricity); information about the owners of that infrastructure (fixed/mobile telecommunications, other network operators, national and local government, etc.)	The activity entailing the gathering, structuring and representing: data about service availability (including bandwidth and or type of technology used to offer the service), data about the number of broadband service offers from operators data about the estimated quality of service available for a specific address and/or a specifically defined geographical area (e.g., 100m x 100m grid)
Investment Mapping	**Demand Mapping**
The activity entailing the gathering, structuring and representing: data about planned investments aimed at developing broadband infrastructure and services in a defined geographical area (e.g., region, municipality), including relevant information about publicly and/or privately funded projects. Investment maps may include reports about areas characterized by market failure or sub optimal outcomes	The activity entailing the gathering, structuring and representing: data about the quantity and quality of broadband demand for bandwidth desired by the end user. the level of financial allocation foreseen in association with that given broadband fixed service.

Table 1 **Four Types of Broadband Mapping Systems**



Global Gateway

Regulatory Practices & Frameworks



ITU GUIDELINES

International Telecommunication Union
Telecommunication Development Bureau

Establishing or Strengthening National Broadband Mapping Systems

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International Telecommunication Union

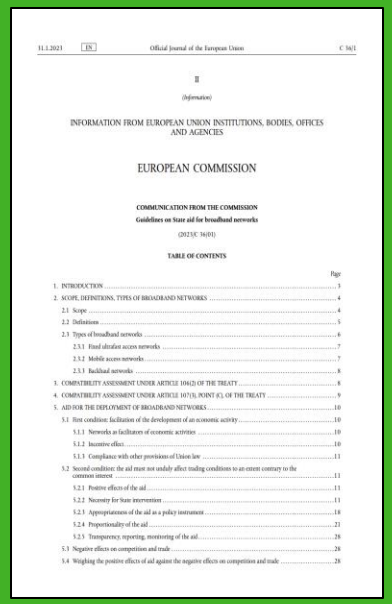
Compendium of Case Studies on Broadband Mapping Systems Across the EMERG and EaPeReg Regions

Open Document
October 2024
Final Version

ITU POLICY PAPER

ENABLING ENVIRONMENT FOR BROADBAND MAPPING IN BOSNIA AND HERZEGOVINA

© ITU December 2021



11.1.2021 EN Official Journal of the European Union C 16/1

II

(Information)

INFORMATION FROM EUROPEAN UNION INSTITUTIONS, BODIES, OFFICES AND AGENCIES

EUROPEAN COMMISSION

COMMUNICATION FROM THE COMMISSION
Guidelines on State aid for broadband networks

(2021/C 36/01)

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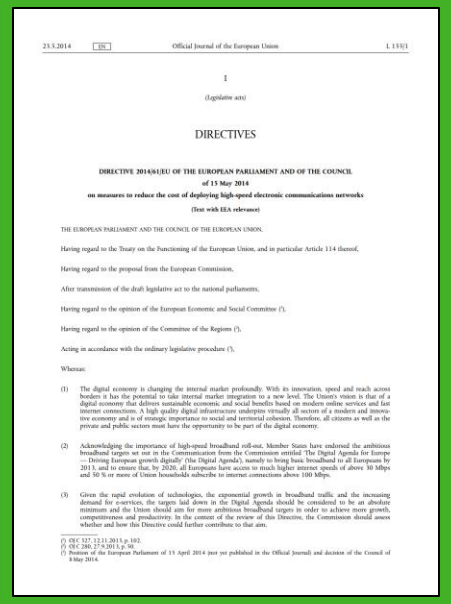


23.5.2014 EN Official Journal of the European Union L 153/1

I

(Legislative acts)

DIRECTIVES

DIRECTIVE 2014/61/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
of 15 May 2014
on measures to reduce the cost of deploying high-speed electronic communications networks
(Text with EEA relevance)

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty on the Functioning of the European Union, and in particular Article 114 thereof,

Having regard to the proposal from the European Commission,

After transmission of the draft legislative act to the national parliaments,

Having regard to the opinion of the European Economic and Social Committee (1),

Having regard to the opinion of the Committee of the Regions (2),

Acting in accordance with the ordinary legislative procedure (3),

Whereas:

(1) The digital economy is changing the internal market profoundly. With its innovation, speed and reach across borders it has the potential to take internal market integration to a new level. The Union's vision is that of a digital economy that delivers sustainable economic and social benefits based on modern online services and fast internet connections. A high quality digital infrastructure underpins virtually all sectors of a modern and innovative economy and is of strategic importance to social and territorial cohesion. Therefore, all citizens as well as the private and public sectors must have the opportunity to be part of the digital economy.

(2) Acknowledging the importance of high-speed broadband roll-out, Member States have endorsed the ambitious broadband targets set out in the Communication from the Commission entitled 'The Digital Agenda for Europe — Driving European growth digitally' ('the Digital Agenda'), namely to bring basic broadband to all Europeans by 2013, and to ensure that, by 2020, all Europeans have access to much higher internet speeds of above 30 Mbps and 50 % or more of Union households subscribe to internet connections above 100 Mbps.

(3) Given the rapid evolution of technologies, the exponential growth in broadband traffic and the increasing demand for e-services, the targets laid down in the Digital Agenda should be considered to be an absolute minimum and the Union should aim for more ambitious broadband targets in order to achieve more growth, competitiveness and productivity. In the context of the review of this Directive, the Commission should assess whether and how this Directive could further contribute to that aim.

(1) OJ C 327, 12.11.2013, p. 102.
(2) OJ C 280, 27.9.2013, p. 30.
(3) Position of the European Parliament of 15 April 2014 (not yet published in the Official Journal) and decision of the Council of 8 May 2014.

L 321/36 EN Official Journal of the European Union 17.12.2018

DIRECTIVES

DIRECTIVE (EU) 2018/1972 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL
of 11 December 2018
establishing the European Electronic Communications Code
(Recast)
(Text with EEA relevance)

THE EUROPEAN PARLIAMENT AND THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty on the Functioning of the European Union, and in particular Article 114 thereof,

Having regard to the proposal from the European Commission,

After transmission of the draft legislative act to the national parliaments,

Having regard to the opinion of the European Economic and Social Committee (1),

Having regard to the opinion of the Committee of the Regions (2),

Acting in accordance with the ordinary legislative procedure (3),

Whereas:

(1) Directives 2002/19/EC (4), 2002/20/EC (5), 2002/21/EC (6) and 2002/22/EC (7) of the European Parliament and of the Council have been substantially amended. Since further amendments are to be made, those Directives should be recast in the interests of clarity.

(2) The functioning of the five Directives which are part of the existing regulatory framework for electronic communications networks and services, namely Directives 2002/19/EC, 2002/20/EC, 2002/21/EC and 2002/22/EC, and Directive 2002/58/EC of the European Parliament and of the Council (8), is subject to periodic review by the Commission, with a view, in particular, to determining the need for modification in light of technological and market developments.

(3) In its communication of 6 May 2015 setting out a Digital Single Market Strategy for Europe, the Commission stated that its review of the telecommunications framework would focus on measures that aim to provide incentives for investment in high-speed broadband networks; bring a more consistent internal market approach to radio spectrum policy and management; deliver conditions for a true internal market by tackling regulatory fragmentation, ensure effective protection of consumers, a level playing field for all market players and consistent application of the rules, as well as provide a more effective regulatory institutional framework.

(1) OJ C 125, 21.4.2017, p. 56.
(2) OJ C 207, 30.6.2017, p. 87.
(3) Position of the European Parliament of 14 November 2018 (not yet published in the Official Journal) and decision of the Council of 4 December 2018.
(4) Directive 2002/19/EC of the European Parliament and of the Council of 7 March 2002 on access to, and interconnection of, electronic communications networks and associated facilities (Access Directive) (OJ L 108, 24.4.2002, p. 7).
(5) Directive 2002/20/EC of the European Parliament and of the Council of 7 March 2002 on the authorisation of electronic communications networks and services (Authorisation Directive) (OJ L 108, 24.4.2002, p. 21).
(6) Directive 2002/21/EC of the European Parliament and of the Council of 7 March 2002 on a common regulatory framework for electronic communications networks and services (Framework Directive) (OJ L 108, 24.4.2002, p. 33).
(7) Directive 2002/22/EC of the European Parliament and of the Council of 7 March 2002 on universal service and users' rights relating to electronic communications networks and services (Universal Service Directive) (OJ L 108, 24.4.2002, p. 51).
(8) Directive 2002/58/EC of the European Parliament and of the Council of 12 July 2002 concerning the processing of personal data and the protection of privacy in the electronic communications sector (Directive on privacy and electronic communications) (OJ L 201, 31.7.2002, p. 37).

Africa-BB-Maps au Burundi

Merci

Est-ce que vous avez des questions?

PAGE BREAK

Case Studie from ITU: The Polish experience

What Lessons Apply?

Mr. Elind Sulmina

Project Officer, Africa-BB-Maps, ITU

POLAND – Heart of Europe

- Situation centrale en Europe
- Accès à la mer Baltique
- Membre de l’Union européenne depuis 2004

- Pays clé entre l’Est et l’Ouest
- Important carrefour commercial vers l’Union européenne

Polish Telco Market

Informations de base

1. 3 658 entreprises de télécommunications sont enregistrées, dont 2 133 fournissent des services Internet
2. Valeur du marché : 10,28 milliards d'euros
3. 77 % des ménages en Pologne disposent d'une connexion Internet avec une vitesse d'au moins 1 Gbit/s, et 84 % utilisent un accès haut débit avec une vitesse d'au moins 100 Mbit/s
4. Le revenu mensuel moyen par abonné Internet fixe s'élève à 12 euros
5. 4 opérateurs mobiles : Orange, T-Mobile, Play, Plus
6. Le taux de pénétration des services mobiles en Pologne, calculé comme le nombre de cartes SIM par rapport à la population, atteint 141,9 %
7. Le revenu mensuel moyen par utilisateur mobile s'élève à 6 euros

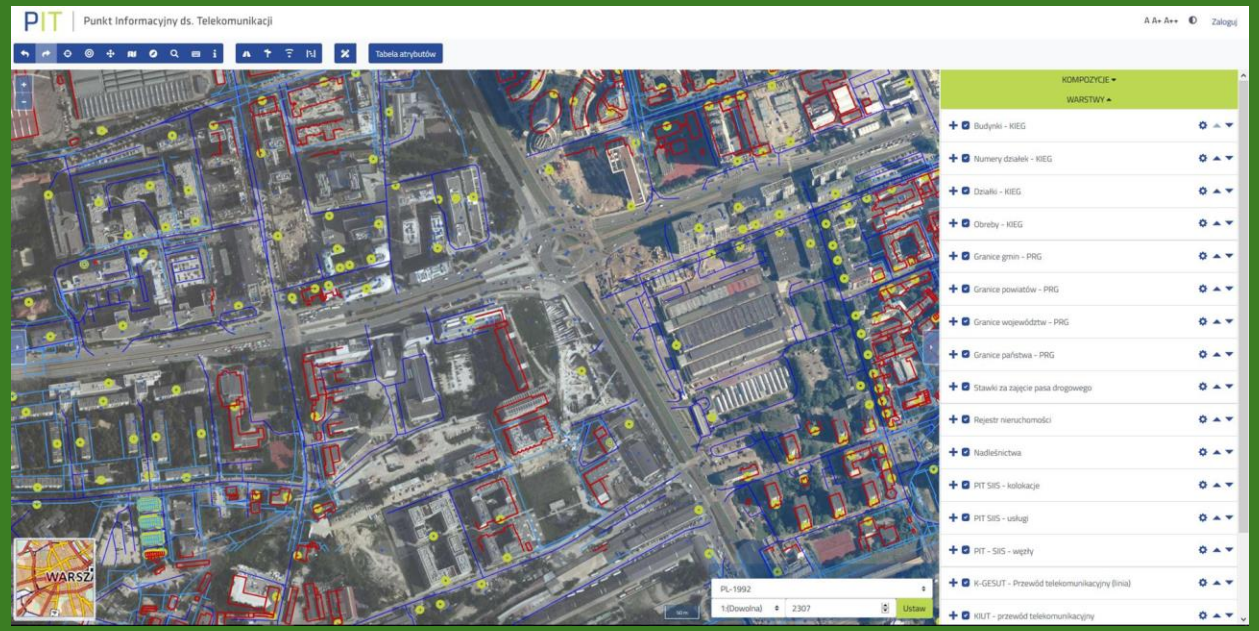
Big Picture

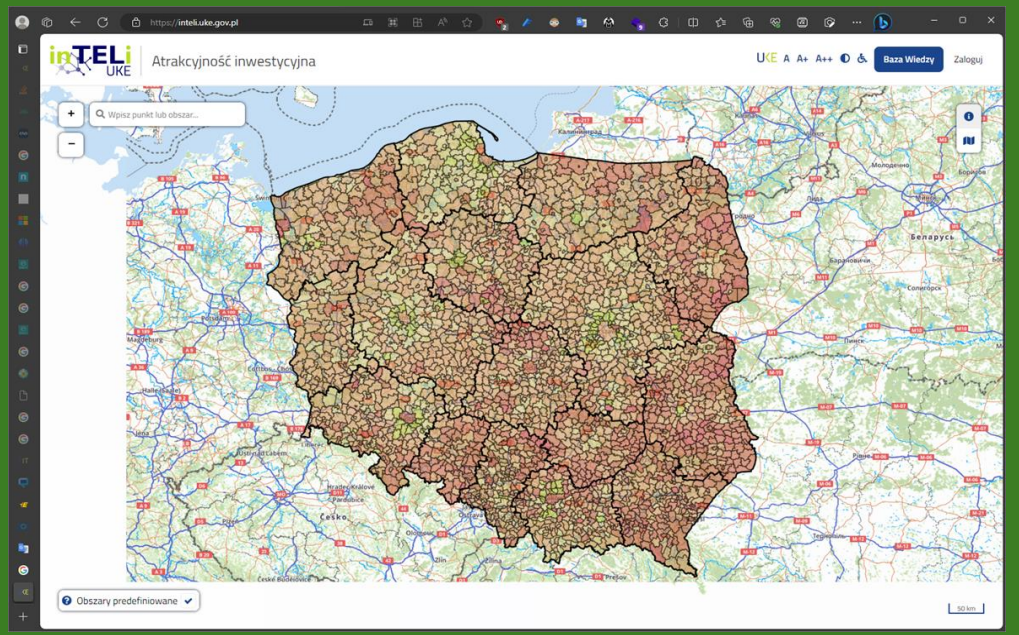
1. Données fournies par l'ensemble des opérateurs d'infrastructures (y compris les entreprises commerciales, les collectivités locales, les municipalités et autres parties prenantes)
2. L'UKE collecte et cartographie ces données depuis 2010
3. Le rapportage est défini par la législation polonaise et est entré en vigueur le 1er janvier 2022
4. Les données déclarées couvrent tous les éléments d'infrastructure : nœuds, points de flexibilité, tracés de lignes de câbles, lignes optiques, lignes sans fil, services aux points d'adresse, bâtiments permettant la colocalisation, infrastructures techniques existantes et planifiées, canalisations techniques, redevances d'occupation du domaine routier
5. L'infrastructure mobile est également incluse dans le rapportage
6. La collecte des données a lieu deux fois par an
7. La communication avec les parties prenantes s'effectue via le transfert de données dans un point d'information unique : https://pit.uke.gov.pl/pl-pl/strona-glowna/
8. La coordination entre les institutions gouvernementales permet d'obtenir un meilleur retour d'information pour les citoyens et les utilisateurs professionnels

Data – information - knowledge

En 2010, le gouvernement polonais a adopté la Loi sur le haut débit, également appelée « Mega-Act », qui soutient le développement des services et des réseaux de télécommunication. Il s'agit de la loi clé qui a lancé l'inventaire de l'infrastructure de télécommunication en Pologne.

L'article 29 de la Loi sur le haut débit constitue la base juridique pour l'élaboration de l'inventaire des infrastructures de télécommunication existantes et des réseaux publics de télécommunication sur le territoire polonais (sous forme électronique).





Single Information Point

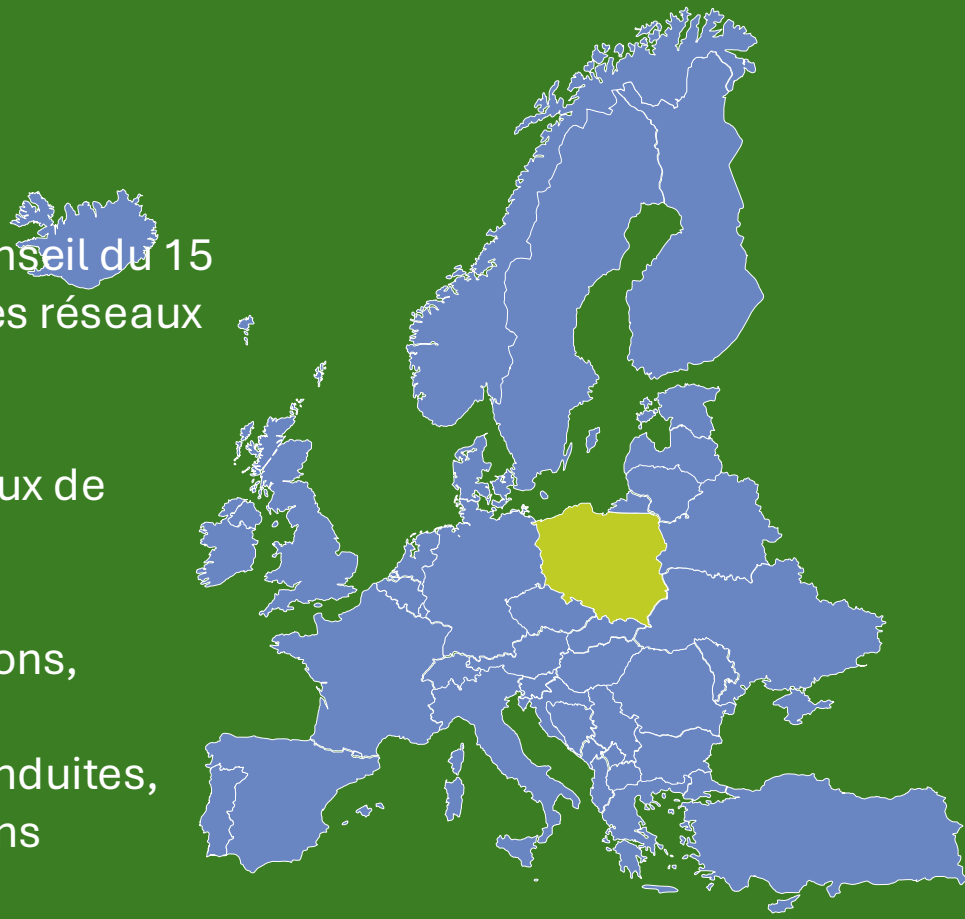
Le préambule de la Directive 2014/61/UE du Parlement européen et du Conseil du 15 mai 2014 relative à des mesures visant à réduire le coût du déploiement des réseaux de communications électroniques à haut débit souligne que :

1. la réduction des goulets d'étranglement liés à la coordination des travaux de génie civil,

2. la simplification des procédures administratives d'octroi des autorisations,

3. et l'utilisation des infrastructures passives existantes (telles que les conduites, canalisations, chambres de tirage, armoires, poteaux, mâts, installations d'antennes, tours et autres structures de support)

4. sont nécessaires pour contribuer à un déploiement rapide et étendu des réseaux de communications électroniques à haut débit.



SIP law in Poland

La Loi sur le soutien au développement des services et des réseaux de télécommunications définit :

1. les groupes d'informations à fournir au Président de l'UKE via le portail SIP ;
2. les entités tenues de transmettre ces informations au Président de l'UKE via le portail SIP ;
3. les délais de transmission des informations ;
4. ainsi que la méthode de transfert des données.

L'Ordonnance du Ministre des Affaires numériques du 31 juillet 2019 relative aux informations concernant l'infrastructure technique et les canaux technologiques, ainsi qu'aux tarifs des redevances d'occupation du domaine routier, précise :

1. le champ d'application détaillé des informations à fournir ;
2. le format électronique de transmission des données ;
3. et les modèles de formulaires à transmettre par les entités au Président de l'UKE, accompagnés d'explications sur la manière de les remplir.

Data collected in SIP

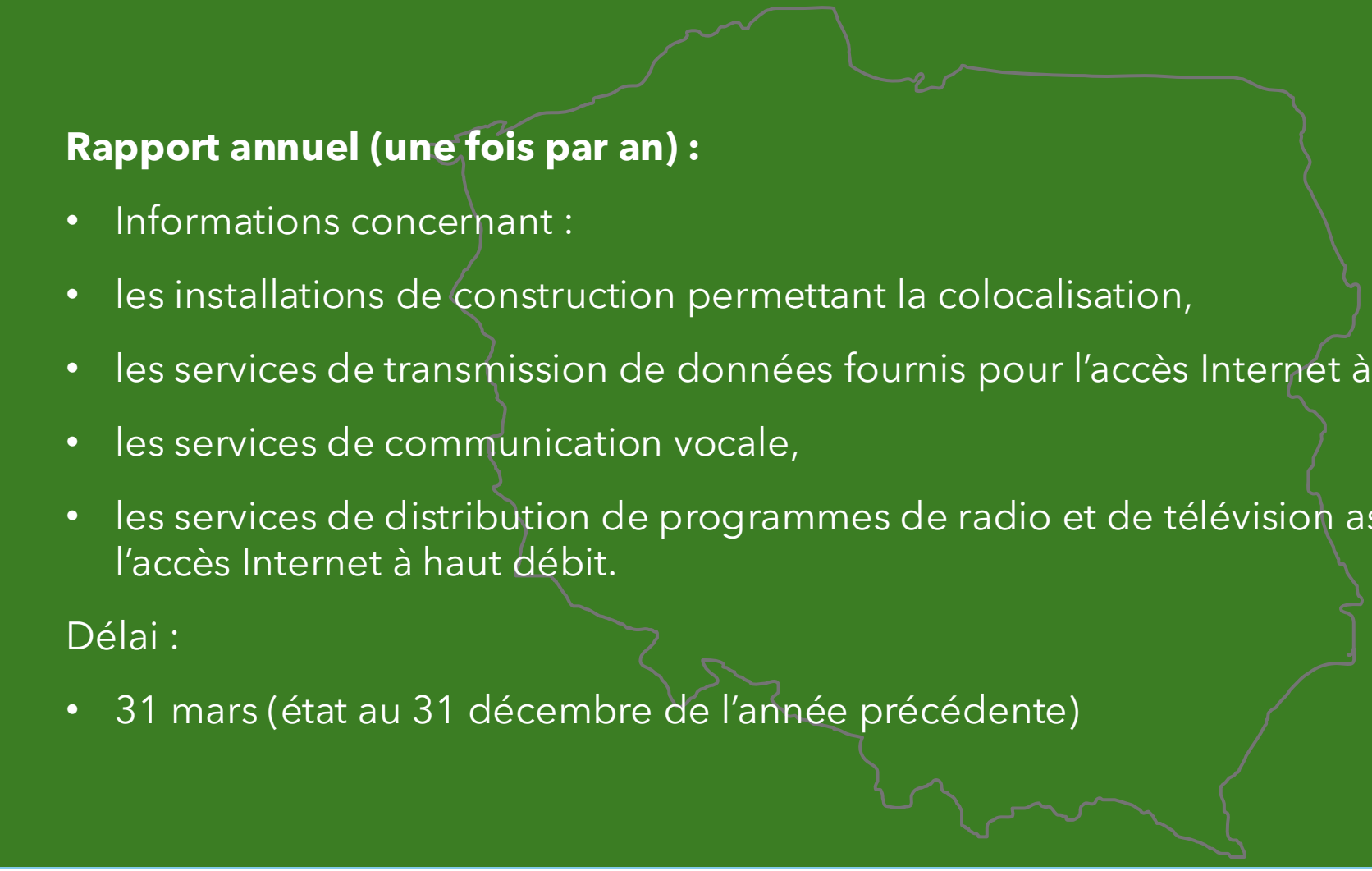
Infrastructures et services de télécommunication (article 29 de la « Mega-Act »)

1. Rapportage semestriel (deux fois par an) :
2. Informations concernant :
3. l'infrastructure de télécommunication détenue,
4. les réseaux publics de télécommunication,
5. les tracés des lignes de câbles à fibre optique fournissant ou permettant l'accès Internet à haut débit,

Les informations électroniques relatives aux lignes de câbles non fibrées fournissant ou permettant l'accès Internet à haut débit.

1. Délais :
2. 15 septembre (état au 30 juin)
3. 31 mars (état au 31 décembre de l'année précédente)

Data collected in SIP



Rapport annuel (une fois par an) :

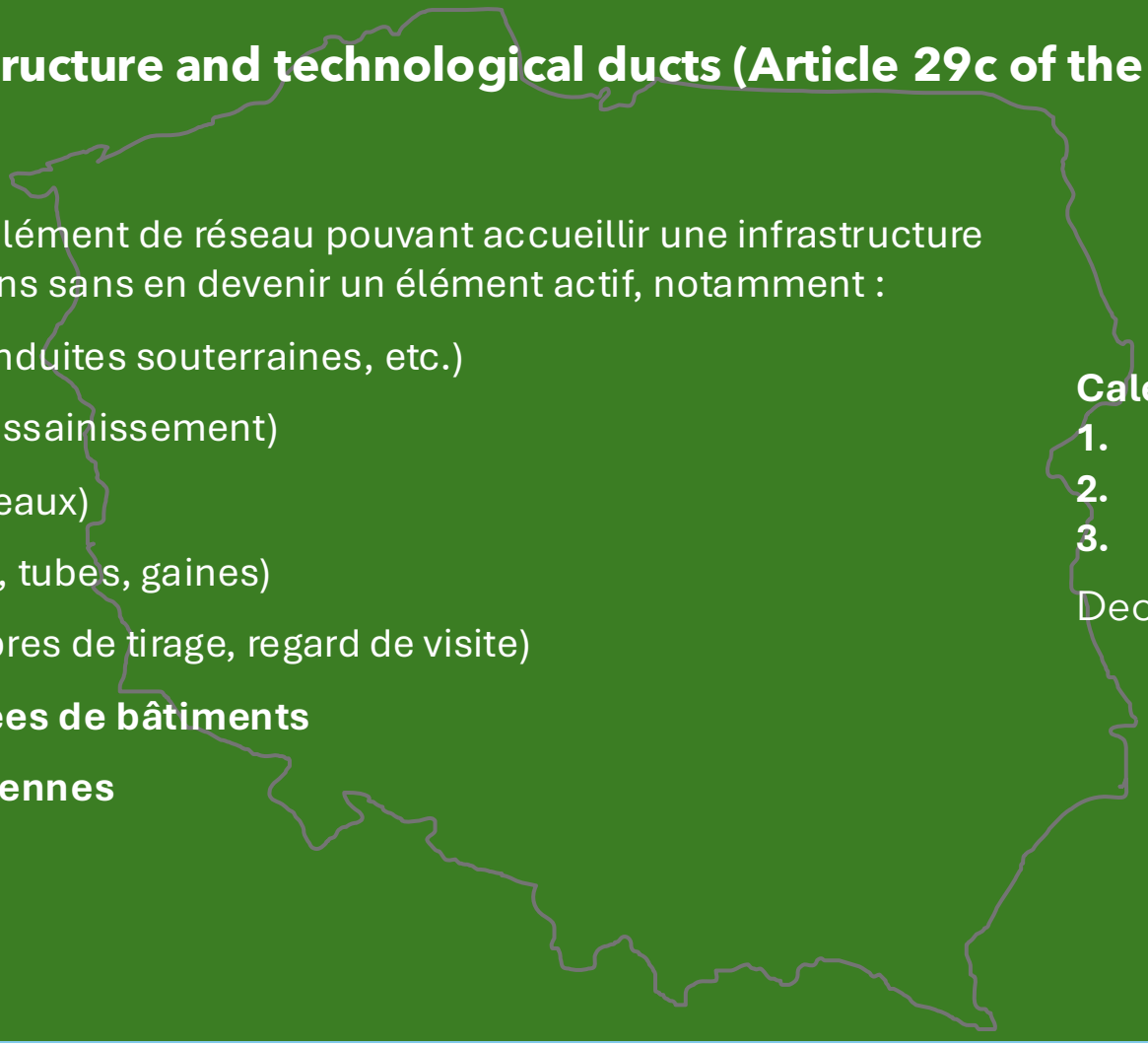
- Informations concernant :
- les installations de construction permettant la colocalisation,
- les services de transmission de données fournis pour l'accès Internet à haut débit,
- les services de communication vocale,
- les services de distribution de programmes de radio et de télévision associés à l'accès Internet à haut débit.

Délai :

- 31 mars (état au 31 décembre de l'année précédente)

Data collected in SIP

2. Technical infrastructure and technological ducts (Article 29c of the Mega-Act):



Toute infrastructure ou élément de réseau pouvant accueillir une infrastructure de télécommunications sans en devenir un élément actif, notamment :

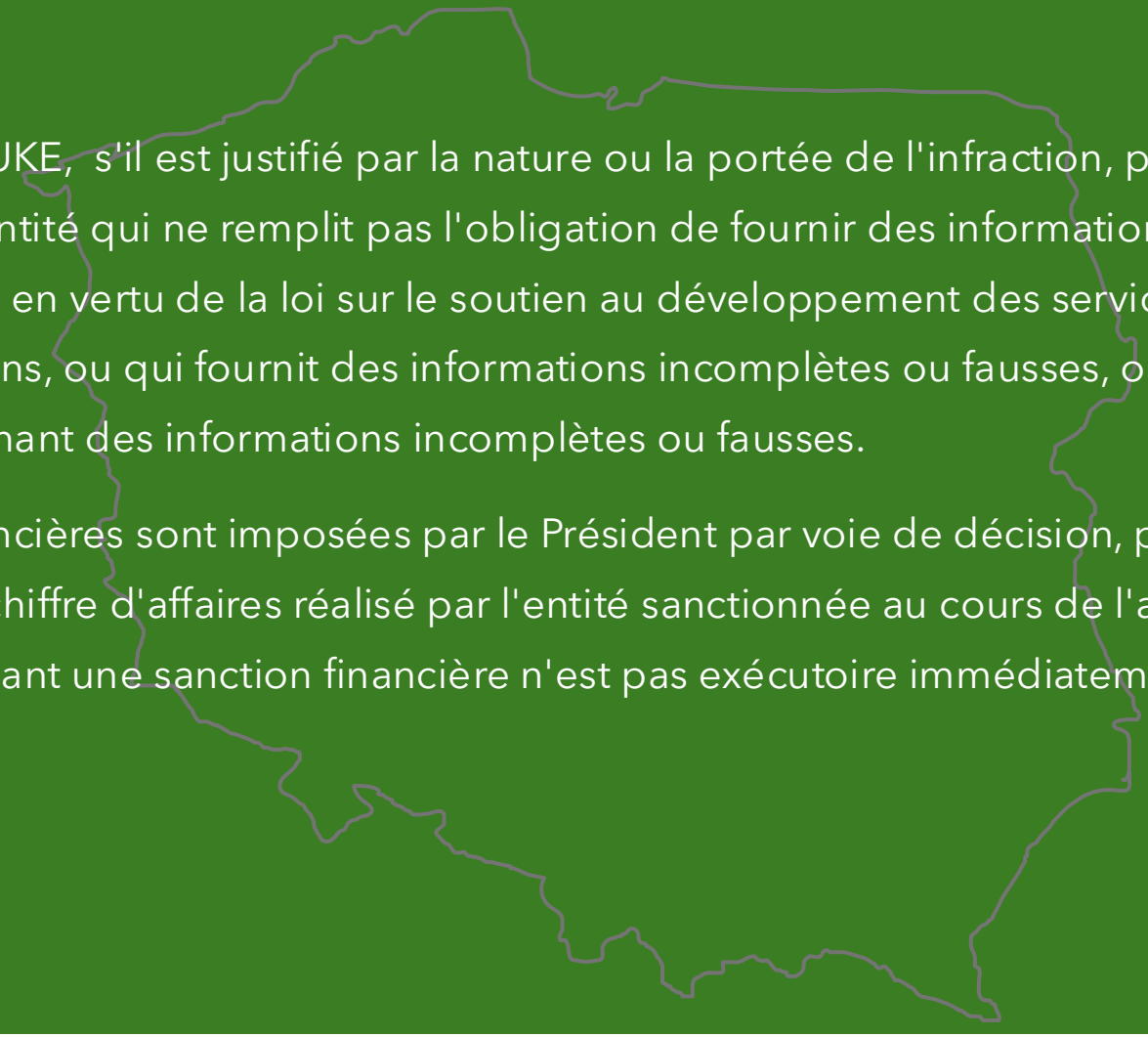
- **1. Canalisations** (Conduites souterraines, etc.)
- **2. Égouts** (Réseau d'assainissement)
- **3. Mâts** (Pylônes, poteaux)
- **4. Conduites** (Tuyaux, tubes, gaines)
- **5. Chambres** (Chambres de tirage, regard de visite)
- **6. Bâtiments et entrées de bâtiments**
- **7. Installations d'antennes**
- **8. Tours et poteaux**

Calendrier de communication :

1. **Fréquence :** Une fois par an
2. **Date limite :** 28 février
3. **Date de situation :**

December 31 of the previous year

Penalties



- Le Président de l'UKE, s'il est justifié par la nature ou la portée de l'infraction, peut imposer une sanction financière à une entité qui ne remplit pas l'obligation de fournir des informations ou de soumettre des documents requis en vertu de la loi sur le soutien au développement des services et des réseaux de télécommunications, ou qui fournit des informations incomplètes ou fausses, ou qui soumet des documents contenant des informations incomplètes ou fausses.
- Les sanctions financières sont imposées par le Président par voie de décision, pour un montant pouvant atteindre 3 % du chiffre d'affaires réalisé par l'entité sanctionnée au cours de l'année civile précédente. La décision imposant une sanction financière n'est pas exécutoire immédiatement.

Added Value

1. **Données d'infrastructure actuelles à l'échelle nationale.**
2. **Amélioration et optimisation du processus de planification, de conception et de construction des réseaux publics de télécommunications.** La planification et l'optimisation sont des enjeux cruciaux. Le chevauchement des câbles et des lignes de fibre optique, en particulier en zone rurale, peut être évité.
3. **Meilleure allocation des aides d'État aux investisseurs.** Planification de la couverture dans les zones blanches (ou « zones non couvertes »), qui peuvent être comblées par des infrastructures cofinancées par l'État ou l'UE.
4. **Identification des zones attractives pour les opérateurs commerciaux de réseaux de fibre optique** qui investissent sans aide d'État.
5. **Possibilité d'évaluer les zones où l'opérateur jouissant d'une PMF (Puissance de Marché Significative) détient une position dominante.** Le marché évolue très rapidement et la position dominante au niveau local (municipalité) peut changer en raison de nouveaux investissements.
6. **Soutien au modèle d'opérateurs de gros (wholesale) :** un seul grossiste pour plusieurs opérateurs de détail (retail).
7. **Observation de la distinction entre l'infrastructure de télécommunication et les services** aux niveaux national et local.

Interopérabilité au niveau gouvernemental

1. **Sécurité nationale** – les informations sur le réseau haut débit peuvent être partagées avec le Ministère de la Défense nationale.
2. **Valeur ajoutée pour les citoyens** : retour d'information sur les opérateurs d'accès à Internet de détail.

Benefits and challenges

Avantages

1. **Meilleur processus de régulation.**
2. **Données – information – connaissance** : l'UKE prend des décisions réglementaires « fondées sur la connaissance ».
3. **Possibilité de soutenir les propriétaires d'infrastructure.**
4. **Capacité de vérifier si la Pologne suit les initiatives de l'UE**, telles que le règlement sur l'infrastructure Gigabit (Gigabit Infrastructure Act).
5. **Identification des infrastructures qui se chevauchent** (par exemple, cuivre et fibre optique), l'infrastructure en cuivre étant destinée au démantèlement.
6. **Possibilité d'évaluer la part de marché de l'opérateur jouissant d'une PMF** (Puissance de Marché Significative) au niveau local (municipalités).
7. **Soutien au marché de gros du haut débit** (nous observons une distinction entre l'infrastructure et les services).

Défis

1. **Qualité des données** : trop de détails, problèmes de validation des données.
2. **« Trous dans les rapports »** : données manquantes ou incorrectes.
3. **Apprendre à identifier les données incorrectes.**
4. **Tracés de câbles** : tous les points de flexion (ou points d'inflexion) doivent être signalés (dans le système précédent, seule la relation entre le point de départ et le point d'arrivée était signalée, d'où des tracés de câbles incomplets).
5. **Graphiques vectoriels** : les opérateurs doivent apprendre à utiliser les graphiques vectoriels ; ils doivent être compatibles avec les systèmes de preuves de l'État.
6. **Formats de données** : il existe 7 formats de données (principalement `*.csv`, `geopack`) – le cas du Monténégro montre que 7 formats de données peuvent fonctionner, dans notre cas même 3 [formats seraient un défi].

Vidéo du système national de cartographie à l'arge bande en Pologne

Any question?

Thank you

PAGE BREAK

Technical Deep Dive: Architecture, Standards, Tools and Data Ecosystem

Mr. Dana Jon Kamason

Project Manager, Africa-BB-Maps, ITU

Africa-BB-Maps – Geospatial Software Choices for Burundi

ArcGIS

Africa-BB-Maps – Geospatial Software: Burundi's Choice

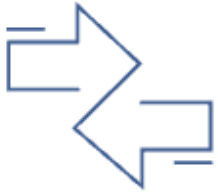
Africa-BB-Maps – Architected Pillars

Best Practice and Design Recommendations

Security

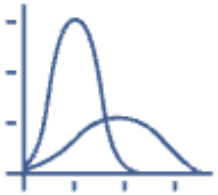
Performance & Scalability

Reliability



Integration

Automation



Observability

Africa-BB-Maps – Architected Systems Patterns

Geospatial in Nature, Supports Multiple Deployment Models

Location Services

Self-service mapping, analysis, and sharing

Enterprise application hosting and management

Data editing and management

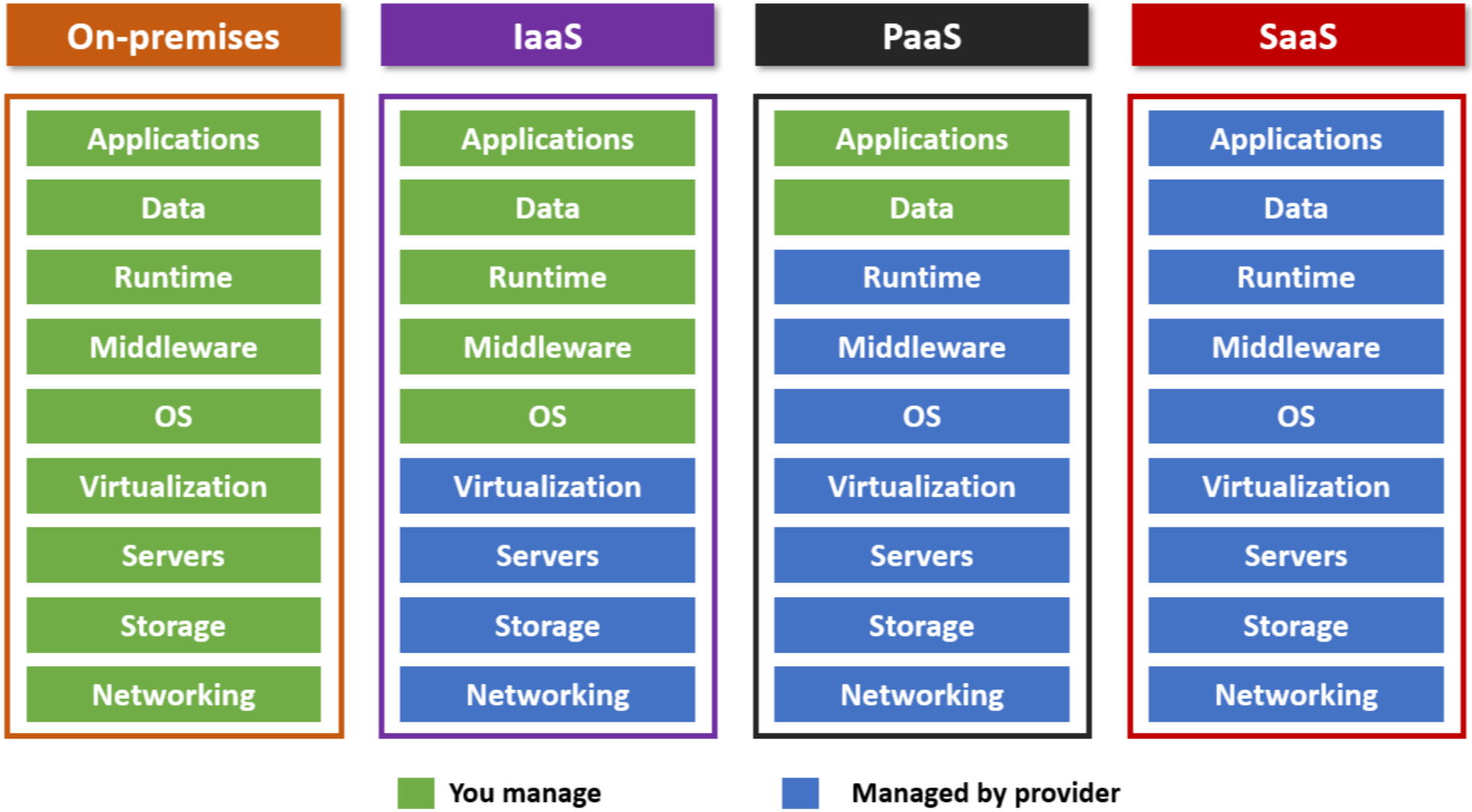
Imagery data management and analysis

Mobile operation and offline data management

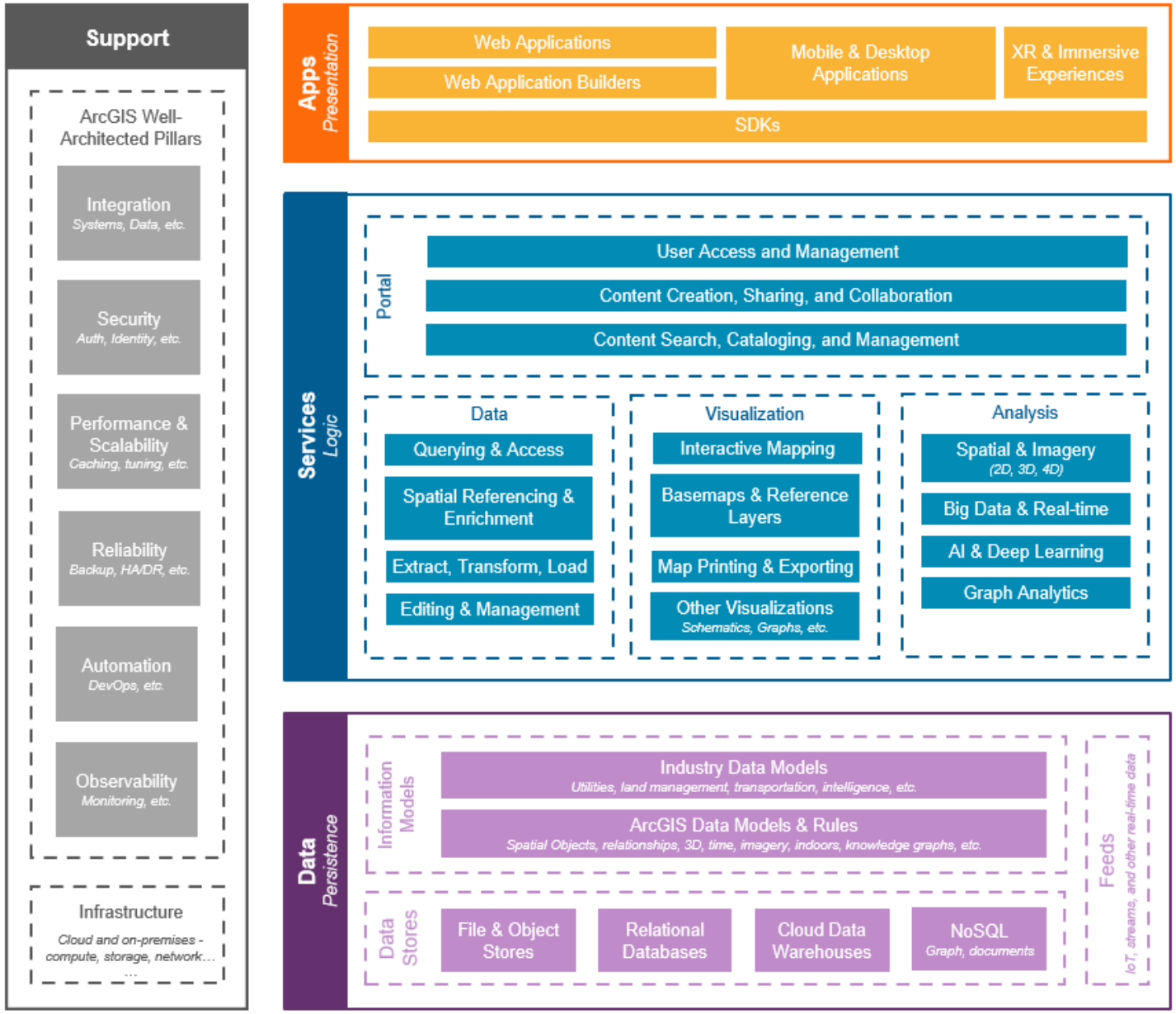
Real-time data streaming and analytics

Big data analytics

Africa-BB-Maps – Infrastructure Deployment Model

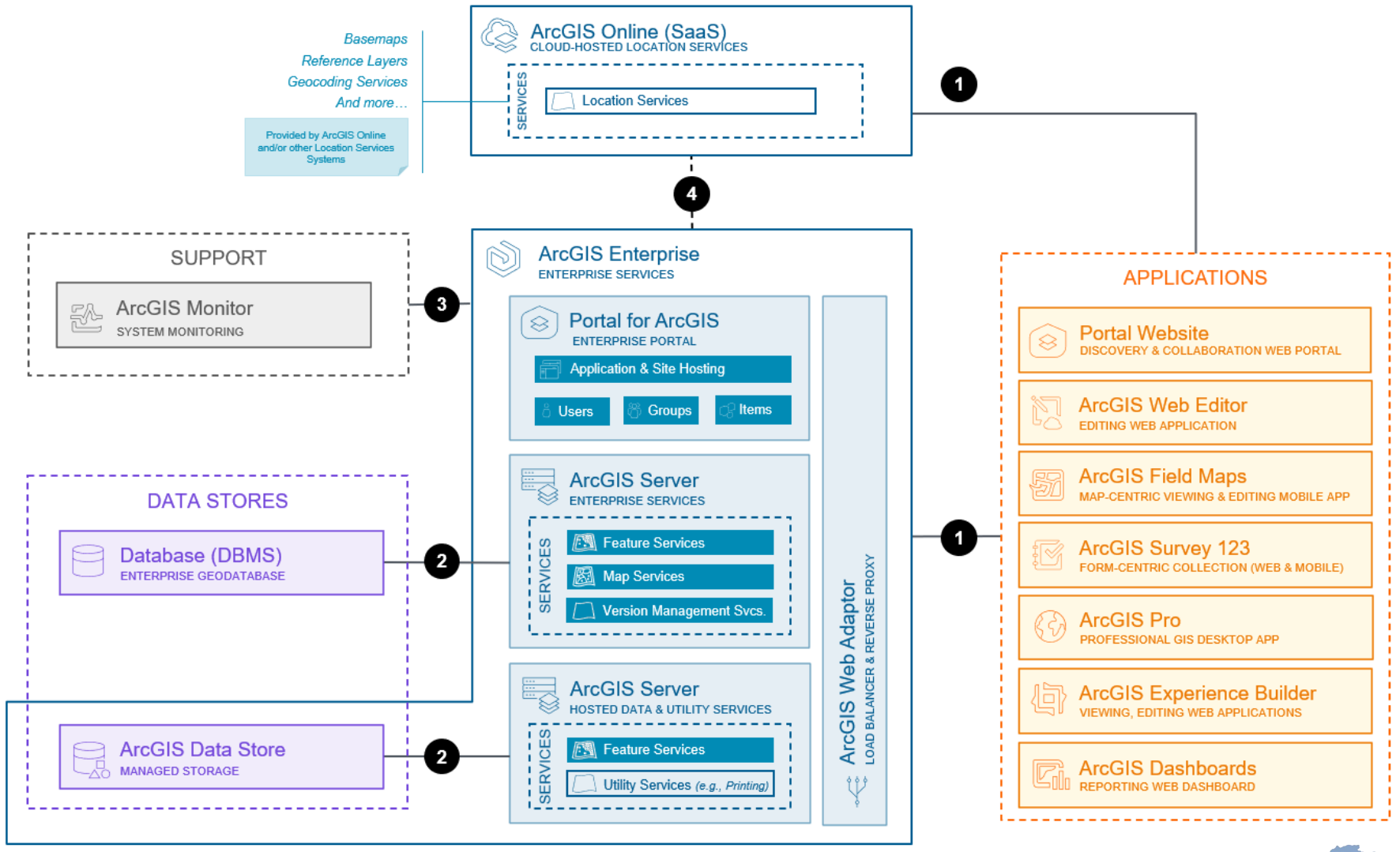


Africa-BB-Maps – Enterprise GIS Architecture



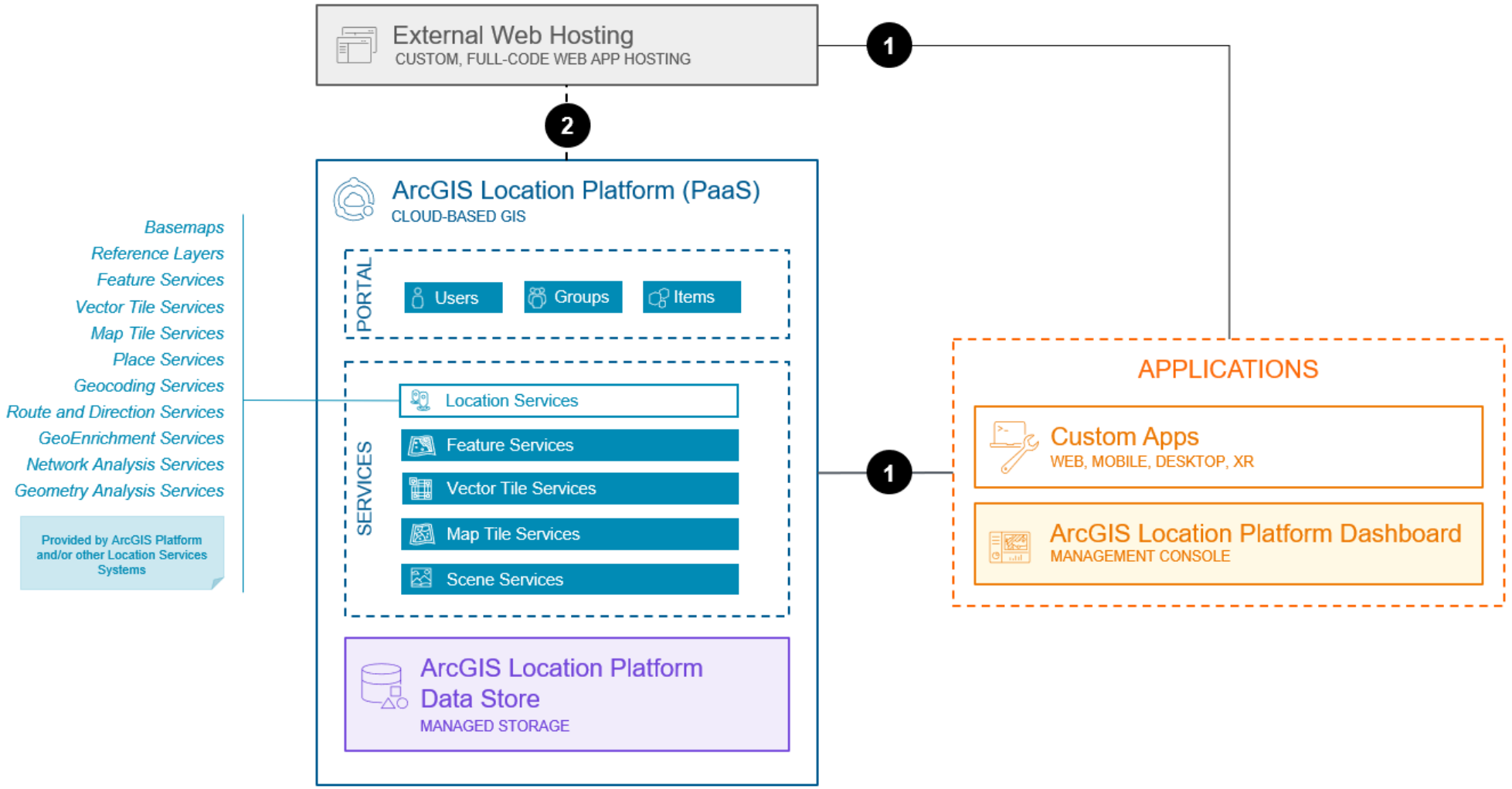
Source: Esri

Africa-BB-Maps – ArcGIS IaaS/On-Premises



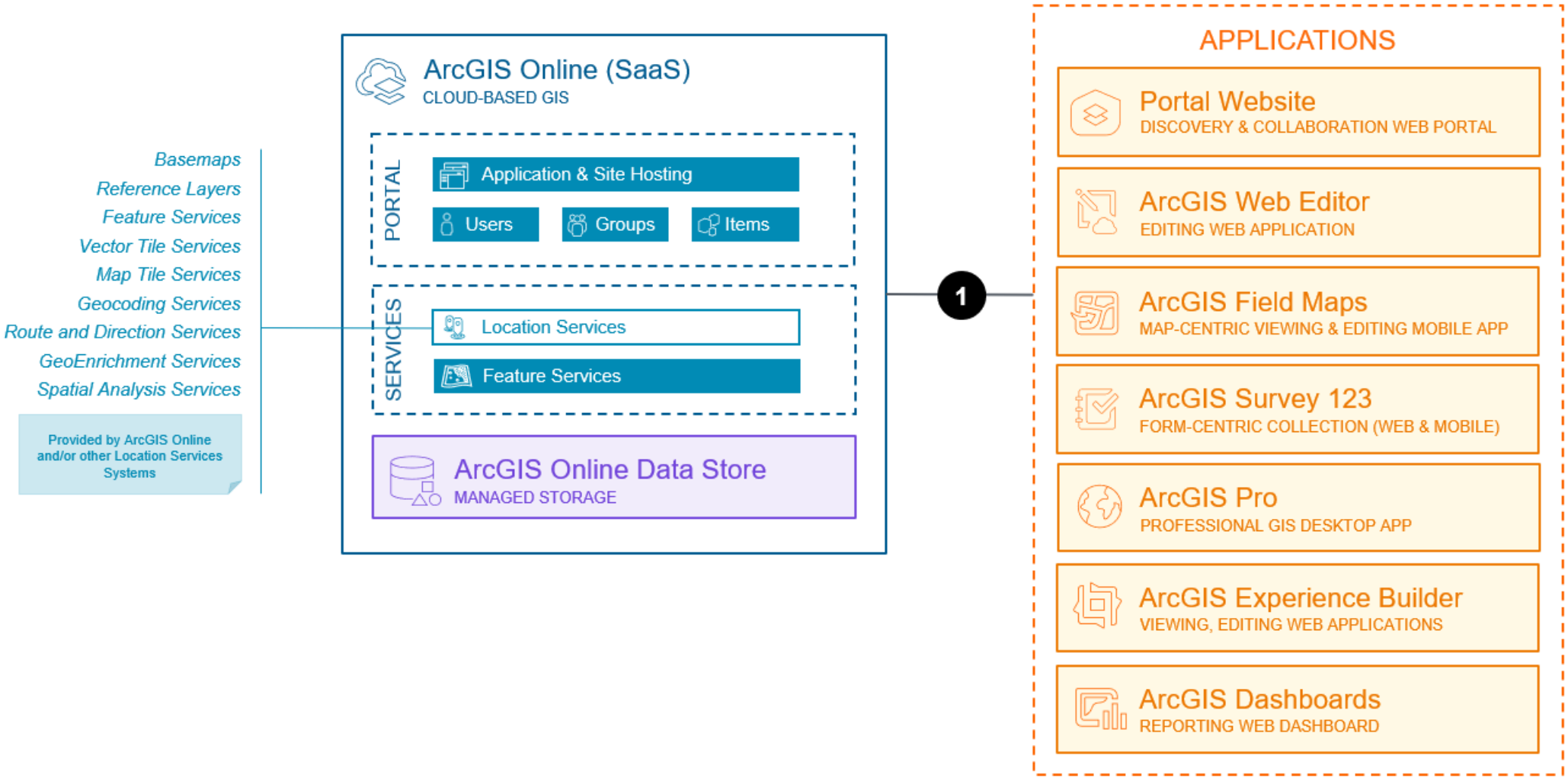
Source: Esri

Africa-BB-Maps – ArcGIS PaaS



Source: Esri

Africa-BB-Maps – ArcGIS SaaS



Source: Esri

Geospatial
Open Source Solutions

Africa-BB-Maps – Geospatial Open Source Software

https://www.osgeo.org/

Africa-BB-Maps – Geospatial Open Source Projects

deegree

deegree is open source software for spatial data infrastructures and the geospat...

Website Source Documentation

GDAL/OGR

GDAL is a C++ translator library for more than 200 raster and vector geospatial ...

Website Source Documentation

GeoMoose

GeoMoose is a Web Client JavaScript Framework for displaying distributed cartogr...

Website Source Documentation

gvSIG Desktop

gvSIG is a powerful, user-friendly, interoperable GIS used by thousands o...

Website Source Documentation

Mapbender

Mapbender is a web based geoportal framework to publish, register, view, navigat...

Website Source Documentation

MapServer

Known as one of the fastest mapping engines in the world, MapServer is an Open S...

Website Source Documentation

GeoNetwork

A catalog to manage spatially referenced resources. It provides powerful metadat...

Website Source Documentation

GeoNode

GeoNode is a web-based application and platform for developing geospatial inform...

Website Source Documentation

GEOS

GEOS (Geometry Engine – Open Source) is a C++ port of the Java Topology Su...

Website Source Documentation

Marble

Versatile, yet easy to use. Use Marble similar to a desktop globe; pan around an...

Website Source

OpenLayers

OpenLayers makes it easy to put a dynamic map in any web page. It can display ma...

Website Source Documentation

Orfeo ToolBox

Orfeo ToolBox is an open-source project for state-of-the-art remote sensing, inc...

Website Source Documentation

GeoServer

Designed for interoperability, GeoServer publishes data from any major spatial d...

Website Source Documentation

GeoTools

An open source Java library providing a standards compliant approach for visuali...

Website Source Documentation

GRASS

GRASS is a powerful computational engine for raster, vector, and geospatial proc...

Website Source Documentation

OSGeoLive

OSGeoLive is a self-contained bootable DVD, USB thumb drive or Virtual Machine b...

Website Source Documentation

pgRouting

pgRouting extends the PostGIS / PostgreSQL geospatial database providing routing...

Website Source Documentation

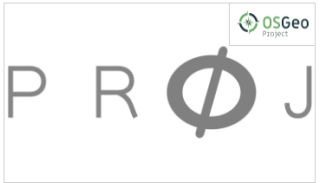
PostGIS

PostGIS adds GIS spatial types and support to PostgreSQL. It is used by Database...

Website Source Documentation

https://www.osgeo.org/projects/

Africa-BB-Maps – Geospatial Open Source Projects



PROJ

PROJ is a generic coordinate transformation software that transforms geospatial ...

Website Source Documentation

pycsw

pycsw is an OGC CSW server implementation written in Python. Started in 2010 (mo...

Website Source Documentation

pygeoapi

pygeoapi is an OGC API to geospatial data

Website Source Documentation

FDO

FDO Data Access Technology is an API for manipulating, defining and analyzing ge...

Website Documentation

GC2/Vidi

A platform for building spatial data infrastructure and deploying browser based ...

Website Source Documentation

GeoExt

A JavaScript Toolkit for Rich Web Mapping Applications

Website Source Documentation

PyWPS

PyWPS is an implementation of the Web Processing Service standard from the Open ...

Website Source Documentation

QGIS Desktop

QGIS is the leading Free and Open Source Desktop GIS. It allows you to create, e...

Website Source Documentation

ZOO-Project

ZOO-Project is a C-based WPS (Web Processing Service) implementation. It is an o...

Website Source Documentation

GeoHealthCheck

GeoHealthCheck is a Python application to support monitoring OGC Web Services up...

Website Source Documentation

GeoServer Client PHP

GeoServer Client PHP is library for interacting with the GeoServer API.

Website Source Documentation

GeoStyler

generic styler for geodata

Website Source Documentation

actinia

Actinia is an open source REST API for scalable, distributed, high performance p...

Website Source Documentation

EOEPCA+

EOEPCA+'s vision is to streamline the access to and processing of earth observat...

Website Documentation

ETF

ETF is a testing framework for validating data and APIs in Spatial Data Infrastr...

Website Source Documentation

GeoWebCache

GWC is a tile server and caching proxy written in Java.

Website Source Documentation

Giswater

An intelligent technology, free and open source for the integral water cycle man...

Website Source Documentation

istSOS

IstSOS is an OGC Sensor Observation Service server implementation written in Pyt...

Website Source Documentation

https://www.osgeo.org/projects/

Africa-BB-Maps – Geospatial Open Source Projects

Loader

A loader for geographic data in GML and KML (that needs some preparation before ...

Website Source Documentation

mapfish

Create reports that contain maps!

Website Source Documentation

MapGuide Open Source

MapGuide Open Source is a web-based platform that enables users to develop and d...

Website Source Documentation

OSSIM

OSSIM is an open source, C++ (mostly), geospatial image processing library used ...

Source

OWSLib

OWSLib is a Python package for client programming with Open Geospatial Consortiu...

Website Source Documentation

Portable GIS

GIS on a USB stick, for windows

Website Source Documentation

mappyfile

A Python library to create, parse, modify, and format MapServer Mapfiles....

Website Source Documentation

Mesh Data Abstraction Library (MDAL)

Mesh Data Abstraction Library (MDAL) is a translator library for more than 15 un...

Website Source Documentation

MobilityDB

An open source geospatial trajectory data management & analysis platform...

Website Source Documentation

PROJ-JNI

PROJ-JNI provides a Java Native Interface for PROJ C/C++ library....

Website Source Documentation

Pronto Raster

Pronto Raster is a C++ library for calculations with raster data. The library is...

Website Source Documentation

rasdaman

Scalable datacube analytics

Website Source Documentation

Open Data Cube

The Open Data Cube is a Python library and suite of supporting applications that...

Website Source Documentation

Opticks

Opticks is an expandable remote sensing and imagery analysis software platform t...

Website Source

OSGeo4W

OSGeo4W is a binary distribution of a broad set of open source geospatial softwa...

Website Source Documentation

TEAM Engine

The Test, Evaluation, And Measurement (TEAM) Engine is a testing facility that e...

Website Source Documentation

TorchGeo

TorchGeo: datasets, samplers, transforms, and pre-trained models for geospatial ...

Website Source Documentation

XYZ / MAPP

Open source presentation, controller, domain, and service layers for cloud nativ...

Website Source Documentation

https://www.osgeo.org/projects/

Africa-BB-Maps – Geospatial Open Source Projects

Bezitopo

A land surveying CAD package under development

Website Source

CoastalME

CoastalME (Coastal Modelling Environment) is a Free Open Source and Software for...

Website Source Documentation

DigiAgriApp

DigiAgriApp is a software solution aimed at anyone with cultivated land....

Website Source Documentation

eodash

Publish and integrate Earth Observation data in a dashboard application through ...

Website Source Documentation

EOxServer

EOxServer is a Python application and framework for presenting Earth Observation...

Website Source Documentation

ESA-NASA WorldWind

WorldWind is a free, open source API for a virtual globe. WorldWind allows devel...

Website Source

First Draft GIS

First Draft GIS is an Artificial Intelligence that makes the first draft of a ma...

Website Source Documentation

Flexurba

Flexurba is an open-source R package to flexibly reconstruct the Degree of Urban...

Website Source Documentation

Geomajas - OSGeo Heritage Project

Note: This project is an OSGeo Heritage Project – it is no longer maintain...

Source

GeoMesa

GeoMesa is an open-source, distributed, spatio-temporal database built on a numb...

Website Source Documentation

Geopaparazzi

Geopaparazzi is a tool developed to do very fast qualitative engineering/geologi...

Website Source Documentation

geOrchestra

geOrchestra is the free, modular, interoperable & secure Spatial Data Infras...

Website Source Documentation

GeoTrellis

GeoTrellis is a geographic data processing library designed to work with large g...

Website Source Documentation

GeoWave

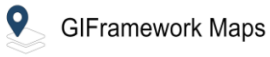
GeoWave is a software library that connects the scalability of distributed compu...

Website Source Documentation

GET-IT - Geoinformation Enabling ToolkIT starterkit®

The Geoinformation Enabling ToolkIT starterkit® (GET-IT) is the software suite f...

Website Source Documentation



GIFramework Maps

GIFramework Maps is a .NET based web mapping application designed and developed ...

Website Source Documentation

Giro3D

Giro3D is an open-source JavaScript framework for visualizing and interacting wi...

Website Source Documentation

Gisquick

Let's share GIS much quicker!

Website Source Documentation

https://www.osgeo.org/projects/

Africa-BB-Maps – Geospatial Open Source Projects

HOT Tasking Manager

The purpose of the Tasking Manager is to divide a large mapping project into sma...

Website Source Documentation

JTS Topology Suite

JTS is an open source spatial library defining geometry, spatial relationships, ...

Website Source Documentation

Kaoto

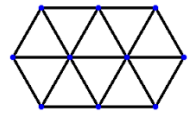
Kaoto is an integration editor to create and deploy workflows in a visual, low-c...

Website Source Documentation

pdal

The Point Data Abstraction Library (PDAL) provides command line tools and a libr...

Website Source Documentation



PerfectTIN

Converts point clouds to TINs

Source

py3dtiles

Python library and command-line for 3dtiles

Website Source Documentation

Koop

An Open Geospatial ETL Engine so you can leave geospatial data where it lives an...

Website Source Documentation

Leaflet

Open-source JavaScript library for mobile-friendly interactive maps

Website Source Documentation

LERC Limited Error Raster Compression

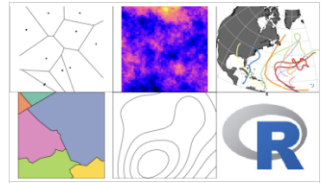
LERC is an open-source image or raster format which supports rapid encoding and ...

Website Source Documentation

QField

Get your QGIS fieldwork done efficiently and comfortably.

Website Source Documentation



R-Spatial

A set of R packages for handling and analysing spatial data, built upon OSGeo co...

Website Source Documentation

RasterFrames

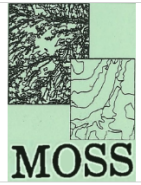
RasterFrames® enables analysts, data scientists and EO specialists to easily...

Website Source Documentation

Masterportal

Masterportal is an open source geoviewer (WebGIS) compliant to OGC standards. It...

Website Source Documentation



MOSS

Map Overlay and Statistical System (MOSS) The Map Overlay and Statistical System...

Website Source Documentation

MovingPandas

Python library for movement trajectory data exploration and analysis.

Website Source Documentation

SFCGAL

SFCGAL is a C++ wrapper library around CGAL (Computational Geometry Algorithms L...

Website Source Documentation

Tegola

Tegola is a high performance Mapbox Vector Tile server written in Go. In a nutsh...

Website Source

Terra Draw

Terra Draw is an open source JavaScript library for drawing and editing geometri...

Website Source Documentation

https://www.osgeo.org/projects/

Geospatial Open Data

Africa-BB-Maps – Geospatial Open Data

‘Open Data applies the principles of ***free and open*** to geospatial data’

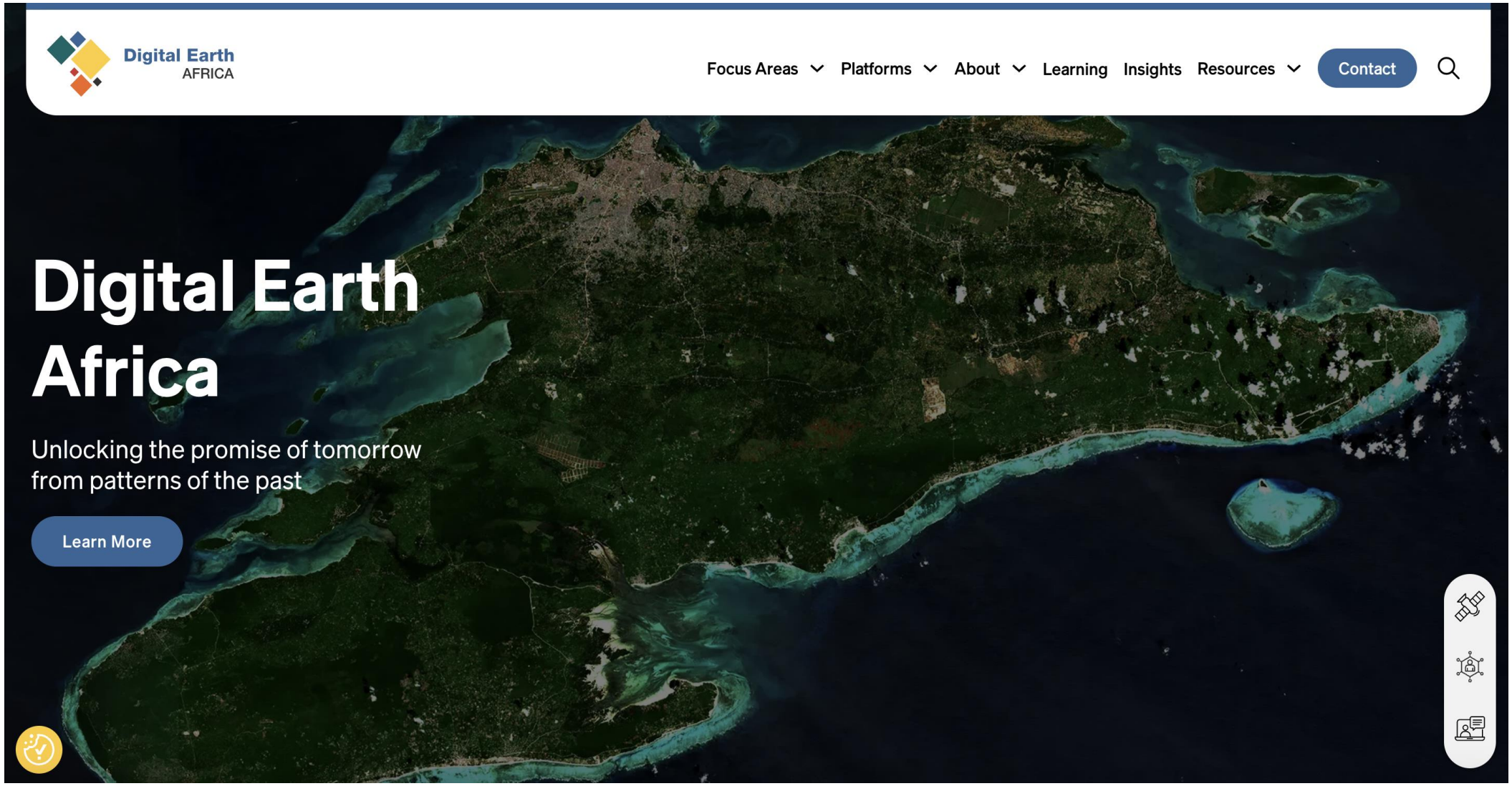
Africa-BB-Maps – Geospatial Open Data (Global)

https://www.openstreetmap.org

Africa-BB-Maps – Geospatial Open Data (Global)

https://www.copernicus.eu/en/access-data/conventional-data-access-hubs

Africa-BB-Maps – Geospatial Open Data (Africa)

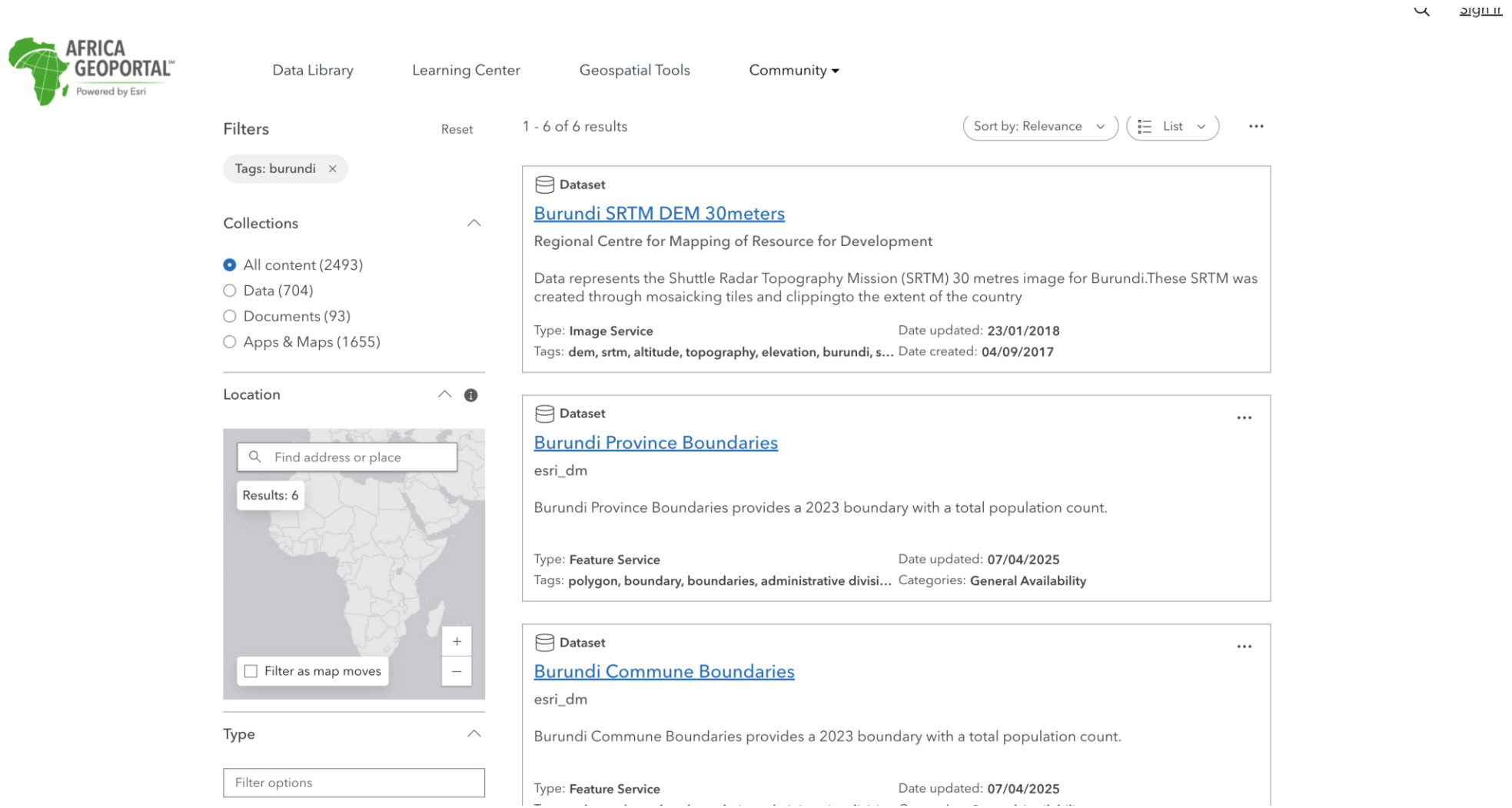


https://digitalearthafrica.org/en_za

Africa-BB-Maps – Geospatial Open Data (Africa)

https://www.africageoportal.com

Africa-BB-Maps – Geospatial Open Data (Burundi)



https://www.africageoportal.com

Merci

Est-ce que vous avez des questions?

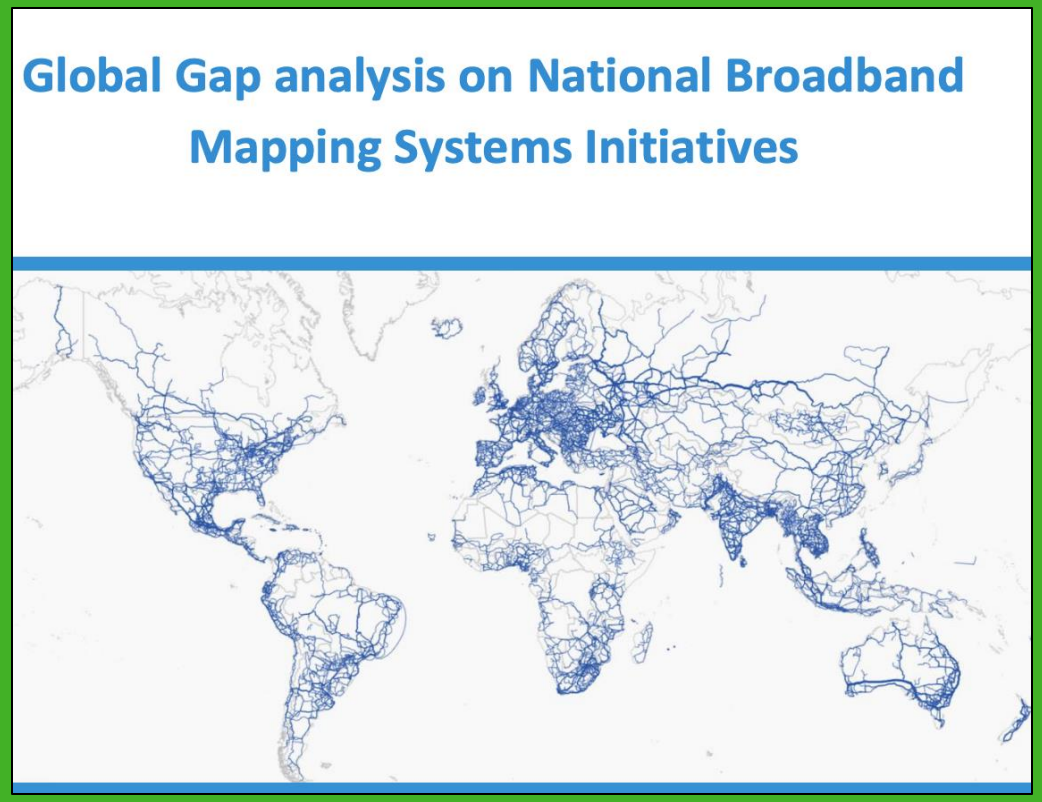
PAGE BREAK

Policy Deep-dive: Presentation of upcoming Policy Analysis work

Mr. Elind Sulmina

Project Officer, Africa-BB-Maps, ITU

Framework for our policy action



Global Gateway

Policy Deep-dive: Structure

Section	Title
1.1	Background
1.2	Context
1.3	Problem statement
1.4	Purpose of the guidelines

Policy Deep-dive: Presentation of upcoming Policy Analysis work

2.1	Strategic and policy drivers for broadband mapping
2.2	A regulatory framework for mapping
2.2.1	The EU Guidelines on State Aid for Broadband (2013)
2.2.2	The Broadband Cost Reduction Directive (2014)
2.2.3	The European Electronic Communications Code (2018)
2.3	Regulatory improvements and developments
2.3.1	Revision of the EU Guidelines on State Aid for Broadband
2.3.2	Revision of the Broadband Cost Reduction Directive
2.3.3	BEREC's implementation of the EECC
2.3.4	The EU experience in the field of dispute settlement mechanism
2.4	Minimum policy and regulatory requirements to implement a broadband mapping system

Policy Deep-dive: Presentation of upcoming Policy Analysis work

3.1	Project setup
3.1.1	Project framework and objectives
3.1.2	Project design
3.3	Minimum technical and project requirements to implement a broadband mapping system

Policy Deep-dive: Presentation of upcoming Policy Analysis work

4.2 General Success Factors
4.2.1 Stakeholder involvement
4.2.2. Clear definition on types of mapping
4.2.3. Internal sponsorship
4.2.4 Efficient reporting tool
4.2.5 Reporting support

4.1	**Data quality**
4.1.1	Data confidentiality
4.1.2	Data sources
4.1.3	Reporting types
4.1.4	Regulation
4.1.5	Stakeholder costs

4.3 Long term sustainability
4.3.1 Investment in reporting tools
4.3.2 Collection tool adaptability and development
4.3.3 Visualisation tools
4.3.4 Tools' promotion
4.3.5 Data application
4.3.6 Open-source solutions
4.3.7 Change management

Checklist 1

Checklist 1 - Policy and Regulatory Checklist

1. Define the rationale and objectives for broadband mapping at the country level
2. Identify relevant institutions and stakeholders and their roles
3. Include the rationale and mandate in strategic documents (e.g., broadband plans, ICT strategies)
4. Provide a platform for long term engagement and consultation with all stakeholders (operators, regional and local administrations, etc.)
5. Analyse the legislative framework and propose reform as needed - Infrastructure sharing (infrastructure mapping) - Allocation of public funding (service mapping) - Objective of the map - Obligation for the authority to deliver the map - Obligation for stakeholders to provide information - Other
6. Ensure the NRA (or other Competent Authority) has the necessary mandate, budget and human resources to implement the provisions of the law
7. Define common technical definitions and methods to carry out the broadband mapping exercise. Consult with stakeholders.
8. Establish a dispute settlement mechanism fit for the national context
9. Plan regular evaluations of the mapping and of its the usefulness in fulfilling its objectives. adjust the map and any related normative provisions, if necessary, in accordance with the assessment, changes in objectives or legal/regulatory framework every 4-5 years to ensure they are fit for purpose
OUTPUT: review of enabling environment and recommendations and/or report describing existing boundaries of the regulatory framework for broadband mapping

PAGE BREAK

Co-Creation on Architecture, Governance and Policies & Regulation

Group 1

Systems Architecture & Deployment Models

Key Area:

- Proprietary / Open source
- Deployment Model

Architected Pillars

- Security
- Performance
- Scalability
- Integration
- Reliability

Group 2

Data Governance Framework

Key Area:

- Data: Governance,
  - Data Standardization,
  - Data Validation,
  - Data Classification
  - Data Quality

Group 3

Policy and Regulation

Key Area:

- Internal, legal or policy barriers;
- Coordination challenges between data providers and ARCT
- Institutional limitations
- National & Regional harmonization

Groupe 1

Architecture des Systèmes et Modèles de Déploiement

Domaine Clé :

- Propriétaire / Open source
- Model de Déploiement

Piliers architecturaux

- Sécurité
- Performance Scalabilité
- Intégration
- Fiabilité

Groupe 2

Cadre de Gouvernance des Données

Domaine Clé

- Gouvernance des Données,
- Standardisation
- Validation,
- Assurance Qualité des Données

Group 3

Politique et réglementation

Domaine Clé

- Barrières internes, légales ou politiques;
- Défis de coordination entre les fournisseurs de données et ARCT
- Propriété et confidentialité des données
- Limitations institutionnelles
- Harmonisation nationale et régionale

PAGE BREAK

National Roadmap – Training Programme, Final Timeline & Next Steps

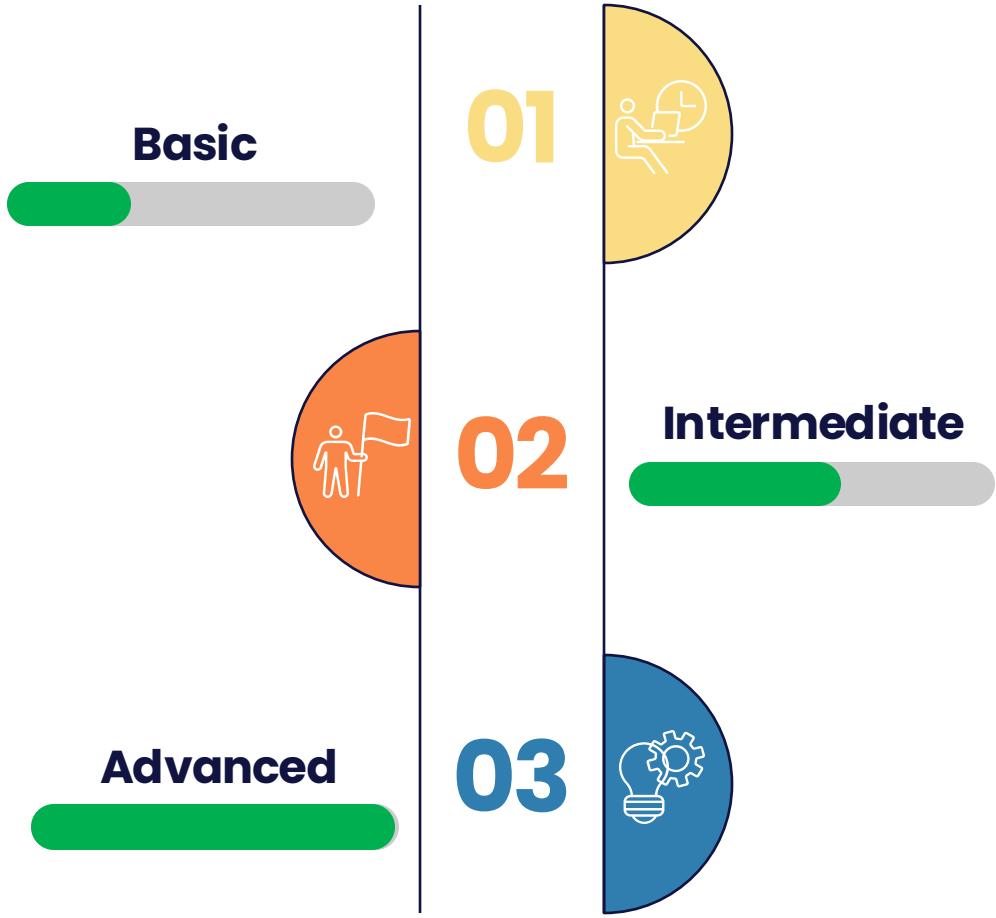
Mr. Dana Jon Kamason

Project Manager, Africa-BB-Maps, ITU

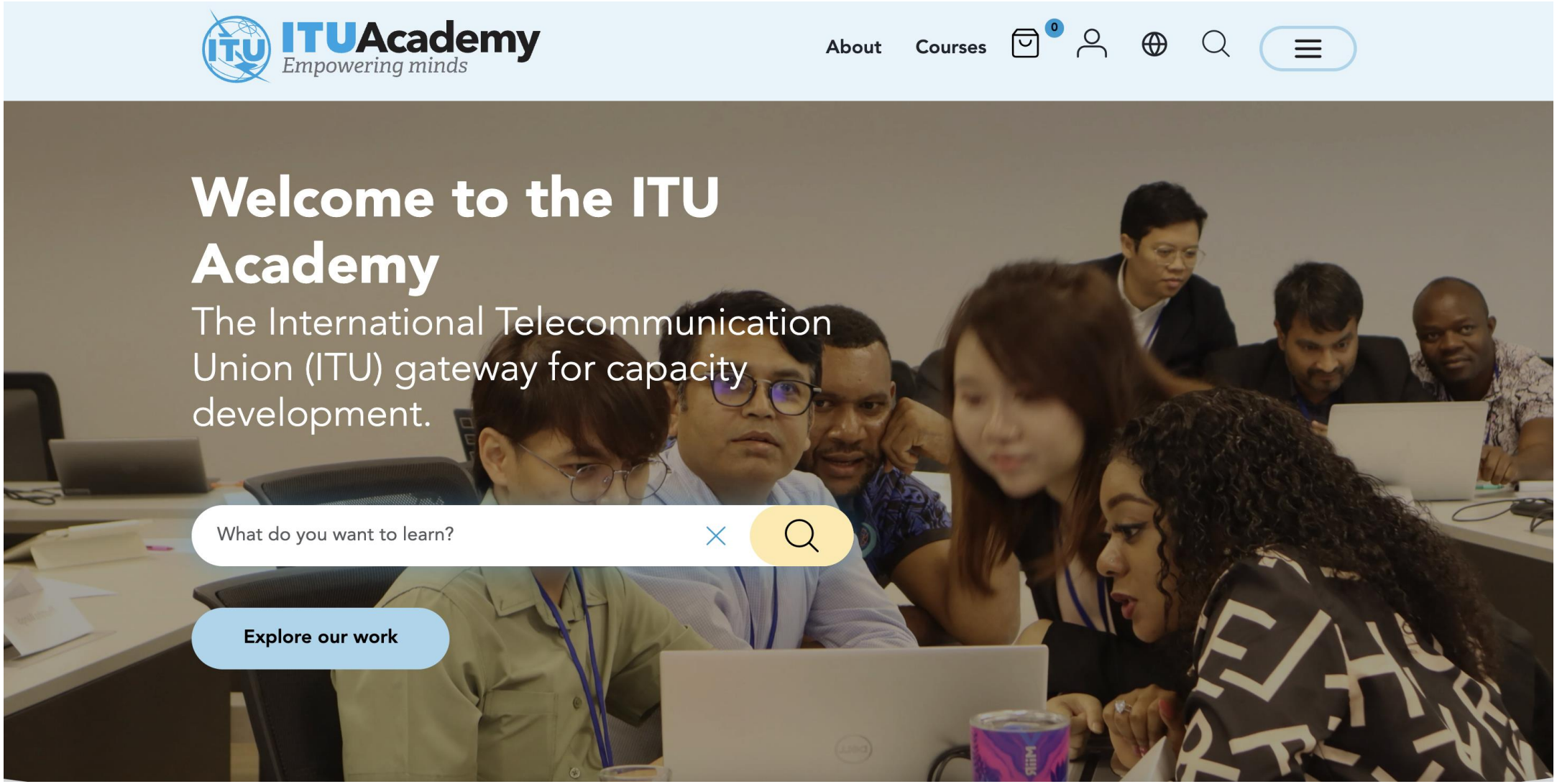
Africa-BB-Maps – ARCT's Orchestrating Role

Africa-BB-Maps – Capacity Development Roadmap for Burundi

GIS, Data, Policy



Africa-BB-Maps – Capacity Development Delivery Platform



https://academy.itu.int/

Africa-BB-Maps – Capacity Development Framework (2026-2028)

	GIS	DATA	POLICY
Format	Online Self-Study Online Instructure-Led In-Person Workshops Training-the-Trainer	Online Self-Paced Online Instructor-Led In-Person Workshops Conferences	Webinars Regional Policy Labs EU Study Visits Structured Workshops
Approach	Hands-On Practical Application Accelerated Skill Progression	Standard-Based Data Management Applied Analytics	Peer Learning Exposure to EU Practices Evidence-Based Regulation
Target Audience	GIS Specialist Technical Teams	Data Managers Analysts	Policy and Regulatory Officers
Implementing Partners	ITU, Commercial Experts, Local Stakeholders		

Expected Outcomes

Sustainable Expertise in GIS, Data, and Policy

2026 - 2028

Africa-BB-Maps – Next Steps for Burundi

Foundation & Readiness

2025

System Deployment & Capacity Building

2026

Operationalisation & Policy Alignment

2027

Sustainability & Regional Leadership

2028

Identify

Improve

Innovate

Manage

Thank you

Any question?

Closing Ceremony