

Studies in Space Policy

Annette Froehlich
Nicolas Ringas
James Wilson

Space Supporting Africa

Volume 3: Security, Peace, and
Development through Efficient
Governance Supported by Space
Applications

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Preface

This volume considers the leveraging of space applications to enable efficient governance in African civil society, thereby supporting security, peace and development within the continent. It analyses the potential benefits of e-governance for African countries and describes how space-based applications can be employed in implementing e-government solutions, thereby strengthening civil society, bolstering democratic processes and supporting socio-economic development, in line with Africa's development goals. As such, this volume reviews the landscape of governance and e-governance both globally and within the African context and then identifies the most fruitful avenues for space technologies and applications to support the strengthening of African governance.

Chapter 1 explores the positive correlation between good governance and achieving the United Nations (UN) Agenda 2030 Sustainable Development Goals (SDGs) and the African Union (AU) Agenda 2063 aspirations. Subsequently, the various existing governance structures and frameworks established at a continental level within Africa are analysed, namely: the African Union (AU), African policy frameworks relevant to governance, the New Partnership for Africa's Development (NEPAD), the African Peer Review Mechanism (APRM) and the African Continental Free Trade Area (AfCFTA). Specific challenges threatening governance within Africa are examined to determine remedial actions that can be employed to overcome them. The current governance levels in Africa are assessed by examining the results of the latest African Peer Review Mechanism's African Governance Report and the Ibrahim Index of African Governance study, and areas where improvements are necessary are identified.

Chapter 2 assesses e-government readiness levels across Africa through an analysis of the key findings from the United Nations E-Government Survey from 2018. Thereafter, new trends and emerging technologies in e-government including blockchain, e-voting and digital government are discussed. Specific case studies of innovative e-government applications from both developed and developing countries are examined, to identify objectives and strategies that African countries should consider when implementing their own e-government solutions.

Chapter 3 investigates how the digital divide and lack of Internet connectivity within Africa can be overcome using new technologies and commitments from both terrestrial and space actors. The opportunities facilitated by rapidly growing satellite constellations that increase connectivity levels and reduce costs are analysed. The various planned constellations are assessed on a technical level.

Chapter 4 examines space-based applications that can be utilised to improve governance and support e-governance in different sectors, specifically: (i) peace, security and defence, (ii) healthcare and disease control, (iii) water provision and management, (iv) biodiversity management. The chapter identifies specific sources for African countries to obtain Earth Observation and remote sensing data to minimise costs and maximise benefits. Various geographical information system (GIS) software packages used to process and manipulate remote sensing data are discussed, after which relevant European Space Agency projects focused on supporting African development are analysed, including Copernicus, SWAY4Edu2, GlobWetland Africa, B-LiFE, SatFinAfrica and the ESA Tiger project. Lastly, Chapter 4 explores how space-based applications can support the UN SDGs by modelling the risks, interactions and costs of the various SDGs.

Vienna, Austria

Annette Froehlich
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Abbreviations

ACBF	African Capacity Building Foundation
ACDEG	African Charter on Democracy, Elections and Governance
ACERWC	African Committee of Experts on the Rights and Welfare of the Child
ACHPR	African Union Commission on Human and Peoples' Rights
AEC	African Economic Community
AfCFTA	African Continental Free Trade Area
AfCHPR	African Court on Human and Peoples' Rights
AfDB	African Development Bank
AGA	African Governance Architecture Platform
AGR	African Governance Report
AI	Artificial Intelligence
AIDS	Acquired Immune Deficiency Syndrome
AISI	African Information Society Initiative
AML	Anti-Money Laundering
APAI-CRVS	Africa Programme on Accelerated Civil Registration and Vital Statistics
APB	Aadhaar Payment Bridge
APRM	African Peer Review Mechanism
APSA	African Peace and Security Architecture
ARFSD	African Regional Forum on Sustainable Development
ATM	Automated Teller Machine
AU	African Union
AUABC	African Union Advisory Board on Corruption
AUC	African Union Commission
AUCIL	African Union Commission on International Law
AV-net	Anonymous Veto Protocol
CAA	Civil Aviation Authority
CAADP	Comprehensive Africa Agriculture Development Programme
CERT	Computer Emergency Response Team
CERT-MU	Computer Emergency Response Team of Mauritius

CFTA	Continental Free Trade Area
CIDR	Central Identities Data Repository
CII	Critical Information Infrastructure
CIMER	Turkey's Presidency's Communication Centre
CNES	Centre National D'Etudes Spatiales
COP	Child Online Protection
CPI	Corruption Perception Index
CRVS	Civil Registration and Vital Statistics
CSE	Communications Security Establishment (Canada)
CSIRT	Computer Security Incident Response Team
CSSDCA	Conference on Security, Stability, Development and Co-operation in Africa
DARPA	Defense Advanced Research Projects Agency
DBT	Direct Benefit Transfer
DEM	Digital Elevation Map
DFID	UK Department for International Development
DLT	Distributed Ledger Technology
DRC	Democratic Republic of Congo
DRE	Direct Recording Electronic voting system
EDRS	European Data Relay System
EGDI	E-Government Development Index
EIU	Economist Intelligence Unit
EO	Earth Observation
EPI	E-Participation Index
ESA	European Space Agency
EU	European Union
EVM	Electronic Voting Machine
FDA	US Food and Drug Administration
FTYIP	First Ten-Year Implementation Plan
GCA	Global Cybersecurity Agenda
GCI	Global Cybersecurity Index
GDP	Gross Domestic Product
GDPR	General Data Protection Regulation
GEO	Geostationary Orbit
GIFMIS	Ghana Integrated Financial Management Information System
GIS	Geographic Information System
GNSS	Global Navigation Satellite System
GoG	Government of Ghana
GPS	Global Positioning System
GSM	Global System for Mobile Communications
HCI	Human Capital Index
HHS	Health and Human Services
HLPF	High-Level Political Forum on Sustainable Development
HSS	US Department of Health and Human Services
IAEG-SDG	Inter-agency and Expert Group on SDG Indicators

ICT	Information and Communications Technology
ID4D	Identification for Development
IDA	International Development Association
IEG	Independent Evaluation Group
IFZ	Institute for Financial Services (Lucerne University)
IIAG	Ibrahim Index of African Governance
IoT	Internet of Things
IPRA	International Public Relations Association
ISS	International Space Station
ITES	Information Technology Enabled Services
ITU	International Telecommunications Union
JRC	Joint Research Centre
KYC	Know Your Customer
LEO	Low Earth Orbit
LPG	Liquefied Petroleum Gas
MAP	Millennium Africa Recovery Plan
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
MIF	Mo Ibrahim Foundation
MODIS	Moderate Resolution Imaging Spectroradiometer
MOSFET	Metal Oxide Semiconductor Field Effect Transistor
NASA	National Aeronautics and Space Administration
NDVI	Normalised Difference Vegetation Index
NEC	National Electoral Commission
NEPAD	New Partnership for Africa's Development
NGO	Non-Governmental Organisation
NHS	National Health Service
NIR	Near-Infrared
NPCI	National Payments Corporation of India
NSO	National Statistical Office
OAU	Organisation of African Unity
ODIN	Open Data Inventory
OECD	Organisation for Economic Co-operation and Development
OGD	Open Government Data
OPSI	Observatory of Public Sector Innovation
OSAA	Office of the Special Advisor on Africa
OSI	Online Services Index
OTP	One Time Pin
OVN	Open Vote Network
PARIS21	Partnership in Statistics for Development in the 21st Century
PDS	Public Distribution System
PHC	Population and Housing Census
PMJDY	Pradhan Mantri Jan Dhan Yojana
POS	Point-of-Sale
PPP	Public-Private Partnership
PRC	Permanent Representatives Committee

REC	Regional Economic Communities
RGB	Red Green Blue
RSS	Rich Site Summary
SAATM	Single African Air-Transport Market
SAIIA	South African Institute for International Affairs
SAR	Synthetic Aperture Radar
SDG	Sustainable Development Goals
SHaSA	Strategy for the Harmonisation of Statistics in Africa
SIM	Subscriber Identification Module
SMOS	Soil Moisture and Ocean Salinity
SMS	Short Message Service
SSA	Sub-Saharan Africa
STATAFRIC	African Union Institute for Statistics in Africa
STC	Specialised Technical Committees
TII	Telecommunications Infrastructure Index
TRIPS	Total Revenue Integrated Processing System
TYIP	Ten-Year Implementation Plan
UAS	Unmanned and Autonomous System
UHF	Ultra High Frequency
UID	Unique Identification Number
UIDAI	Unique Identification Authority of India
UN	United Nations
UN DESA	United Nations Department of Economic and Social Affairs
UNDP	United Nations Development Programme
UNECA	United Nations Economic Commission for Africa
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNFPA	United Nations Population Fund
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
UNSD	United Nations Statistics Division
USA	United States of America
UVI	Unique Verifiable Identity
VHF	Very High Frequency
VNR	Voluntary National Review
VSAT	Very Small Aperture Terminal
WAN	Wide Area Network
WHO	World Health Organisation
WSIS	World Summit on the Information Society

Chapter 1

A Look at Governance Throughout Africa



Abstract This chapter defines governance and explores how good governance is integral to realizing the United Nations Agenda 2030 Sustainable Development Goals and the African Union Agenda 2063 aspirations. It then examines the various governance structures established within Africa in order to provide an overview of the frameworks that inform governance within the continent, as well as the specific challenges that need to be overcome to ensure good governance. An analysis of the current governance levels in Africa is presented through an examination of the African Peer Review Mechanism's African Governance Report and the Ibrahim Index of African Governance study and critical areas requiring improvements are identified.

1.1 Introduction

Development is impossible in the absence of true democracy, respect for human rights, peace and good governance¹

New Partnership for Africa's Development

The United Nations Children's Fund (UNICEF) forecasts that by 2050, more than 2 billion babies will be born in Africa. Similarly, the World Economic Forum estimates that by 2055 there will be approximately 1.5 billion Africans aged between 15 and 64 years.² The growth rate of this age group is known as Africa's demographic dividend and yields an opportunity for economic development.

The UN estimates that by 2050, Africa will account for more than one quarter of the world's projected working age population. Moreover, it is estimated that the

¹African Peer Review Mechanism, *Strategic Plan 2016–2020*, South Africa, 2016.

²J. McKenna, *Six numbers that prove the future is African*, World Economic Forum, May 2017, www.weforum.org/agenda/2017/05/africa-is-rising-and-here-are-the-numbers-to-prove-it/, accessed: 8 February 2020.

African economy will exhibit a growth rate double that of the developed world.³ Good governance throughout Africa is paramount to realizing the socio-economic opportunities afforded by its human capital.

In the 2008 Compendium of Basic UN Terminology (UNTERM) the definition for “governance” is:

The exercise of political, economic and administrative authority in the management of a country’s affairs at all levels. Governance is a neutral concept referring to the complex mechanisms, processes, relationships and institutions through which citizens and groups articulate their interests, exercise their rights and obligations and mediate their differences.⁴

Similarly, the definition of the Office of the UN High Commissioner for Human Rights states:

Governance is the process whereby public institutions conduct public affairs, manage public resources and guarantee the realization of human rights. Good governance accomplishes this in a manner essentially free of abuse and corruption, and with due regard for the rule of law. The true test of *good* governance is the degree to which it delivers on the promise of human rights: civil, cultural, economic, political and social rights.⁵

This chapter examines the existing governance levels in African states, investigates the challenges facing good governance within Africa and identifies fundamental areas where improvements are required. The second chapter explores how e-governance and e-government applications can be employed to assist with realizing good governance throughout the continent. In this regard, the European Union (EU) defines e-government as “the use of information and communication technology in public administrations combined with organisational change and new skills in order to improve public services and democratic processes and strengthen support to public policies”.⁶

1.2 Africa’s Development Goals

Prior to examining governance throughout Africa, it is first necessary to discuss the development goals of African states, which are influenced by the UN Agenda 2030 and the AU Agenda 2063. Good governance is crucial to realize the two agendas and numerous countries have revised their national development strategies to align with these goals and aspirations. Furthermore, tracking the progress achieved towards the two agendas offers insights into governance efficiency in African states.

³United Nations Economic Commission for Africa, *African Continental Free Trade Area—Questions & Answers*, United Nations Economic Commission for Africa, www.uneca.org/publications/african-continental-free-trade-area-questions-answers, accessed: 27 April 2020.

⁴United Nations Economic and Social Council, *Compendium of basic United Nations terminology in governance and public administration*, New York, 2008 (E/C.16/2008/3), p. 23.

⁵Ibid., p. 24.

⁶Ibid., p. 25.

1.2.1 African Union Agenda 2063

Agenda 2063⁷ is a 50 year framework seeking to “prioritize inclusive social and economic development, continental and regional integration, democratic governance and peace and security amongst other issues aimed at repositioning Africa to become a dominant player in the global arena.” It forms a strategic blueprint that details how Africa can transform itself over the 50 years between 2013 and 2063 to attain the Pan-African vision of “an integrated, prosperous and peaceful Africa, driven by its own citizens, representing a dynamic force in the international arena.”⁸

Agenda 2063, developed under the auspices of the AU Commission (AUC), was formally adopted in 2015 and comprises seven aspirations each with their own goals (see Table 1.1). It aspires towards “shared prosperity and well-being, for unity and integration, for a continent of free citizens and expanded horizons, where the full potential of women and youth are realized, and with freedom from fear, disease and want”.⁹

Agenda 2063 identifies key activities in five separate Ten Year Implementation Plans (TYIP), which provide both quantitative and qualitative metrics to assess and monitor progress in the form of goals and targets. The purpose of the First Ten-Year Implementation Plan (FTYIP) is to:

- “Identify priority areas, set specific targets, define strategies and policy measures to implement the FTYIP of Agenda 2063.
- Bring to fruition the Fast Track programmes and initiatives outlined in the Malabo Decisions¹⁰ of the AU to provide the big push and breakthroughs for Africa’s economic and social transformation.
- Provide information to all key stakeholders at the national, regional and continental levels on the expected results/outcomes for the first ten years of the plan

⁷For a further discussion of Agenda 2063 in the context of the African space sector, see: A. Froehlich and A. Siebrits, *Space Supporting Africa Volume 1: A Primary Needs Approach and Africa’s Emerging Space Middle Powers* (Cham: Springer, 2019).

⁸The African Union Commission, *Agenda 2063: The Africa We Want*, <https://au.int/en/agenda2063/overview>, accessed: 21 January 2020.

⁹The African Union Commission, *Our Aspirations for the Africa We Want*, <https://au.int/en/agenda2063/aspirations>, accessed: 21 January 2020.

¹⁰At the AU Summit of June 2014 in Malabo (Equatorial Guinea) the AU Assembly identified high priority programmes to highlight the success of Agenda 2063 to the African Citizenry. The projects and programmes identified were: the Integrated High Speed Train Network, increasing efforts towards establishing a Continental Free Trade Area, the African Passport and free movement of people, establishing the Single African Aviation Market, establishing various financial institutions at continental level (such as the African Investment Bank, the African Remittances Institute, the African Credit Guarantee Facility, the African Monetary Union and the African Central Bank), implementing the Grand Inga Dam Project hydroelectric power station, setting up the Pan African E-Network to allow for increased infrastructure and cybersecurity to support e-governance, creating the Annual Consultative Platform to assist in reaching the Agenda 2063 Aspirations, and the Silencing the Guns by 2020 initiative. These high priority programmes were chosen to be fast tracked and as such were included in the FTYIP.

Table 1.1 AU Agenda 2063 aspirations and goals

Aspiration	Description	Goals
Aspiration 1	A prosperous Africa based on inclusive growth and sustainable development	1. A high standard of living, quality of life and well-being for all
		2. Well educated citizens and skills revolutions underpinned by science, technology and innovation
		3. Healthy and well-nourished citizens
		4. Transformed economies and jobs
		5. Modern agriculture for increased proactivity and production
		6. Blue/Ocean Economy for accelerated economic growth
		7. Environmentally sustainable climate and resilient economies and communities
Aspiration 2	An integrated continent, politically united and based on the ideals of Pan-Africanism and the vision of Africa's Renaissance	1. Establishing a United Africa (Federal/Confederate) and realizing a Continental Free Trade Area (CFTA)
		2. World class infrastructure criss-crosses Africa
		3. Decolonisation
Aspiration 3	An Africa of good governance, democracy, respect for human rights, justice and the rule of law	1. Democratic values, practices, universal principles for human rights, justice and rule of law entrenched
		2. Capable institutions and transformed leadership in place at all levels

(continued)

and assign responsibilities to all stakeholders in its implementation, monitoring and evaluation.

- Outline the strategies required to ensure availability of resources and capacities together with citizen's engagement in the implementation of the First Ten Year Plan.”¹¹

The FTYIP covers the period from 2013 to 2023 and identifies 20 Agenda 2063 goals linked to the seven aspirations (as shown in Table 1.1).¹² Furthermore, priority areas for national level implementation are identified for each of the goals, along with their respective targets. In total there are 39 priority areas and 255 targets, as summarised in Fig. 1.1. Of those targets, 63 are classified as core indicators and the

¹¹The African Union Commission, *The First-Ten Year Implementation Plan*, <https://au.int/en/agenda2063/ftyip>, accessed: 21 January 2020.

¹²Ibid.

Table 1.1 (continued)

Aspiration	Description	Goals
Aspiration 4	A peaceful and secure Africa	1. Peace, security and stability is preserved
		2. A stable and peaceful Africa
		3. A fully functional and operational African Peace and Security Architecture (APSA)
Aspiration 5	An Africa with a strong cultural identity, common heritage, shared values and ethics	1. Africa cultural renaissance is pre-eminent—inculcating the spirit of Pan Africanism, ensuring creative arts are major contributors to Africa's growth, and restoring and preserving African cultural heritage
Aspiration 6	An Africa, whose development is people-driven, relying on the potential of African people, especially its women ^a and youth, and caring for children	1. Full gender equality in all spheres of life
		2. Engaged and empowered youth and children
Aspiration 7	Africa as a strong, united, resilient and influential global player and partner	1. Africa as a major partner in global affairs and peaceful co-existence
		2. Africa takes full responsibility for financing her development

^aFor an overview of the perspectives of African women on the African space sector, see T. Oniosun, N. M. A. Ndieguene, M. Mwamba, et al., "African Women Competition", in *Space Fostering African Societies: Developing the African Continent through Space, Part 1*, ed. Annette Froehlich (Cham: Springer, 2020), 253–272

The African Union Commission, *Our Aspirations for the Africa We Want*, <https://au.int/en/agenda2063/aspirations>, accessed: 21 January 2020

FTYIP requires all states to report on these indicators to their Regional Economic Communities (RECs) as a minimum requirement.¹³

The objectives and key focus areas of the FTYIP were influenced by the National Development Plans of member states and the strategic plans of the RECs, existing continental frameworks, the key Transformational Outcomes of Agenda 2063 and, lastly, by Flagship Projects identified within Agenda 2063.¹⁴

The Flagship Projects are 13 key initiatives encompassing infrastructure, education,¹⁵ science, technology, arts and culture and are aimed at boosting the growth and

¹³Mo Ibrahim Foundation, *African Governance Report—Agendas 2063 & 2030: Is Africa on Track?*, 2019.

¹⁴The African Union Commission, *The First-Ten Year Implementation Plan*, <https://au.int/en/agenda2063/ftyip>, accessed: 21 January 2020.

¹⁵For additional information regarding education in Africa in the context of the space sector, see: A. Siebrits and V. van de Heyde, "Towards the Sustainable Development Goals in Africa: The African Space-Education Ecosystem for Sustainability and the Role of Educational Technologies", in *Embedding Space in African Society: The United Nations Sustainable Development Goals 2030*