ISPL

LONDON INSTITUTE OF SPACE POLICY AND LAW

THE INTERNATIONAL SPACE PARTNERSHIP PROGRAMME

REPORT ON THE POLICIES OF KENYA, NIGERIA AND UNITED KINGDOM

A MODEL FOR THE FOUNDATION OF EFFECTIVE ENGAGEMENT AND COLLABORATION BETWEEN THE UK AND AFRICAN COUNTRIES

TO

INMARSAT GLOBAL LIMITED
AND
THE UNITED KINGDOM SPACE AGENCY

FINAL REPORT
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FINAL REPORT
IPSP PROJECT WITH PARTNERS: UK, KENYA AND NIGERIA

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EXECUTIVE SUMMARY

The Project demonstrates the societal and economic benefits that UK space systems and services can provide to countries that do not currently have such capabilities. This Report examines the space policy objectives of each Partner Country and their compatibility with those of the UK in relation to the Project. It covers issues relevant to the UK, Kenya and Nigeria, with limited mention of sub-Saharan and regional issues where relevant.

Specific national policies are considered in the context of all relevant national, regional and international policies. There is an emphasis on social and economic policies of the Partner Countries, the most prominent being the closely inter-dependent policies on health, education, access to finance, communications and electricity. The respective space policies are assessed in relation to their broader objectives and their alignment with UK policy not only for space but overseas development. The Report is based on information obtained from research and interviews.

The primary element of UK space policy is the achievement of economic growth. The space policies of Kenya and Nigeria are built on three foundations. Each has an overarching set of national policies, namely Vision 2030 in Kenya and Vision 20:2020 in Nigeria. In addition, both countries subscribe to the recently adopted regional African Space Policy and Strategy, an important part of the African Union Agenda 2063 and a step toward an African Outer Space Programme. The Agenda emphasises priorities that are already present in the respective national policies of each country. The Policy is consistent with Kenyan and Nigerian space policy objectives. It is also an important consideration for the UK in its dealings with African countries. Further, these countries aim to meet the UN Sustainable Development Goals to improve the lives all people everywhere.

African governments are keen to see the expansion of space services to meet their policy objectives and to provide a range of socio-economic benefits. These are as diverse as eradication of poverty, promoting health and wellbeing, a well-educated and skilled citizenry, and improving power supply.

UK international space policy can provide benefits to the domestic space sector, throughout government departments and agencies, to society as a whole, and to the rest of the world. It can spur development of applications and digital services in the UK, and build on innovations born of necessity and creativity in other countries. The UK can continue to focus on satellite applications as an area of growth, while also promoting the achievement of African policy objectives. The UK space sector can provide data acquisition by satellite, which adds significant value to off-grid power supply and other services. As a subscriber to the SDGs, the UK is expected to promote their achievement in its international dealings. It can do so through its space policy and development strategies.

The UK can be a leader in developing a holistic international space policy that serves its own socio-economic aims and objectives, as well as those of the international community.

1 INTRODUCTION

1.1 THE PROJECT

Pushing Digital Frontiers to advance e-finance solutions and access to maternal health in remote locations: Realising the critical role and benefits of leveraging mobile satellite to its fullest extent in the pursuit of bridging the digital divide and delivering truly inclusive digital economies globally.

The Project was commissioned by the UK Space Agency in March 2015, as part of the International Partnership Space Programme (IPSP). It is one of several space projects funded through the International Partnerships Space Programme, in which UK companies will work with international partners to develop satellite technology and applications in emerging economies. They are intended to demonstrate how UK satellite or space technology can provide societal and economic benefits to countries that do not currently have such capabilities.[1]

1.2 SPECIFIC AIMS OF THE PROJECT

The focus of the Project is the provision of maternal health and banking services through two programmes in Africa, working with international partners in two partner countries, Kenya and Nigeria. This Project implements space-enabled technology solutions to help develop sustainable, digitally connected and empowered communities in Kenya and Nigeria. Inmarsat will use its Alphasat mobile satellite capabilities to deliver tangible economic value from the UK to accelerate economic growth in Africa.[2]

Although the nature of the satellite service is broadly the same in both partner countries - communication connectivity - it will serve different needs. From a policy perspective it will meet different objectives.

Working with Equity Bank Kenya, Inmarsat will increase connectivity to drive inclusive digital services at over 200 locations across Kenya. Relying on the successes achieved in Kenya by the Equity Group Foundation, established by Equity Bank in 2006, this Project aims to speed the establishment of "Equity Digital Zones" at Equity Bank branches and rural Bank Agents across Kenya.[3]

In Nigeria the Project draws on the achievements of NPHCDA, the National Primary Health Care Agency, in improving access to healthcare of the rural poor. By partnering with NPHCDA, maternal and child health services were brought to 50 physically and technologically disconnected rural communities in remote locations.

The Project enhances local economies by providing Internet access to local communities with all its associated benefits. The Satellite Applications Catapult will connect UK applications experts to users in order to provide services designed to grow and enhance these emerging markets. The Project advances the knowledge base for delivery of successful satellite-enabled services in developing and emerging markets.[4]

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1 https://www.gov.uk/government/news/first-round-of-international-space-partnerships-announced, accessed 2 November 2015.
2 Inmarsat_UKSA Application.docx, 30 March 2015.
3 Inmarsat Collaboration Agreement, Consortium MOU Draft IPSP.docx, 11 December 2014.
4 https://www.gov.uk/government/news/first-round-of-international-space-partnerships-announced,

1.3 FINAL REPORT

1.3.1 ISPL's Role in the Project

ISPL conducted certain tasks and prepared a Final Report (ISPL R) on topics enumerated in the IPSP Project subcontract.

This document reports results concerning the space policy objectives of each Partner Country and their compatibility with those of the UK in relation to the Project. The services were provided in Kenya and Nigeria. The section concerning Nigerian policy is necessarily more limited than that relating to Kenya, as the change of government has entailed structural change, including a new Cabinet.

It is possible that other countries will also be served in similar ways in future. This may occur under the Prosperity Fund of the Foreign and Commonwealth Office (FCO).

This Report therefore covers issues relevant to the UK, Kenya, and Nigeria. There is limited mention of sub-Saharan and regional issues where relevant, followed by conclusions.

There are four Annexes to the Report. Annex 1 is a glossary of abbreviations used in the Report; Annexes 2 and 3 contain some background information on law and statistics relating respectively to Kenya and Nigeria that do not directly affecting the subject of the Report, but may be helpful to the reader. Annex 4 outlines the MDGs and SDGs.

ISPL also delivered an interim Report (R1) in November 2015 on its findings in relation to the following tasks:

- (WP3) Determine and advise on Partner Country space policy objectives and their compatibility with those of the UK relating to the proposed satellite services; and
- (WP5) Prepare an interim Report (R1) of the findings of WP 3.

1.3.2 Methodology

The research underlying this Report consists of information obtained from research and interviews carried out in the UK and in Kenya. The section on Nigeria is largely based on publicly available documents and telephone conversations with individuals knowledgeable about Nigerian government matters. Further conversations took place with individuals in each country who are familiar with the policies and regulatory frameworks shaping the development of the space sector and applications employed to advance those policies.

Those interviewed included Ministers, regulators, policy makers, agency heads and personnel, academics and businessmen. Additional material considered includes Acts, Regulations, Bills and other documents, including proposals, academic journal articles, news reports and on-line documents.

accessed 2 November 2015.

1.4 PROJECT PARTICIPANTS AND ADVISORS

The UK Lead Supplier is Inmarsat Global Ltd (Inmarsat). Also participating are Caribou Digital (Caribou), Dalberg Global Development Advisors (Dalberg) and the London Institute of Space Policy and Law (ISPL).[5]

Additional participants are the UK Satellite Applications Catapult (Catapult), the Global eHealth Foundation (GeHF), the Royal African Society (RAS), Fentiman Consultants Limited (Fentiman), the Open University (TOU), and the Praekelt Foundation (Praekelt).[6]

The following is an outline roles of the Lead Supplier and primary Participants in the Project

- UK Space Agency – Promotion of UK space sector through international partnerships, via IPSP
- Inmarsat – Overall Consortium and Technical Lead
- Caribou Digital – Programme Director, Commercial Modelling and STARHub software development, Lead for STARHub Portal and UK Application partners
- Dalberg – Lead Research Partner

1.5 INTERNATIONAL PARTNERS

International Partners in the Project are Equity Bank Group, Kenya, providing financial services and welfare content. NPHCDA, the National Primary Health Care Agency in Nigeria, provides access to maternal and child health services in rural areas lacking other connectivity or access to such services.

1.5.1 Partner Country: Kenya

Kenya desires to develop and to utilise increased space technology and services, to fulfil the aims of its Constitution and the objectives of other policies and strategies enunciated by the Kenyan Government. One of those strategies is increased access to financial services, which although much improved by recent mobile phone availability, is still very limited in remote areas.

The Project provides an ideal opportunity to explore and refine the available information on Kenya's interaction with the UK, the ITU, the UN, other countries, and other international bodies in its present and future satellite and space activities. It will also be useful to identify areas that will benefit from further research in policy and its implementation, including alternative approaches to national regulation, for the benefit of a wider audience.

5 http://Inmarsat.com; http://cariboudigital.net; http://www.dalberg.com; http://www.space-institute.org.
6 https://sa.catapult.org.uk; http://www.globalehealthfoundation.org; http://www.royalafricansociety.org; http://www.fentimanconsultants.co.uk/index.html; http://www.open.ac.uk; http://praekeltfoundation.org.

1.5.2 Partner Country: Nigeria

The Project's focus on provision of maternal health services by satellite is extremely timely for Nigeria. As will be seen, populations currently lacking necessary care and advice can benefit greatly by such services, which help to address serious problems arising from poverty, remoteness and lack of access to maternal health facilities.

The Project will also be of interest to many other countries that currently encounter one or more of these barriers to the provision of medical care.

1.6 IMPACT OF THE PROJECT

The African Union Heads of State and Government recently adopted the African Space Policy and Strategy, as the first of the concrete steps to realize an African Outer Space Programme, and one of the flagship programmes of the AU Agenda 2063.[7] Considering space science and technology central to Africa's socio-economic development, they urged the Member States, the Commission and others to mobilise domestic resources for the implementation of the policy and strategy. Adoption of the Space Policy and Strategy is intended to advance the collective revitalization of African space activities and to contribute to the achievements of Agenda 2063.[8]

The adoption of this continent-wide policy will most likely have an influence on further development of Kenyan and Nigerian space policies. Its objectives include priorities that are already present in the respective national policies of each country, namely eradication of poverty and shared prosperity through socio-economic transformation, high quality of life, sound health and wellbeing and well-educated and skilled citizens.[9] The Policy recognises advances made by others, and the contribution these advances can make to the socio-economic development of Africa.[10]

This Project advances the objectives of the African Space Policy and Strategy.

Programmes like this IPSP Project are considered very important within the partnering countries for a number of reasons. In addition to adding much needed facilities, they show that African nations are capable of making significant contributions within the framework of international partnerships. This kind of collaboration can help to dispel any perception that populations of Kenya, Nigeria and other countries lack entrepreneurial capacity.

Executive Director of the Africa Centre for Technology Studies articulated enthusiasm for the Project,[11] suggesting that the strength in Africa is innovation. A good example is the M-Pesa[12] service: Kenyans did not invent the mobile phone, but they found novel ways of

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7 Twenty-Sixth Ordinary Session on 31 January 2016 in Addis Ababa; http://www.african-union.africa-newsroom.com/press/african-union-heads-of-state-and-government-adopts-the-african-space-policy-and-strategy?lang=en.

8 http://agenda2063.au.int/en/sites/default/files/03_Agenda2063_popular_version_ENG%2021SEP15-3.pdf

9 Agenda 2063, Aspiration 1, Paragraphs 9 and 10; http://agenda2063.au.int/en/sites/default/files/03_Agenda2063_popular_version_ENG%2021SEP15-3.pdf; accessed 22 March 2016. See also African Space Policy (Draft Version 13), Paragraph 7.

10 African Space Policy (Draft Version 13), Paragraphs 2, 4-6.

11 The Centre undertakes policy, legislative and analytical research. The aim is to focus on the environment needed to enable collaborative projects of this kind, as well as to identify constraints, such as intellectual property, ownership or financial incentives. The Centre's focus is on innovation.

12 For more information about M-Pesa and access to mobile phone services see Annex 2.

using it. This Project is seen in that light.[13]

13 Interview ACTS.

2 THE BENEFITS OF THE PROJECT TO THE UK AND PARTNER COUNTRIES

2.1 OVERVIEW OF THE IPSP

The International Partnership Space Programme (IPSP) was established by the UK Space Agency to promote growth of the space sector of the economy through provision of space capabilities that would bring societal and economic benefits to emerging economies. Its objectives are stated as:

> This programme focuses on societal or economic benefits from the use of UK satellite or space technology for countries that currently do not have these benefits. It is about the UK learning from the partnership with the partner countries, and establishing the UK as the partner of choice with these countries once they are in a position to acquire or enhance their own space or satellite infrastructure.[14]

The Space Agency also articulates benefits from the IPSP to the UK space sector.

> The rationale for UK companies .... might be about establishing partnerships for the future on which to build trade. .... By working with emerging space countries, for example by offering training and technology transfer, the UK can build both strong and enduring human links upon which future trade can be built; and also disseminate best practice in licensing, regulation and safe disposal of satellites. In the longer term UK companies become trusted partners to provide high tech exports for the UK thus growing the space sector.[15]

The Programme emphasises benefits not just for the Agency and the UK space sector, but also to a broader range of government departments and interests. This wider impact of the IPSP is addressed in the concluding sections of this Report.

The partnerships established by this Project are between a UK commercial entity and national or international entities operating in the Partner Countries.

There is also further opportunity for government-to-government involvement in addition to this engagement, perhaps at a regulatory or development level. This involvement would likely be with the UK Space Agency and the Department for International Development (DfID), furthering the objectives of each. Other Departments, such as Health, Education, BIS, UKTI, DEFRA, Energy and Climate, and others might also be involved.

The Foreign and Commonwealth Office (FCO) could also be involved through its Prosperity Fund for financing these types of projects, broadening the nature and points of contact between the UK and the Partner Country.

Thus the IPSP can serve many of the needs of the Partner Country while also advancing multiple UK Government interests. Some of these needs and interests are considered in the following sections.

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14 UK Space Agency, International Partnership Space Programme, 2015; https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/383540/IPSP_information.pdf.

15 UK Space Agency, International Partnership Space Programme; https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/383540/IPSP_information.pdf

2.2 INTERESTS OF PARTNER COUNTRIES

Many African countries and emerging economies face a number of challenges to be met by national governments. These include large numbers of poor people and lack of desirable socio-economic benefits in isolated rural areas. Satellite services can help meet these challenges. Satellite and other space services can assist in providing solutions to problems in the following categories, among other potential areas of contribution.

2.2.1 Poverty

- Provision of information about market prices for agricultural produce and other goods, thereby improving the price obtained by rural producers
- Access to banking services
- Efficient use of land and its management
- Crop health

2.2.2 Lack of access to healthcare

- Telemedicine
- Information about pre- and post-natal care and of infants and children
- Enabling centralisation of health records and early detection of health risks

2.2.3 Lack of access to education and educational resources

- Provision of educational material
- Remote access to specialist topics and their teaching by experts

2.2.4 Absence of infrastructure and communication services

- Efficient management of utilities
- Access to communication and broadband services

2.3 UK INTERESTS

The UK has both economic and non-financial interests in emerging economies that can be served by space capabilities and satellite service provision.

2.3.1 Exports

There is an export potential in each category identified below. If not immediately lucrative, they have significant future potential. In many cases there will be opportunities for the manufacturing and space applications sectors to export products and services to the Partner Countries.

2.3.2 International Support and Trust

The provision of satellite services to international partners is an effective means of supporting the Partner Countries and the UK space sector. These services provide socio-economic benefits to the citizens of Partner Countries. The benefits to the international

partners and to the Partner Countries are greater than alternatives because space-enabled solutions can be provided on a national scale.
An added advantage of international partnership projects is the opportunity they provide to build mutual trust at operational and at government levels.

2.3.3 Education

There are many opportunities for UK educational institutions to provide material and services to be delivered via satellite.

2.3.4 Agriculture and Climate

UK entities have the capabilities to address agricultural needs of the Partner Countries, including those relating to crop condition, water resources, weather and climate.

2.3.5 International Relations

The UK will benefit from closer relationship with Partner Countries and strengthened diplomatic ties.

2.3.6 Security

Improved prosperity and trade relationships with Partner Countries will advance security interests of both the UK and those countries.

3 ALIGNMENT OF INTERNATIONAL PARTNERSHIPS WITH UK INTERESTS

3.1 POLICY IMPLEMENTATION

International partnerships such as the IPSP projects align with these UK interests, especially exports, international development and international relations. By helping to reduce poverty and improve health, they also align with education, agriculture, climate and security interests of the UK.

The UK implements its policies through a number of channels. The IPSP projects are a way to put in place strong international partnerships to achieve the UK's growth and international development aims. The involvement of the Space Agency has shaped the current projects, and will clearly bring benefits to the UK space sector. But the benefits to the UK and internationally will be much wider than to the space sector alone.

3.1.1 Growth

UK government and commercial sectors will see benefits from International Partnerships, which provide an excellent environment within which to encourage innovation. M-Pesa in Kenya is a vivid example.

There is strong interest across government in information sharing, from tracking and monitoring crime to the movement of illegal goods including drugs and human movement. Other areas of interest include intelligence gathering related to data use, monitoring safety of navigable waters and pollution, and tracking world food demand. There is potential for identification of new markets across maritime, aviation, energy, government and commercial fields, especially as new and faster satellite technology is introduced.

In addition to IPSP projects, there is another potential source for future investment in UK and international development. One of the principal aims of the FCO's Prosperity Fund is to promote an open global economy in key emerging economies. Through targeted projects, it aims to support development by fostering opportunity, openness and sustainability as core components of global growth. It operates dedicated programmes in priority countries, as well as regional funds, including one in Africa.

3.1.2 Funding

In 2014, the Prosperity Fund invested in 12 projects in South Africa and Southern Africa focused on trade, investment, education, science and innovation, governance, extractives and climate change and energy. In 2015-2016, 14 new projects address issues in climate change and energy, education, economics and trade, illegal wildlife trade and science and innovation.

The recent African funding round for the 2015-2016 High Level Prosperity Partnership (HLPP) Fund targeted core sectors that are demonstrably related to this Project, including infrastructure and finance, agriculture and agri-business, as well as other sectors that could benefit such as education, energy and extractives.

The Prosperity Fund projects are required to align with and complement UK programming

by DfID[16] or UKTI,[17] and to demonstrate support of the Prosperity Directorate Conditions for Growth. One target is measurable benefit to the UK.

Proposals are evaluated on partnership potential with the private sector, opportunity for UK companies to compete and operate in previously challenging sectors, and increased market value to UK companies through an enhanced business environment.

It is notable that the 2015-2016 HLPP bids did not include small activities, but rather strategic projects with high impact. This level of funding could provide strong enough platforms to encourage expansion in a wide range of areas. For example, the system for providing financial connectivity could also be used to deliver educational material or health information and services.

The 2015-2016 HLPP bids were assessed against the following criteria, all strongly aligned with the IPSP Project that is the subject of this Report.

- Value for money;
- Strategic fit;
- Evidence of local demand or need;
- Project viability, including capacity of implementing organisation(s);
- Project design, including clear achievable impact;
- Sustainability; and
- Risk and stakeholder management.

In addition, the Africa Directorate has been allocated additional funding for prosperity-related activity aimed at "Improving the Business Environment in Sub-Saharan Africa". Bids were sought for projects that would influence change in the overall business environment. They would also demonstrate complementarity with existing work by others, such as DfID and UKTI.

3.2 CONDITIONS FOR GROWTH

The Prosperity Fund supports projects that aim to provide the necessary conditions for UK and global growth.[18] One option available to the Prosperity Fund could be to leverage satellite services to advance its objectives. The FCO may well consider that activities similar to the Project and its objectives align well with the Fund's aims.

3.2.1 Openness

The Project's transaction and accounting protocols introduce a high level of transparency, improving the management of resources and strengthening rule-based economic systems.

3.2.2 Sustainability

The aim of ensuring sustainable and equitable growth is part of the wider concept of increasing the commercial relationship between the UK and sub-Saharan Africa.

16 Department for International Development; https://www.gov.uk/government/organisations/department-for-international-development.
17 UK Trade & Investment; https://www.gov.uk/government/organisations/uk-trade-investment.
18 https://www.gov.uk/guidance/prosperity-fund-programme.

Whether International Partnership Projects are sustainable over time will depend to some extent on costs and benefits. The advantages to be gained will provide strong motivation to take up and continue use of the systems provided. These include better market prices for farmers and other businesses and reliable long-term availability of financial services in the Kenyan programme, while the Nigerian partnership will increase wellbeing and employability in a healthier society. Keeping costs low to the user in relation to alternatives will help make the programmes sustainable.

The Partnerships promote science and innovation in the UK as solutions to global challenges. Partner Countries will develop and manage databases for the communication systems to be put in place and to develop new uses for the assets. The Kenyan and Nigerian Projects provide data that will reveal the level of demand and the need for the services they provide. This can help to provide targets for further programmes.

While Partner Countries clearly aim for specific results from collaboration with the UK, often regardless of the technology involved, there is also a specific wish to utilise space assets and services for the socio-economic advancement of their populations. They see benefits to their economies by engagement with the space sector.

Finally, reduction of carbon footprint in space systems is already on the agenda in the UK. It is also worth noting that provision of alternative services under the Project by terrestrial means would involve a good deal of environmental disruption.

3.2.3 Promoting Opportunity

Both manufacturing and service sectors in the UK, particularly telecommunications, have long shown their ability to identify markets and services internationally that can be served by their products. This Project and similar partnerships can support the expansion and growth of these sectors, with identification and provision of new services for the available infrastructure. This will also strengthen sustainability.

Achievement of a healthier population in Nigeria will build a society better able to work and innovate, to address the challenges of meeting its social and economic goals. The impact of health on financial resources is also very significant, freeing up financial resources for other productive pursuits including programmes to address other problems such as poverty, security and education. In Kenya, there will be a strong impact from provision of financial services to new sectors of society, with a very wide range of opportunities not otherwise available to the part of the population that is not currently served. Secure money transfer, enhanced financial planning and new market activity are some of the benefits.

3.2.4 Reputation

Projects like the Kenya and Nigeria IPSP (and Prosperity Fund Projects) enhance the UK's reputation as a strong collaborator in achieving the Partner Countries' national and regional policy objectives. Likewise, successful and sustainable programmes like this Project will demonstrate progress in the Partner Countries in areas such as transparency, reducing corruption, and increasing inclusiveness.

In summary, this Project is strongly aligned with the conditions for global growth of the UK space sector and the relevant policies of the UK Space Agency.

4 UK

4.1 UK Policy Direction

4.1.1 Growth

A primary consideration in developing policy in any area is the UK Government's intention to promote growth in the UK economy. This was reflected in the UK Civil Space Strategy 2012-2016.[19]

The Strategy provided the overall policy direction of the UK civil space agenda by setting out six areas of focus, and describing how each area is important to the UK's "growth agenda". Inherent in the Strategy is growth of the space sector of the economy.[20] This growth is *inter alia* to be achieved by export, innovation and education. In the context of this Report, the relevant strategy is to achieve growth from exports, although other catalysts of growth apply.

4.1.2 SDGs

The UK was one of the leading advocates for the adoption of the SDGs, and is committed to advancing their achievement. As argued in the SDG section below,[21] the provision of access to banking and healthcare are measures that further objectives of the SDGs.

Certain UK strategies, objectives and policies are relevant to this Report, including those related specifically to space activities.

4.2 UK Space Policy

A UK Civil Space Policy was published in December 2015. This National Space Policy (NSP)[22] is consistent with and reflects the policies partly outlined in the instruments creating the UK Space Agency[23] and inherent in other supporting documents and strategies that it follows.

The NSP identifies four interrelated policies for Government action. These are to:

i. Recognise that space is of strategic importance to the UK because of the value that space programmes deliver back to public services, national security, science and innovation and the economy;

ii. Commit to preserving and promoting the safety and security of the unique space operating environment, free from interference;

19 http://webarchive.nationalarchives.gov.uk/20121212135622/http://www.bis.gov.uk/assets/ukspaceagency/docs/uk-space-agency-civil-space-strategy.pdf

20 http://www.ukspace.org/wp-content/uploads/2013/11/Space-IGS-Space-Growth-Action-Plan-2014-2030-Nov-2013.pdf

21 See Section 5.4 of this Report.

22 United Kingdom National Space Policy, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/484864/NSP_-_Final.pdf. See also https://www.gov.uk/government/news/national-space-policy-science-fiction-in-to-science-fact.

23 The United Kingdom Space Agency (Transfer of Property etc.) Order 2011; SI 2011 No. 822; www.legislation.gov.uk/uksi/2011/822/pdfs/uksi_20110822_en.pdf

iii. Support the growth of a robust and competitive commercial space sector, underpinned by excellent academic research; and

iv. Commit to cooperating internationally to create the legal frameworks for the responsible use of space and to collaborating with other nations to deliver maximum benefit from UK investment in space.

It will be noted that there is no clear and immediately identifiable policy to assist other countries to use UK space assets and services to benefit their populations. However, the fourth policy articulated in the NSP, "collaborating with other nations to deliver maximum benefit from UK investment in space" can be read in a wider context, to include the use of UK space capabilities for the benefit of others.

Therefore, the Project and its aims are consistent with, and have the capacity to further, the relevant UK policies.

4.2.1 Serving Public Interest

Almost every national space policy or lower tier policy makes reference to serving the needs of that nation's citizens.[24] By implication this is the case with UK space policy, as the UK Space Strategy calls upon the UK Space Agency to serve other government departments in order to facilitate informed policy decisions to serve the public interest. Serving the public interest is an integral part of the NSP. The role of space technologies and applications in serving the public interest is explicitly recognised in the NSP.[25]

4.2.2 Space Sector Growth

A primary space policy aim is the promotion of growth in the UK space sector, along with the growth and benefits that will accrue to other domestic and international sectors and markets. The strategies pursued by the UK Space Agency focus mainly on enlarging the UK share of the global space market, which comprises manufacturing, infrastructure and applications.

4.2.3 Smart Government

The NSP enumerates Government Departments that use space services in the performance of their functions. The Space Strategy also highlights space-related facilitation of smarter government.

Government will increasingly rely on satellite-derived services and data. In many areas information gathered from space enables government to make well-informed public policy decisions. For example, space can provide data on the environment, climate, weather, security, agriculture, coastal management and disaster mitigation. The UK Space Agency will support the development of 'smarter', more efficient government through the use of space data by providing the strategic leadership and acting as the centre of expertise for Government departments.[26]

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24 Graham Gibbs, An Analysis of the Space Policies of the Major Space Faring Nations, Annals of Air and Space Law, 2012, Vol XXXVII.

25 Secretary of State's Introduction, United Kingdom National Space Policy, p 4.

26 Graham Gibbs, An Analysis of the Space Policies of the Major Space Faring Nations, Annals of Air and Space Law, 2012, Vol XXXVII.

4.2.4 UK Space Agency's International Policy

The UK Space Agency's international policy is focused on forming international relationships that are helpful to advancing industry objectives. In keeping with general UK Space Policy, the international policy aims to increase the UK's share of the international space market.

To achieve this aim the UK Space Agency works through ESA and EUMETSAT and, where possible, through CEOS and other gatherings of institutional communities.

Where space is an enabler for industry and for government, the UK Space Agency forms relationships with appropriate governments and their agencies to further industry and government interests. The UK Space Agency recognises that the interest of governments is often not in space *per se*, but in using space to achieve its broader policies.[27]

4.2.5 International Development

DfID funds activities in developing countries, such as the Project, as well as providing direct funding to them.

The international development policies of the UK were fundamentally reviewed in 2015 to ensure that development expenditure is more clearly seen to be in the national interest.[28] The Prosperity Fund Programme is a dedicated annual fund of the Foreign and Commonwealth Office (FCO) supporting prosperity work overseas. Through targeted projects, it aims to support the conditions for global and UK growth.[29] The aims of the Prosperity Fund Programme are not inconsistent with those of the IPSP.

The UK government will shape its Official Development Assistance (ODA)[30] spending according to four strategic objectives, set out in the New Aid Strategy:[31]

1. Strengthening global peace, security and governance;
2. Strengthening resilience and response to crises;
3. Promoting global prosperity; and
4. Tackling extreme poverty and helping the world's most vulnerable.

The aims of the Project are compatible with these objectives, notably aiming to eliminate extreme poverty by 2030, and supporting the world's poorest people to ensure that every person has access to basic needs.

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27 Personal communication, Chris Lee, UK Space Agency.

28 DfID, UK aid: tackling global challenges in the national interest, p3; https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/478834/ODA_strategy_final_web_0905.pdf, accessed 22 February 2016.

29 The Prosperity Fund is primarily allocated to priority countries, which include all of Africa; Prosperity Fund Programme, Guide, https://www.gov.uk/guidance/prosperity-fund-programme.

30 Official Development Assistance is defined by the Organisation for Economic Co-operation and Development (OECD) Development Assistance Committee as financial flows to lower and middle income countries and to multilateral institutions which are: provided by official agencies; administered with the promotion of the economic development and welfare of developing countries as their main objective; and are provided as grants or loans which are concessional in character.

31 UK aid: tackling global challenges in the national interest, A New Aid Strategy, para 2.3.

The New Aid Strategy includes the statement:

> The government will continue to ensure that all spending under the International Development Act meets its provisions, in particular that this spending furthers the sustainable development and welfare of developing countries and is likely to contribute to a reduction in poverty.[32]

As noted in this Report, the connectivity and services facilitated by the Project can help to reduce poverty (objective 4). It will advance sustainable welfare of the target populations in Kenya and Nigeria. The Project in Nigeria prioritised the rights of girls and women in particular, which is one of the objectives of the SDGs.

The object of the UK Space Agency's international development policy is the delivery of international collaborative space programmes. These are intended to assist development in regions lacking the necessary infrastructure or capabilities. The capability to develop space-based applications is an important benefit of the programme.

The IPSP is one way in which the UK Space Agency meets this policy objective. It also aligns well with the remit and objectives of the Space Applications Catapult.

The infrastructure being established by Inmarsat in Kenya and Nigeria will be critical to encouraging and enabling the introduction of other applications. In particular, data collection and delivery will lead to space applications not prevalent in the regions under consideration. The role of Inmarsat in each of the Partner Countries is to provide access and to deliver information.

The Project is fully consistent with the objectives and with the direction of UK policy.

4.2.6 Export

Consistent with the policy for economic growth, the UK's objective is to grow its share of the global market to 10% by 2030. The UK Space Agency will aim to assist the space sector to capture more business in all areas, but particularly the global commercial and security markets that are forecast to grow most strongly.[33]

4.2.7 Export Barriers

The recently established Strategic Export Group aims to identify the barriers to export and to drive the implementation of measures to overcome them. The participants in this group include the Satellite Finance Network, UKSpace, UK Export Finance, UK Space Agency, Innovate UK and UK Trade and Investment.[34]

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32 *Ibid.*, para 2.6; International Development Act 2002, s. 1(1) & 1(1A).

33 Gibbs, p. 304, http://www.spacepolicyonline.com/pages/images/stories/Graham%20Gibbs%20Analysis%20of%20National%20Space%20Policies.pdf, pp. 303-305, accessed 2 November 2015. referring to UK Space Agency, UK Space Agency Strategy 2011-2015 consultation document: http://www .bis.gov .uk/assets/ukspaceagency/docs/strategy/11-834-uk-space-agency- strategy-2011-2015-consultation.pdf

34 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/444918/_SPACE-IGS_report-web-JJF-V2.0.pdf, accessed 2 November 2015.

4.2.8 Innovation

The UK's industrial and academic space sectors are at the cutting edge of technology, data processing and analysis.[35]

These capabilities can be employed in infrastructure management that is one of the critical needs in both Kenya and Nigeria. In particular, as noted below, the distribution of electricity in Nigeria is a major barrier to development. Satellite services can make a contribution in access to reliable energy.

4.2.9 Education

It has been argued that some studies have demonstrated the value of space activities in attracting children into science, technology, engineering and mathematics (STEM). The UK Space Agency is tasked with encouraging the study of STEM subjects for the benefit of the economy and to ensure that universities and colleges provide appropriate skills to meet the needs of the space sector.[36]

Education ranks high in the priorities of both Kenya and Nigeria. The Project demonstrates that space services can provide access to educational resources and encourage the development of a technically skilled workforce.

4.3 Relevant UK Government Bodies & Documents

4.3.1 UK Space Agency

In 2010 the government authorised the creation of a space agency to achieve the UK's policy aims and objectives. The UK Space Agency became a fully executive agency on 1 April 2011.

The Agency performs two related but distinct functions. First, it is the appointed regulatory authority for activities in outer space. Second, the Agency promotes the interests of the UK space sector and its contribution to the national economy.[37]

4.4 Satellite Applications (SA) Catapult

Catapults are established under the remit of Innovate UK, an executive non-departmental public body sponsored by the Department for Business, Innovation and Skills. "The Catapult centres are a network of world-leading centres designed to transform the UK's capability for innovation in specific areas and help drive future economic growth."[38]

To promote its underlying objective to capture 10% of the world market in space products and services, the UK established the SA Catapult. The remit of the Catapult is to facilitate and promote opportunities to encourage growth in the space sector and its export potential. "The Satellite Applications Catapult is an independent innovation and technology company, created to foster growth across the economy through the exploitation of space." Its Mission is "to innovate for a better world, empowered by satellites."

35 Gibbs, p. 304.
36 Gibbs, p. 305.
37 Sa'id Mosteshar, The Establishment of the UK Space Agency, ESPI Yearbook on Space Policy 2010/2011.
38 https://www.catapult.org.uk

4.4.1 International focus of SA Catapult

The SA Catapult works closely with UK Space Agency, UKTI, Innovate UK, Foreign & Commonwealth Office and the Science and Innovation Network to support export initiatives, inward investment opportunities and international partnership building. [39]

In relation to the Project, the SA Catapult's role was largely to support "…the UK ambition to grow its exports. Over the next five years, the Catapult's focus on international engagement will increase. It works with UK Trade & Investment (UKTI) to find overseas partners with potential to provide export opportunities for the UK supply chain".[40]

In addition, the Catapult's aims supported specific aspects of this Project. Access to healthcare is at the heart of the Nigerian partnership, as is expansion of financial access in Kenya.

> Africa and other emerging economies have seized on the communications and remote sensing capabilities of satellites, largely bypassing costly and vulnerable ground-based infrastructure. Telemedicine has increased life expectancy…[41]

4.5 Regulatory Regime

Space activity in the UK or by UK nationals is governed by the Outer Space Act 1986. Broadly, the Act requires space activities to be conducted only under licence from the Secretary of State and provides for certain terms to be included in the licence. Ofcom is the agency that administers orbital and spectrum assignments.

There were conflicts identified, or problems arising, from the operations under the Project with the regulatory requirements in the UK, Kenya or Nigeria.

39 See for instance: http://www.adsadvance.co.uk/going-global-uk-space-to-build-international-partnerships-using-british-expertise.html.

40 Satellite Applications Catapult, Delivery Plan 2015-2020, pp. 6, 20,22, accessed 2 November 2015, https://sa.catapult.org.uk/documents/10625/53676/Delivery+Plan+-+Public+version+March+2015.pdf/e07ee971-a0f2-42be-989b-f6882c304144.

41 A World Empowered by Space, https://sa.catapult.org.uk/documents/10625/53676/C222628+VISION+2030+Design+Stg8.pdf/9b0e0092-86cf-45a7-886d-48ec46411323?version=1.0, p. 8, accessed 2 November 2015.

5 KENYA

5.1 NATIONAL POLICY PRIORITIES - SOCIAL AND ECONOMIC

The social policy aims of Kenya's government centre on the following areas:

- Education and training
- Health
- Environment, water and sanitation
- Population, urbanisation and housing
- Gender, youth and vulnerable groups
- Sports, culture and arts

Economic aims are:

- Tourism
- Agriculture, livestock and fisheries
- Wholesale and retail trade
- Manufacturing
- IT enabled services
- Financial services
- Oil and gas

Political aims are:

- Implementation of Constitution and legal reforms
- Leadership, ethics and integrity
- National cohesion and integration
- Legal aid and awareness
- Strengthening the criminal justice system
- Judicial transformation[42]

The national policy priorities of Kenya have been set out in a series of documents. The most current is Vision 2030, but the MDGs and SDGs are also important.

5.2 VISION 2030

The policy document Vision 2030[43] is central to policies adopted by the Kenyan Government, including those in ICT and space. In considering the compatibility of the Project with national policies of Kenya, it was necessary to do so in the light of the policy objectives outlined there.

The Vision 2030 is a long-term development blueprint for the country. The aim of the Vision[44] is to make Kenya "a globally competitive and prosperous country with a high quality of life by 2030". It aims at transforming Kenya into "a newly-industrialised, middle income country providing a high quality of life to all its citizens in a clean and secure environment". Simultaneously, the Vision aspires to meet the Millennium Development Goals (MDGs) for Kenyans. The Vision is anchored on economic, social and political pillars, with aims that are fully consistent and advance the Sustainable Development Goals (SDGs).[45]

42 Vision 2030.go.ke
43 Vision2030_Popular_version_final2.
44 http://www.information.go.ke/wp-content/uploads/2014/11/MinistryStrategic.pdf
45 See SDGs at Annex 4 of this Report.

The Vision 2030 is to be implemented in successive five-year Medium-Term Plans with the first such plan covering the period 2008–2012, and the second covering 2013-2017. At an appropriate stage, another five-year plan will be produced covering the period 2018 to 2022, and so on until 2030.

5.2.1 Vision 2030 Goals in Relation to the Project

It is now obvious that financial inclusion has become a tool in eradicating poverty. Financial access is crucial to social and economic gains. A 14-month ethnographic study of Kenya concluded in 2008 revealed that rural income increased by 30 per cent after factoring in the M-Pesa service.[46]

The Project aimed to extend access to banking services to rural areas and the poor, which clearly aligns with the Vision 2030 goals. The popularity of M-Pesa underlines the desire for these services,[47] which can reduces poverty.

5.3 MDGs

As Kenya progressed through these development plans, it came close to meeting its MDGs, whose deadline was 2015.

> UN Resident Coordinator and UNDP Resident Representative Ms. Nardos Bekele-Thomas has ... said Kenya had made significant progress in achieving the Millennium Development Goals but a lot still needs to be done especially in the area of maternal healthcare and poverty reduction. She said the devolved system of governance that Kenya has adopted will ensure that no one is left behind: "[P]eople must be the centre of development. They must be the ones to drive the process, and that is why devolution is a key component."
>
> Giving an overview of the status of Kenya on the Millennium Development Goals, the United Nations Country team Economic Advisor, Wilmot Reeves said Kenya is yet to achieve goal one of reducing poverty by up to 21%, saying Kenya's poverty level stood at 45.2%. The country was also lagging behind in the health related goals, especially child and maternal mortality, with huge regional disparities on HIV. Kenya had also made significant progress in universal free Primary education, and increase in forest cover and various government policies are in place to address issues of gender equality.[48]

This Project relates to the elimination of extreme poverty in Kenya.[49] It is therefore consistent with the requirements of the Sustainable Development Goals, the first of which is the elimination of poverty. Reduction of child mortality is addressed by the third SDG.

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46 Consultative Group to Assist the Poor (CGAP). See also Kenya: Poverty eradication goes hi tech with M-PESA, Nduta Mbarathi, The Africa Report, 20 July 2011, http://www.theafricareport.com/News-Analysis/kenya-poverty-eradication-goes-hi-tech-with-m-pesa.html, accessed 30 October 2015.

47 M-Pesa, or Mobile Money, facilitates financial transactions via mobile phones.

48 Sustainable Development Goals: Completing unfinished MDGs, http://www.ke.undp.org/content/kenya/en/home/presscenter/pressreleases/2015/Sustainble-Development-Goals/; and UN Helps Kenya Accelerate Development Achievements, Aug 7, 2015, http://www.ke.undp.org/content/kenya/en/home/presscenter/pressreleases/2015/un-helps-kenya-accelerate-development-achievements.html

49 The Project's contribution to reduction in child mortality in Nigeria is addressed in the Section on Nigeria.

5.4 SDGs

Access to financial services and banking is an important factor contributing to the reduction of poverty and to better health. The Project advances the achievement of Goals 1 and 3 of the SDGs, and will have a positive impact in relation to Goal 8, inclusive and sustainable economic growth. It will serve both the interests of the UK and of Kenya in their commitments under the SDGs.

5.5 Project Alignment with Kenyan Policy Goals

The Project in Kenya establishes a satellite-based telecommunication infrastructure, initially to provide access to banking services in partnership with Equity Bank conducting the banking activities.

The Project directly serves the economic policy aim to facilitate financial services and indirectly the social policies of Kenya for education and health. These latter are inextricably linked[50] and can be improved by access to financial services and banking.

5.6 Policy Development

Kenyan government policy is developed over several stages. Generally, the responsible ministry or agency will identify an area of policy to be formulated. Often there is discussion with other bodies and interested persons, leading to draft formulation of the policy by a team of experts. Alternative choices can also be articulated in the initial draft. The draft is then submitted for consultation.

5.6.1 Consultation

Initially the agency responsible creates an expert team, and the policy they develop goes to mandatory stakeholder participation in open fora. The comments received during consultation go through a process of validation. The resulting policy goes through the process for adoption and, where appropriate, implementation by legislation or other means.[51]

5.6.2 Advisory bodies

There are no separate formal advisory bodies in Kenya. Nevertheless, the views of academic and other experts are taken into account in the formulation of policy. The recently drafted Space Policy involved contribution by several knowledgeable persons and bodies.

5.6.3 Stability of Policy

No significant changes in policy or regulation have taken place in recent years, although there have been incremental improvements.

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50 Health and poverty are inextricably intertwined: Sally Murray, Poverty and Health, Canadian Medical Association Journal, 28 March 2006; http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1405857/. Educational Testing Service, Poverty and Education: Finding the Way Forward; https://www.ets.org/s/research/pdf/poverty_and_education_report.pdf.

51 Interviews ICTA, and CA.

5.7 RELEVANT GOVERNMENT BODIES & DOCUMENTS

The primary bodies responsible for policy enactment in areas relating to this Project are the Ministry of Information, Communications and Technology (ICT), the Information, Communications and Technology Authority (ICTA), and the Communications Authority (CA). Once it is fully established the Space Agency will also play a significant role.

ICTA plays a major role in proposing policy directions related to communications. The CA and the ICTA, together implement ICT policies of the Government. The policies it has developed give effect to the Constitution as well as to Vision 2030.

5.7.1 The ICTA

ICTA is a State Corporation under the Ministry of Information, Communications and Technology, established in August 2013.

The Authority is tasked with rationalising and streamlining the management of all Kenyan Government ICT functions. Its broad mandate entails enforcing ICT standards in Government and enhancing the supervision of its electronic communication. The Authority also promotes ICT literacy, capacity, innovation and enterprise in line with the Kenya National ICT Master Plans.[52]

5.7.1.1 National ICT Master Plan 2008

ICTA rolled out the National ICT Master Plan with the aim to completely transform government processes, services and management, and to make information access and service delivery more efficient. The Master Plan, which announced flagship projects to pilot its implementation, was designed to steer Kenya toward the digital future, to transform the country into a regional technical hub, to raise the country's competitiveness and to align the country with Vision 2030's ICT goals.[53]

5.7.1.2 ICTA Master Plan 2013-2017

The Government recognises ICT as a foundation for economic development. Kenya's vision of a knowledge-based economy aims at shifting the current industrial development path towards innovation where creation, adoption, adaptation and use of knowledge form the key source of economic growth.

> "ICT is a critical tool for expanding human skills and rests largely on a system of producing, distributing and utilising information and knowledge that in turn plays a role in driving productivity and economic prosperity."[54]

The current Master Plan sets out priorities and key initiatives to be undertaken from the Vision 2030 socio-economic pillars,[55] in two of the three categories enumerated above:

> Social Pillar, comprising seven priority areas;

52 http://www.icta.go.ke/ict-authority/
53 Ministry of Information, Communications and Technology. Cf ICTA Website. http://www.information.go.ke/?p=1408.
54 http://www.information.go.ke/wp-content/uploads/2014/11/MinistryStrategic.pdf
55 http://www.icta.go.ke/wp-content/uploads/2014/03/KICTB-Connected-Kenya-2017-Master-Plan.pdf

Economic Pillar, with six key intervention areas;

- Tourism
- Agriculture
- Wholesale and Retail Trade
- Manufacturing
- Business Process Outsourcing
- Financial Services

The inclusion of financial services for intervention is clearly relevant to the Project.

5.7.1.3 ICT Legislation: further aims of 2010 Constitution[56]

Kenya enacted a new Constitution in 2010. The Constitution brings with it significant changes to the political system of governance of Kenya, expands rights and fundamental freedoms, and introduces a new system of public finance, among other changes.

ICT is one of the means by which some of the objectives of the 2010 Constitution are to be met in a cost effective way. These include realising democracy through participation of citizen as defined in the Constitution; efficiency of the Government; effective methods to provide public service; and the citizen's right to know.

In particular, relevant requirements of the Constitution that can be delivered by ICT include Article 6 (3) on equitable delivery of public services to Kenyan citizens regardless of their domicile; Article 232 on quality service delivery by the public service; Article 35 on the correctness of information held by the state as well as ensuring public access to the information; and other articles concerning accountability of public officers, transparency of Government and participation of citizens in Government processes.

5.7.1.4 Strategy 2013-2017: Flagship Programmes and Projects[57]

Under the second Vision 2030 MTP (Medium-Term Plan) of 2013-2017, the sector is expected to deliver programmes to upgrade the national ICT infrastructure, create appropriate policies, legislation and institutional reforms.

5.7.2 Ministries of Education, Science and Technology, Devolution and Planning

The Ministry of Education, Science and Technology's mandate includes science, technical and innovation policy. In addition to its educational responsibilities, the Ministry aims to enhance integration of science, technology and innovation into national production systems for sustainable development.

In its Science Technology and Innovation (ST&I) Policy and Strategy of March 2008,[58] the Ministry emphasised the role of ICT.

> To address the macroeconomic and social challenges and achieve the transformation to a knowledge based economy, priority sectors in which ST&I will be strategically integrated to create technology platforms for enhanced productivity growth were

56 ICT Master Plan 2013-14 - 2017-18 April 2014, accessed 30 August 2015 at https://www.kenet.or.ke/sites/default/files/Final%20ICT%20Masterplan%20Apr%202014.pdf

57 http://www.information.go.ke/wp-content/uploads/2014/11/MinistryStrategic.pdf

58 http://ist-africa.org/home/files/Kenya_STI-Policy_Mar08.pdf.

> identified through a consultative process. The national sectors significant to achievement of national growth and development targets include, (h) Information Communication Technology (ICT) – Provision of a robust ICT and infrastructure to stimulate and support local ICT industry growth, improved service delivery in both public and private sectors.[59]

The Ministry's aims are to be achieved through the expansion of fibre optic networks to include hospitals, schools, police stations and other public service institutions.

The Ministry, in partnership with institutions of higher learning, will also create local content aimed at spurring new business opportunities, to promote employment and generate wealth. It also aims to facilitate upgraded ICT capacity through training of professionals in the ICT sector. Emphasis will be placed on encouraging ICT training in educational institutions, and setting up of county ICT incubation hubs to empower the young with the necessary training and work experience to develop market-ready ICT services and products.

The Ministry of Devolution and Planning has also announced plans for ICT incubation hubs in every county.[60]

All of these programmes can benefit from satellite connectivity. The Project demonstrates the advantages of rapid provision of connectivity and cost advantages of satellite alternatives.

5.7.3 The Communications Authority

The Communications Authority of Kenya is the regulatory authority for the communications sector in Kenya. Established in 1999 by the Kenya Information and Communications Act, 1998, the Authority is responsible for facilitating the development of the Information and Communications sectors including broadcasting, multimedia, telecommunications, electronic commerce, postal and courier services.

The Ministry of ICT is responsible for the policy affecting the services envisaged by this Project. Once formulated, ICTA and CA will implement the policies. However, as the implementing body, the CA is consulted in the formulation of policies.

This is a slow process that is not prone to sudden unpredictable changes, resulting in reasonably stabile policies and laws.

The previous authority, the Communications Commission of Kenya (CCK) was re-named and restructured in 2014. CA Director General remarked that the rebranding came with an added mandate in regulating electronic transactions, to include administering broadcast content, developing media standards and monitoring compliance.

> "Our rebranding is meant to give us a new outlook in dealing with the sector issues; we were given more powers that include prosecutorial powers in contraventions in terms of the regulations of Information Communication and Technology (ICT) more especially on the spectrum".[61]

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59 Ministry of Science and Technology, Science, Technology and Innovation Policy, March 2008; http://www.ist-africa.org/home/files/Kenya_STI-Policy_Mar08.pdf

60 http://allafrica.com/stories/201305290921.html

61 Communications Authority of Kenya succeeds CCK, Kennedy Kangethe, 24 June 2014, http://www.capitalfm.co.ke/business/2014/06/communications-authority-of-kenya-succeeds-cck/

Currently, the CA has responsibility for:

1. Licensing all systems and services in the communications industry, including; telecommunications, postal, courier and broadcasting.

2. Managing the country's frequency spectrum and numbering resources. Facilitating the development of e-commerce.

3. Type approving and accepting communications equipment meant for use in the country. Protecting consumer rights within the communications environment.

4. Managing competition within the sector to ensure a level playing ground for all players. Regulating retail and wholesale tariffs for communications services.

5. Managing the universal access fund to facilitate access to communications services by all in Kenya.

6. Monitoring the activities of licensees to enforce compliance with the license terms and conditions as well as the law.

5.7.4 Proposed Kenyan Space Agency

One of the functions of the Space Secretariat, part of the Ministry of Defence, was to oversee the transition of the Secretariat into a fully-fledged Kenya Space Agency.[62]

The Space Agency has not yet been formally created. The Government is going through the process of creating the Space Agency and its policies.

Initially appropriate individuals can be seconded from the Ministry of Defence, MoD, and other organisations.

Once the Agency is established it will promote the passage of legislation to implement Treaty obligations, including licensing, penalties and other measures.[63]

5.7.5 Kenyan Space Centre

Kenya is also in the final stages of establishing a Space Centre, with similar functions to those of the US National Aeronautics and Space Administration (NASA).[64]

62 Gazette Notice 5563, 2 June 2009, Section 2.6; http://www.kenyalaw.org/KenyaGazette/view_gazette.php?title=3222; accessed 10 March 2016.
63 Interviews Jomo Kenyatta University of Agriculture & Technology (JKUAT), and NACOSTI.
64 Kenya to launch space centre, Nyambega Gisesa, updated Saturday, June 27th 2015, https://www.standardmedia.co.ke/health/article/2000167230/kenya-to-launch-space-centre, accessed 9 September 2015.

5.8 KENYAN POLICY RELEVANT TO THIS PROJECT

Policy areas relevant to this Project most prominently relate to access to finance, banking and communications. They are inseparable from alleviation of poverty and increased access to goods and services, improved standard of living, and infrastructure improvement including electrical and digital connectivity. Another area of focus in Kenyan policy is strengthening national space science programmes. While these programmes obviously relate to space-specific goals, they also have a broader impact on education, commerce and other areas of policy focus.

The responsibilities and objectives of various Kenyan Government departments and agencies in these and other related areas are briefly discussed in this Report.

5.8.1 Education and Health

Education and health are two primary areas of focus for the policies and strategies being pursued in Kenya. The ICT Authority's view is that:

> The most important things are education and health. New services must be considered in relation to the effect they have on education and health.[65]

5.8.1.1 Responsibility for Healthcare Provision

Healthcare is devolved to county governments that find it difficult to connect the rural population to health services. The provision of access to health services and expertise, as in the Nigerian Project, have a strong impact on the rural population.[66]

5.8.1.2 Current Health Service Projects

The Government has embarked on an aggressive medical sector programme with mobile units fully equipped with diagnostic equipment. If they could be connected through a network to relay the results to a common central records database, hospitals could access patient records to provide the information necessary for appropriate treatment.[67]

Part of this programme is the provision of much needed maternal health services by mobile clinics. With mobile satellite access, Internet connectivity, full communication by telephone and data and video conferencing the service could be taken anywhere in the country to provide access to the best doctors anywhere for any patient.[68]

There is some provision of telemedicine through Airbus, SSTL, in conjunction with African Medical Research Foundation, AMRF, and Kenyatta National Hospital providing services in remote areas of Kenya.[69]

65 Interview ICTA.
66 Interview ICTA.
67 Interview ICTA.
68 Interview ICTA.
69 Interviews ICTA, and NACOSTI.

5.8.2 Connection Between Provision of Banking Services, Education and Health

There was considerable comment during the course of this research to indicate that education and healthcare are considered to be more critical than banking. However, financial access contributes to better education and health. Financial services are universally considered to be an important factor in the reduction of poverty and the safe circulation of funds. In turn, improved economic circumstances lead to better health and educational outcome for the population.[70]

The emphasis on education and health are widely shared among officials, academics and the business community.[71] Health and education are seen as critical policy goals in Kenya. Some reservations were expressed about an emphasis on banking services in preference to health services. There seems to be a widely held view that UK programmes should concentrate on education and health, not banking. For example, the African Centre for Technology Studies is convinced that a banking service is important and will succeed, but also states that education will make a huge contribution to the success of Kenya. Access to banking services can be seen a promoting health-related goals. Although there are many NGOs with a focus on health, along with and a strong government focus, healthcare remains expensive in Kenya. Access to healthcare by the rural poor is very limited. Services that reduce poverty, such as provision of banking and financial access, would lead to greater access to health services.[72]

In a broad sense the provision of the banking service is also seen in the link to education.[73] In Kenya primary education is free and secondary education is subsidised. As the banking services are introduced, it is important to see how it will affect and ideally improve education at all levels.[74] Connectivity could and should be extended to E-Education and Mobile Education, as well as other areas such as environmental conservation. It should be noted that the business community is also keen to advance children's education.

5.8.3 Banking and Financial Access

5.8.3.1 Current Financial Access in Kenya[75]

According to Governor of the Central Bank of Kenya, in 2014 the percentage of Kenyans living within a 3km distance of a financial access touch point was 58.7%.[76] However, financial services touch points tend to be located in economically active regions of the country, more in urban than in rural areas. Furthermore, financial services touch points

70 Health and poverty are inextricably intertwined: Sally Murray, Poverty and Health, Canadian Medical Association Journal, 28 March 2006; http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1405857/. Educational Testing Service, Poverty and Education: Finding the Way Forward; https://www.ets.org/s/research/pdf/poverty_and_education_report.pdf.

71 Interviews ACTS, AH, A-G.

72 Interviews AH, ICTA.

73 Interview ACTS.

74 Interview ICTA; see Note 93.

75 http://www.afi-global.org/sites/default/files/publications/r140317a.pdf; 16 October 2015, found on AFI Global pages, in Library: http://www.afi-global.org/library/publications and http://www.gsma.com/mobilefordevelopment/geospatial-analysis-for-financial-inclusion-tracking, accessed 23 October 2015.

76 This figure compares favourably with other countries in the region. Understanding and expanding financial inclusion in Kenya, Keynote speech by Prof Njuguna Ndung'u, Governor of the Central Bank of Kenya, at the launch of the FinAccess GIS Mapping of all Financial Access Touch Points 2014, Nairobi, 13 March 2014, http://www.afi-global.org/sites/default/files/publications/r140317a.pdf, accessed 16 October 2015.

tend to be located away from areas of high poverty, disproportionately favouring less poor areas.
However, a large number of poor Kenyans are remote enough from a branch to make access difficult. While wireless service is available to a majority of them, varying by province, there are still many who have no such connectivity. Proximity to a physical bank branch or a contact point is a significant factor in financial access. Where these are available, the use of portfolios of financial services is more prevalent, helping to address many socio-economic problems.

Financial services touch points tend to be located away from areas of high poverty levels. For instance, 69% of all financial access touch points were located in areas with the least likelihood of poverty, even though only 30% of the population live in those areas.[77]

Furthermore, Kenyans have greater access to mobile phone financial services providers than to banks. For example, Kenyans living within 3km of a mobile phone money agent is 58.6%, or 23.64 million, compared to only 21.2% or 8.57 million living near a bank branch.[78]

5.8.3.2 Increasing Access to Banking & Financial Services

Safaricom and other companies provide mobile access to banking services where bank branches are not within reach, like the tremendously successful M-Pesa system. There is an added need in rural areas with a lack of connectivity. The need for and socio-economic desirability of access to banking services have been amply illustrated by Financial Sector Deepening, the popularity of M-Pesa and research by the Consultative Group to Assist the Poor, among others. Clearly, the achievement of sustainability will depend on the extent of that need and the cost at which it can be met.[79]

5.8.3.3 UK and Kenyan Government Support for Banking Services

The Financial Sector Deepening (FSD) has been providing financial services to people in Northern Kenya in partnership with Equity Bank since 2005.[80] Through this social protection programme FSD provides certain amount of money to about 80k households on the verge of starvation. FSD's programme includes provision of banking services to poor people in very rural areas to demonstrate its profitability.[81]

The Kenyan Government has been very encouraging. FSD has agents in Nairobi and in Northern Kenya, which have very different conditions, but both allow agents to be successful. In addition, DfID's Social Protection Fund provides finance for the FSD. The Kenyan Government is also contributing funding, at the moment about 10% - 20%; by 2017 it will provide the majority, about 60% - 70% and DfID will make up the balance of 30% - 40%. The Kenyan Government has also allocated KS17bn to social protection programmes.[82]

77 *Ibid*.
78 *Ibid*.
79 Interview A-G's office.
80 FSD Kenya was established in 2005, as an independent trust to support the development of financial markets. See http://www.kpmg.com/eastafrica/en/services/advisory/development-advisory-services/services_and_expertise/private_sector_development/financialinclusionkenyarwandauganda/pages/default.aspx. The Government has allocated KS17bn to social protection programmes.
81 Tavreen Suri, The Mobile Money Revolution in Kenya: Can the Promise be Fulfilled?; http://fsdkenya.org/publication/full-presentation-for-the-inaugural-fsd-kenya-annual-lecture-on-financial-inclusion/
82 FSD Interview 30.07.2015

5.8.3.4 Demand for Cashless Payment Systems

The market for cashless payments in Kenya has hugely expanded, accounting for most transactions that were previously carried out with cash in sectors, like foreign travel visas and transport. Recent government and commercial regulations have also restricted cash payments in some sectors.[83]

5.8.3.5 Overcoming Limited Access in Rural Areas

While the banking sector provides on-line services, it is not clear whether there is a sufficiently strong market in rural areas to develop these more aggressively, given the infrastructure costs. In addition, most banks have no experience serving poor customers in rural areas. One of this Project's strengths is that Equity is considered a rural bank, and attracts the kind of customers that would benefit most from access.[84]

5.8.3.6 Affordability

Alleviation of poverty is a goal of the Kenyan Government and one of the obligations it has accepted under the MDGs and the first goal under the SDGs. One aspect of these obligations is ensuring that banking services are reasonably priced.

Off-grid agency banking is particularly vulnerable to high costs. In Kenya, every transaction has to be carried out in real time. Transactions cannot be batched for later transmission to the bank. Using an off-grid satellite phone, which is the only option in many cases, is very expensive. Multiple calls only increase the cost of the enterprise. Extension of the satellite-provided banking service to rural areas may therefore be a solution to the problem of high cost.[85]

For any satellite service to be sustainable, be it to provide access to banking or healthcare, cost is a critical consideration. Costs recoverable from the consumer of the service are particularly important. In some cases, such as healthcare, there can be government subsidies and funding. But for many services, like banking, the consumer will have to bear the cost.[86]

In areas served by the Project, average incomes are very low (about $2 per day per household), and to serve them the technology should be at lower cost. There are also cultural factors to be considered. In the case of banking, there is a need to develop a culture of saving and borrowing for development projects.

Any cost to the consumers will inevitably be seen as another expenditure. There have been some solutions for cost reduction.

> One example that has shown positive results is demonstrated in a community where the borrowing is repaid one half in cash and work for the other half. Many people

83 http://www.businessdailyafrica.com/Mobile-phone-cash-transfers-rise-to-Sh5-2-billion-per-day/-/539552/2165594/-/spvnwtz/-/index.html, accessed 9 November 2015
84 Interviews A-G, Astrium, Technical University of Kenya (TUKenya).
85 Interview FSD.
86 Interview ICTA.

> improve their houses, which improves health. This programme was to provide affordable credit. The borrowing could be for business growth.

The IPSP provided funding to Kenya to implement the Project services. There may be additional funding as part of the KS17bn social programme funding referred to above (Section 5.8.3.3).

5.8.3.7 'Know Your Customer' Requirements

A complication for many emerging branchless banking schemes is that of the know your customer (KYC) regulations, a requirement that every new customer's identity be verified before he or she is able to use the service. In Kenya there is an established national ID card scheme in place, relied on by M-Pesa. It is expected that Equity Bank will have attended to this requirement.

5.9 INFRASTRUCTURE

Kenya continues to improve infrastructure in several areas, some of which are relevant to the Project. Depending on the service to be provided, Government funding and foreign aid could subsidise or fully fund the facility. Projects aimed at alleviation of poverty and healthcare could qualify for such funding assistance.

Kenya is not, of course, the only country with the ambition and the need to enhance its infrastructure and to provide access to services in underserved locations. Each country will have its own particular objectives for specific services such as education, health and disaster response coordination. There is a strong Kenyan focus on improved infrastructure, including service provision by satellite.[87]

The aspiration set out in Vision 2030 is for a country firmly interconnected through a network of roads, railways, ports, airports, water and sanitation facilities and telecommunications. The Kenyan Government has observed "[by] 2030, it will become impossible to refer to any region of our country as 'remote'."[88]

5.9.1 Digital Connectivity

There is a clear desire in Kenya to expand its digital infrastructure. In his April 2013 inaugural speech, President Uhuru Kenyatta stated:

> We will build on the accomplishments of the last administration in infrastructure, by increasing accessibility through roads and rail networks, *as well as increasing digital connectivity*.[89]

The current government's focus on increasing connectivity is shared by others across the spectrum. Interviews and research confirm the widespread need in a number of fields.

87 http://www.vision2030.go.ke/wp-content/uploads/2015/06/Vision2030_Popular_version_final2.pdf, accessed August 30 2015.

88 http://www.vision2030.go.ke/wp-content/uploads/2015/06/Vision2030_Popular_version_final2.pdf, accessed 30.08.15.

89 Inauguration speech, April 09, 2013, http://www.capitalfm.co.ke/eblog/2013/04/09/president-kenyattas-inauguration-speech/.Emphasis added.

The need for connectivity and its impact on the achievement of policy objectives are evident in areas including:

- Government Policy: Vision 2030;
- Primary aims of access to educational and health are impossible for many without connectivity;
- Business, commerce and innovators look for support from access to the Internet;
- Academics also benefit in significant ways, and interact with government and business; and
- International partners, NGOs, IGOs need to monitor, comment and lobby on social and economic matters.

Many, including those in the commercial sector, view countrywide connectivity as the responsibility of Government and not of the telecommunication companies. The success of Korea and Singapore is attributable to such an approach and could be a model to be followed in Kenya.[90]

5.9.2 Current Level of Connectivity

Before the availability of optical fibre, Kenya was one of the biggest users of satellite services. Introduction of optical fibre resulted in less satellite capacity being used, particularly for international traffic. There has been growth of satellite broadcasting, but less for telecommunication.[91]

ITU statistics put Kenya's Internet penetration at 39% and mobile phone subscriptions at 71% of the population. The country is a regional technology hub with a strong online presence.[92] Even so, a significant proportion of the population lack access to the Internet or mobile telephony. At a national level there is reasonable connectivity, but it is poor or non-existent in many rural areas. There are other barriers to connectivity that are explored in this Report. It is clear that space applications are important for bringing connectivity to these areas and to overcoming other barriers to provision of a wide range of necessary services, including banking.[93]

5.9.3 Barriers to Connectivity

5.9.3.1 Cost

Away from the centres like the major cities that are equipped with electrical grids and telecommunication networks, the cost of establishing connections can be too high for a population whose average daily income per household is $2.[94]

Research, development and infrastructure costs can far exceed the revenue that can be generated from them in the short term. Infrastructure projects are therefore often the remit

90 Interview AH.
91 Interview CA.
92 Electronic Frontier Foundation, https://www.eff.org/zh-hans/deeplinks/2015/07/kenya-require-wireless-users-register-phone-number, accessed 31 October 2015. See also Annex 2.
93 Interview A-G . See also Annex 2.
94 Interview ICTA . Note that the CIA Factbook indicates that as of 2012, 43.4% of the population lived below the poverty line. https://www.cia.gov/library/publications/the-world-factbook/geos/ke.html, accessed 2 March 2016.

of government or long-term investors. In some cases lower charges to the user can result in increased demand that can improve overall return on investment.
This was highlighted by Entrepreneur Yaron Assabi who suggested that:

> "operators should take the ... approach of NTT Docomo in Japan that charges only 2% of the revenue, in ... contrast to the 30% to 70% that operators commonly charge in Africa. Arguably, this would incentivize entrepreneurs to create greater quantity and quality of content and applications, which ultimately increase data usage to the benefit of operators ... ."[95]

Nevertheless, connectivity has become more affordable to many Kenyans.[96]

5.9.3.2 Geographic challenges

Especially in remote areas there are barriers to terrestrial solutions, ranging from population density to physical and topographical characteristics of the areas to be reached and covered.

Satellite services can be less costly and quicker to provide than terrestrial equivalents, especially in rural areas where new cable could have to be installed and topographical obstacles overcome.

5.9.3.3 The challenge of mobile and nomadic communities

Populations that move from place to place will by definition be poorly served by fixed networks. However, satellite networks can serve mobile or movable terminals that could be easily relocated close to the population being served.

5.9.2 Electrical Infrastructure

Electricity and connectivity are two vital but often missing elements of infrastructure for many Kenyans.[97] In the present context, connectivity is dependent on reliable power supply.

Most off-grid homes in Kenya are classified as low income, with average per capita annual incomes of KSh 66,430 (US$ 730). Solar providers in Kenya have been successful at creating products and payment options that work financially and practically for these consumers. The M-KOPA and InterMedia study calculates that the total annual energy spend by consumers in Kenya is now valued at over KSh 150 billion (US$ 1.3billion).[98]

5.10 Space Policy

In relation to many countries, and certainly to Kenya, it is not easy to identify official documents specifying space policy. This may be due to weaknesses in official databases, on-going discussion and revision of space policy as part of changes in broader government policy, and the fact that much of the technology is being newly applied. The following policy discussion assumes that statements of relevant government officials and published

95 http://geonet.oii.ox.ac.uk/blog/lets-work-together-mobile-operators-and-digital-startups-in-africa/, accessed 31 October 2015.
96 Interview AH.
97 See Annex 2.
98 http://www.m-kopa.com/press-release/kenya-emerges-as-solar-pv-hot-spot/, accessed 23 October 2015.

reports can be taken as authoritative as of this date, pending official creation of the Space Agency and related regulation and legislation.

5.10.1 Development of Space Policy in Kenya

Kenya does not currently have a comprehensive Space Policy fully in place, but is in the process of adopting one set out in the Draft Space Policy and Strategy. In 2012 the Kenyan Minister for Higher Education, Science and Technology, Margaret Kamar, called for the review, consolidation and refining of the policy and strategies on space policies if the country is to tap into space technology for development.[99]

At the beginning of July 2015 a final draft of the proposed Space Policy was completed and submitted to the Cabinet. At a Cabinet meeting on 18 February 2016 the Kenyan Space Policy and Strategy and the formation of a Space Agency were approved[100] and taken to Parliament for discussion and adoption (Draft Space Policy).[101]

The Agency is likely to promote the space sector and the use of space, and to regulate space activities. The focus will be on areas such as launching, science and technology education.[102]

ICTA's view is that the system is flexible enough to incorporate future changes to policy or regulatory systems, in order to accommodate desirable projects.[103] Where policies or regulations fall short, the system as it stands is such that regulations and policies can be put in place to facilitate better proposals.[104]

5.11 Kenyan Space Policy in Context of Broader National Policy

Kenyan space policy must be seen in the context of Vision 2030, Kenya's blueprint for development covering the period from 2008 to 2030. It aims to transform Kenya into an industrialising "middle-income country providing a high quality life to all its citizens by the year 2030". It is based on the premise that "the pursuit of space science and technology shall contribute to the country's economic growth and socio-economic transformation in addition to service to all humankind". It aims to "promote and enhance social and economic development through the utilisation of space technology in order to uplift the standard of life for all citizens".

In addition, there are specific needs to be addressed, such as training and education of scientists and technologists, government use of space services and development of applications.

5.11.1 Compliance with International Regulations and Treaties

In formulating policies and regulation, international obligations have been taken into consideration. Kenya is party to the UN space treaties and the Draft Space Policy complies with them.[105]

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99 www.africasti.com/?p=3468.
100 Kenya: Cabinet Meeting Held on 18 February 2016, allAfrica, 18 February 2016; http://allafrica.com/stories/201602191640.html, accessed 26 February 2016.
101 JKUAT Communication, 29 February 2016.
102 Interview JKUAT.
103 Interview ICTA.
104 Interview ICTA.
105 Interview JKUAT.

5.11.2 Foreign investment: Requirements for involvement of nationals[106]

One of the important considerations that the CA emphasises is the need to have at least 20% of the business owned by Kenyans. The percentage is kept low to encourage foreign investment. Each application undergoes a case-by-case assessment.

If there is no partner at the outset, the investor is given 3 years to achieve the 20% local shareholding. With a Kenyan partner in the Project, that period is not relevant. Given the structure of the arrangement between Inmarsat and Equity, these rules are also unlikely to apply.

5.11.3 Application of Technology to Policy Goals[107]

In Kenya the uptake of technology is regarded as still low, but two factors indicate the probability of changing that position. Kenya recognises the value of space applications in meeting its socio-economic goals, and is already benefitting from a number of space applications in addition to telecommunications.[108]

The Kenyan Government intends to develop its indigenous space industry and to benefit from the contribution that science and technology can make to solving existing socio-economic problems.

Application of space technology could help solve many of Kenya socio-economic problems. There is a desire to leverage space technology as a driver for developing other sectors and industries, such as advanced manufacturing, electronics, and so on. The Government believes that space technology could have a trickle-down effect, leading to a much more vibrant economy that has a local manufacturing base.

For instance, according to Unesco, about 17 million of Kenya's 41 million people lack access to safe water.[109] During the course of a 2013 survey of groundwater conducted for the Kenyan Government on behalf of the UN, aquifers were detected by space-based technology and Landsat imagery, in Turkana County of Northern Kenya.[110] Although there will be difficulties exploiting this resource,[111] the groundwater could potentially improve the livelihoods of the Turkana people, most of them living in poverty. Sale of water to neighbouring countries can generate income for the region.[112]

There was a view among those interviewed that the Project could provide a model for such solutions, and that it might lead to the identification of other collaborations between Kenya and Britain.

5.11.4 Satellite Connectivity

106 Interview CA.
107 Interview JKUAT and other sources.
108 Interview NACOSTI.
109 See also http://www.bbc.co.uk/news/science-environment-24049800.
110 http://landsat.gsfc.nasa.gov/?p=6404, accessed 9 November 2015
111 http://www.telegraph.co.uk/news/worldnews/africaandindianocean/kenya/10302421/Kenya-finds-70-year-supply-of-water-in-desert-region.html.
112 See further discussion of water resources below.

The Communications Authority also saw this Project as a good tool for achieving policy objectives, particularly as Kenyan infrastructure has not covered most of the country because of the demographics. The CA's aims to increase connectivity in unconnected areas and to narrow the digital divide. This Project helps to achieve these objectives.[113]

5.11.5 Education, Environment and Conservation

The Communications Authority of Kenya is convinced that satellite provision of banking will be successful. It will increase inclusion not just for financial access, and could be extended to e-education and mobile education, environmental and conservation applications.[114]

5.11.6 Promotion of Space Services

Kenya has affirmed its intention to encourage and assimilate space capabilities, particularly by the creation of a Space Agency.[115]

5.11.7 Telecommunications

Kenya has been and continues to be an active user of satellite communications. There are a number of entities offering satellite communication services in Kenya, including, of course, Inmarsat.[116]

5.11.8 Remote Sensing

Remote sensing used for resource management, such as mapping and regular images of landscape, and to detect poaching near Lake Victoria. Satellite remote sensing is also used to detect soil quality and manage farming.[117]

Kenya collaborates with Italy in running the Telemetry station in Malindi, near Mombasa.[118]

5.12 Areas of Future Space Policy Focus

5.12.1 Focus of Draft Space Policy

The Draft Space Policy focuses on a number of areas, including:[119]

- Social economic benefits;
- National security and defence;
- International cooperation;
- Promotion of research, development and innovation;
- Sustainable use of outer space; and
- General access to space technology.

113 Interview CA.
114 Interview CA.
115 Draft Space Policy, Section G.1.
116 http://www.businesslist.co.ke/category/satellite-communications
117 Interview ACTS.
118 Kenya was particularly interested to see how the launcher works. ACTS Interview.
119 Draft Space Policy, Section E.

The Project promotes the first, third and last of these principles by providing access to banking services using UK space capabilities.

5.12.2 Other Space Applications

Kenya is considering how to develop its own national space programme.

A group formed in July 2015 will guide the Government on application of space services, ranging from communication, including mobile banking, to remote sensing and personal protection. A main consideration is how to benefit from the activities to improve the economy. Furthermore, a task that will usefully be carried out by the Space Agency, once it is formed, would be coordinating all space related activities carried out in Kenya.[120]

Kenya will apply the resources now available, such as those under the Disaster Charter, to its disaster management programmes. The expectation is also that other technologies can be added to transponders on the satellites, to develop the capability to transmit and translate data and track any changes.[121]

A challenge for Kenya is to overcome the slightly low uptake of technology. Kenya is more focused on development of applications than Nigeria, whose interest is in development of its own technology. In Kenya, a number of agencies are concentrating on applications. Space applications can greatly benefit Kenya, but there are many areas not yet exploited.[122]

5.13 International Collaboration

5.13.1 Italy

Kenya is working with the Italian Space Agency, Agenzia Spaziale Italiana (ASI) in various projects, including education and training programmes in space technology. ASI is using the Broglio Space Centre, located in Malindi, Kenya, for tracking NASA, ESA and Italian satellites.

The Agreement between the parties over the venture expired in March 2010, but has been repeatedly extended by 2 or 3 months at a time. Arrangements are now being made to transfer the operation of the Centre to the Space Agency when it is established.

5.13.2 Other Countries

There are also collaborations between Nigeria, South Africa, Algeria and Kenya on environmental resource management, under the African Resource and Management Satellite Constellation. Each country contributes assets to the constellation.[123]

NASA and the United States Agency for International Development (USAID) opened the SERVIR-Eastern and Southern Africa hub in 2008 at the Regional Centre for Mapping of Resources for Development in Nairobi.[124] It serves eastern and southern Africa, which faces regular, often disastrous, flooding interspersed with periods of extreme drought, with far-reaching economic and public health ramifications. Kenya is also exploring with NASA

120 Interview NACOSTI ; Draft Space Policy, Section G.1.
121 Interviews ACTS and CA.
122 interview Jomo Kenyatta University of Agriculture & Technology, JKUAT.
123 Interview NACOSTI.
124 http://www.nasa.gov/mission_pages/servir/africa.html

how to harness space technology using NASA data for environmental planning and conservation, with facilitation by the African Centre for Technology Studies.[125] Management of wildlife is another potential area for collaboration. The Kenya Wildlife Service is very interested in potential applications. Kenya has been concerned to strengthen biodiversity conservation, working with Japan and others through the UN University.[126] Biodiversity is considered important, and future projects may bring in participants from others in West African regions.

A water resource management program would be welcomed. Recently there has been some success in water mapping, which has lead to discovery of a large aquifer in Northern Kenya. It allows Kenya to sell water to neighbouring countries.

In addition, urban planning and traffic management need to be improved, and satellite services can help.

5.13.3 UK as Partner

One of the authors of the Kenyan Draft Space Policy, an advocate for the formation of the Space Agency, expressed the view that the Project is good for Kenya, and that Kenyans are open to partnerships. It can provide business for a UK company, and a learning opportunity for Kenya.[127] This view and the collaboration agreements already in place is strong indication that Kenya is a willing and enthusiastic partner for the UK.[128]

5.13.4 Cooperation Between UK and Kenya

To create a thriving space sector there must be readiness in political, legal and governance realms to embrace space technology. Kenya has shown its intention to encourage space capabilities, through the move to create a space agency. It also recognises the benefits of close relationships with countries having space capability. With Inmarsat's infrastructure in place, many benefits can be achieved for the Kenyan nation. There is also a firm basis for the UK Space Agency and the Satellite Applications Catapult to benefit from operational experience and new applications that may develop through the cooperation, while furthering their remit to promote the UK space sector.

Although much of the dialogue in Kenya has been about technological capability, there is also a perceived need for new applications, spin-offs and innovation. These can be further enhanced by engagement with the Satellite Applications Catapult, in keeping with the policies of the UK.

However, it should be noted that value added services have not been well served in the Kenyan communications system. African operators do not readily engage with the start-up and app innovation world around them. Their cultures are different; Application Program Interfaces (APIs) are not open or easy to plug into; operators do not dedicate significant staff and resources for engagement with start-ups; their decision-making structures are not in tune with the speed, experimentation and informality common for start-ups.

Management of value-added services created by start-ups are often outsourced to an aggregator that adds to the cost. Operators run apps competitions for local developers, that

125 Interview ACTS .
126 Interview NACOSTI. See http://www.unu.edu.
127 interview Jomo Kenyatta University of Agriculture & Technology, JKUAT.
128 Interview Technical University of Kenya, TUKenya,.

tend to result in many prototypes but are rarely sustained and scalable, revenue-generating digital products.[129]

It would add to the value of projects like this one if there were more engagement with application developers, encouraging them to create new ways of using the connectivity provided under the Project.

5.14 Space Policy Implementation and Legislation

Kenya does not yet have specific space law. Kenya has not passed space legislation within the time frame of the Project. However, assuming that the Space Agency is created this year, and the Draft Space Policy is fully approved, there could be regulatory and other legislation fairly soon.

In general, other relevant Kenyan law focuses on the technology, but not on applications developed by third parties. It addresses what government agencies can and will do, but does not sufficiently anticipate non-government activities. Nor does it facilitate the role of third parties.

Following the approval of the Space Policy and Strategy, laws may be expected in the near future.[130] Space legislation will be critical to the successful development of a space sector, and there is the will to pursue enactment of space law. The existing plans for the formation of the Space Agency and the policies to be advanced include indications of broad elements of the legislation to be fully drafted and put before parliament.[131]

In the course of the research for this Report, no matters came to light that would raise concern for the banking connectivity Project.

5.15 Regulatory

5.15.1 Regulatory and Policy Environment

There is a fairly liberal policy and regulatory environment in Kenya. Both services and connectivity are encouraged and supported. The interest is in both the technology and applications. The Government recognises that once technology is developed it needs to be used. But while Kenya develops technology it will also encourage applications to be in the forefront.[132]

Current legislation focuses on technology and not on applications. It will be necessary to examine policy and administrative governance to ensure the creation of an enabling environment. Space applications like the Project that have social and economic outcomes are likely to be approached from this perspective.[133]

129 Let's Work Together: Mobile Operators and Digital Startups in Africa, Nicoas Friederici, 29 December 2014, http://geonet.oii.ox.ac.uk/blog/lets-work-together-mobile-operators-and-digital-startups-in-africa/, accessed 31 October 2015.
130 Draft Space Policy, Section A Introduction and Section C.
131 Interview, African Centre for Technology Studies (ACTS).
132 Interviews ICTA , and TUKenya.
133 See also Section 5.7.1.4 above.

5.15.2 Engagement with the Regulatory Bodies

Kenya engages with the relevant bodies of the UN and ITU. Kenya's move toward the increased use of satellite services will necessitate a high level of engagement with the ITU and with the UN COPUOS, as well as consideration of alternative approaches to national regulation.

5.15.3 Security and Data Protection

When increased connectivity is introduced in Kenya, there will inevitably be some concern about security and data. The introduction of M-Pesa on a successful scale raised similar questions within banking and communications regulation circles. Because of the satellite element in the connectivity, there may be a tendency to look at space law for answers. However, there is no current space law that has anything to say about banking service.

For non-Kenyan service providers, the banking regulations to be observed could contain rules on data in relation to agency banking. Privacy and data protection laws are currently before Parliament.[134]

5.15.4 Technology neutrality

Kenya does not appear to have a policy of preferring one technology to another. But, it will protect existing services from harmful interference and coordinate spectrum use with its neighbours.[135]

5.15.5 Public Service Licensing

If a third party is providing service to the public, the Communications Authority will protect the users to ensure they receive what is promised.[136]

5.15.6 Other Regulatory Barriers

Kenya encourages wider access to banking, and agency banking services close to the user. The Government is very supportive of the idea of agency banking, as is the Central Bank. The Financial Sector Deepening, (FSD), is not aware of any current or anticipated regulatory barriers to the provision of agency banking in rural areas.[137]

5.16 Regulation of Space Services

The relevant areas of regulation in Kenya that relate to space services, and specifically to this Project, may include spectrum and system licensing, telecommunications, equipment, cooperation agreements, technology neutrality, minimum coverage requirements, point-to-point services, government funding and preferences, as well as ITU issues and potential restrictions or barriers.

134 Interview ICTA.
135 *Ibid.*
136 *Ibid*.
137 Interview FSD.

5.16.1 Banking Service

The CA grants service provider licences for providing banking services over a telecommunication network. The CA is not concerned about the type of services provided, unless it is a voice service. The Central Bank licences all banking activity, including on-line banking services.[138] It is expected that Equity Bank has any authorisation needed for the banking aspect of the Project.

5.16.2 Spectrum Management

The Communications Authority manages spectrum in accordance with the Kenya Information and Communications Act.[139] Spectrum its valued depending on the technology that is to be used. Current demand is for G4 services, a move away from previous demand for 1800 MHz from G3 network operators.[140]

5.16.3 Uplinks

Depending on the kind of infrastructure provided, a licence may be required. For a satellite system an uplink licence is needed. A minimum fee is payable. The user Agent needs no uplink licence unless the Agent operates the uplink station. The Inmarsat licence is assumed to cover operation of the whole network.[141]

5.16.4 Downlinks

Inmarsat has an agreement with the Authority on the basis of GMPCS (Global Mobile Personal Communications by Satellite). A 15-year licence is granted to Inmarsat for the footprint.

BGAN currently operates at 0.5 Mb/s, less than the 2Mb/s download the Communication Authority considers appropriate to accommodate multiple users to be connected to the Internet. In the event of increased bandwidth to allow such service, other licensing requirements may apply.[142]

5.16.5 Quality

The CA monitors the quality of services and the integrity of the site. For it to be able to monitor there needs to be a licence identifying the provider and characteristics of the system.[143]

5.16.6 Service Provision

5.16.6.1 Range of Services

138 Interview CA ; and see Central Bank of Kenya Act, Sec 4A, https://www.centralbank.go.ke/index.php/banking-services.
139 Kenya Information and Communications Act, 1998, Part IV - Radio Communication, Secs 35 et seq; http://www.kenyalaw.org:8181/exist/kenyalex/actview.xql?actid=CAP.%20411A.
140 Interview CA.
141 Interview CA.
142 Interview CA.
143 Interview CA; BizTech Africa, http://www.biztechafrica.com/article/safricom-gets-reprieve-license-renewal/8350/.

The Kenya Information and Communications (Amendment) Act, 2013, amended the Kenya Information and Communications Act, 1998[144] and provided for the enactment of legislation in order to establish a regulatory body that is independent of political, commercial or government interests.[145]

A licence is required by a service provider to provide service to individuals in Kenya. The CA held the view that the Project's service is easily deployable. The CA indicated that it has told Inmarsat that it is desirable for good broadband connections, to enable users to talk to others.[146]

5.16.6.2 Universal Service

Universal Service is intended to promote voice services and if the operator does not provide a voice service the operator must make a contribution to the Universal Service Fund. Where there is a Universal Service obligation the operator is required to roll out the service in accordance with a schedule. The CA has told Inmarsat that those providing service in Kenya through Inmarsat need to roll out Universal Service.[147]

The CA would favour the banking service that has a component of connecting to the Internet for those who do not otherwise enjoy Internet access.

5.16.6.3 Coverage Requirements

Coverage requirement depends on the type of licence. Infrastructure licence terms for Tier 1 operators include a requirement for coverage. The two lower Tier licences do not include such a requirement.[148]

5.17 OTHER FACTORS

5.17.1 Business Environment

World Bank in its Ease of Doing Business assessment for 2016 ranks Kenya 108 out of 189 economies. The ranking for protection of minority investors is 115.[149]

5.17.2 Corruption

Inmarsat is familiar with the business environment and together with the UK Government has established relationships within Kenya and the Kenyan Government over many years.

Inmarsat has ensured that this Project is not exposed to the risk of corruption.

5.18 CONCLUSIONS ON KENYA AND UK PARTNERSHIP

Across the Kenyan policies in the relevant areas, ranging from communications and spectrum utilisation, ICT and space, no impediment was identified to the provision of the

144 The amendment aligns the Communications Act with Articles 33 and 34 of the Constitution that provide for freedom of expression and freedom of the media respectively.
145 Interviews ICTA and CA; and http://www.ca.go.ke/index.php/overview.
146 Interview CA.
147 Interviews AH and CA; Kenya Information and Communications Act 1998, Sec 25 et seq. However, ISPL is informed by the CA that the Universal Service Fund is dormant.
148 Interview ICTA.
149 http://www.doingbusiness.org/data/exploreeconomies/kenya; accessed 10 March 2016.

services provided by the Project. Nor is there any conflict between the policies in the UK and those of Kenya.
The provision of access to banking services in Kenya will reduce poverty by the multiple benefits it can bring that have been expressed in this Report. In addition to its direct impact on poverty it will bring health and education benefits by virtue of the link between poverty and education and health outcomes.

Therefore, the Project serves to achieve policy objectives of Kenya in relation to all three factors. It would also further the achievement by Kenya of its Sustainable Development Goals.

The United Kingdom International Space Policy objectives are served by the Project in Kenya in the longer term. Inmarsat services exported to Kenya, establish a solid business foundation for future growth. They also meet a non-financial goal of closer interaction with Kenya at a diplomatic and institutional level.

6 NIGERIA

6.1 NIGERIAN POLICY: SOCIAL AND ECONOMIC

Any assessment of up-to-date policy in Nigeria must take into account the recent transition to a new government. President Muhammadu Buhari took office in May 2015. Following confirmation screening by the Senate, the Cabinet list of Ministers was announced in November 2015.[150]

As of February 2016, the Nigerian Federal Ministry of Budget and National Planning website still features Vision 20:2020.[151] It will be assumed for the purposes of this Report to represent official policy.

However, in a statement on 4 February 2016 at the Ministry of Budget and National Planning, the former National Planning Minister Dr. Shamsuddeen Usman praised the Ministry's effort to update the Vision 20:2020. It is not clear what changes may be made. The President in the meantime has not articulated new policy in relation to space activities. Nor is there any record found of other government officials articulating new policy. There is therefore no reason to suppose that the policy has been altered.[152]

6.1.1 Nigeria Vision 20:2020

Nigeria Vision 20:2020 (NV 20:2020, or Vision 20:2020) is an articulation of the long-term intent to launch Nigeria onto a path of sustained social and economic progress and accelerate the emergence of a truly prosperous and united Nigeria. Recognising the enormous human and natural endowments of the nation, the blueprint is an expression of Nigeria's intent to improve the living standards of its citizens and place the country among the top 20 economies in the world.

The following are the basic aims for achieving the NV 20:2020 for the wellbeing and productivity of Nigerians and fit well with the Millennium Development Goals.[153]

1. Eradicate extreme hunger and poverty;
2. Enhance access to quality healthcare;
3. Provide sustainable access to potable water and basic sanitation;
4. Provide accessible and affordable housing.;
5. Build human capacity for sustainable livelihoods and national development;
6. Improve access to micro–credit;
7. Promote gender equality and empower women; and
8. Foster a culture of recreation and entertainment for enhanced productivity.

It will be noted that they cover social and economic objectives.

150 The Ministers most closely concerned in satellite communications are: Minister of State for Industry, Trade & Investment, Aisha Abubakar; Ministers of: Information, Lai Mohammed; Communication, Adebayo Shittu; Science & Technology, Ogbonnaya Onu; http://ngex.com/nigeria/govt/officials/ministers.htm

151 http://www.nationalplanning.gov.ng/index.php/national-plans/nv20-2020

152 Approval is also implied by President's leadership role: see http://nationalplanning.gov.ng/index.php/about-us/leadership-directors, accessed October 2015. Confirmed by Director General of NASRDA, 3 March 2016.

153 Overview of NV 20:2020; http://www.nationalplanning.gov.ng/images/docs/NationalPlans/nigeria-vision-20-20-20.pdf, accessed October 2015.

6.1.2 MDGs and SDGs

Nigeria aimed to meet the child mortality and maternal health targets of MDGs and will continue to strive toward those objectives under the SDGs.[154]

6.1.3 Importance of Space Services

The National Space Research and Development Agency (NASRDA) recognises the importance of space services for efficient communication, and enhancement of transportation and tourism sectors, advancement in education and healthcare delivery systems.[155]

6.1.4 Role of ICT

Many research efforts specific to Nigeria have also shown that ICT investments can have positive impacts on jobs, productivity, GDP growth and innovation. It has been shown that ICTs can help to achieve a better quality of life through enhanced education, business practices and healthcare.[156]

Yet another application of ICT that is having far reaching impact on access to and affordability of medical expertise is in the field of Telemedicine. Telemedicine tools enable the communication and sharing of medical information in electronic form, and thus facilitate access to remote expertise. A physician located far from a reference centre can consult colleagues remotely in order to solve a difficult case. These same tools can also be used to facilitate exchanges between centres of medical expertise, at a national or international level.[157]

6.2 Specific Areas of Policy Focus

6.2.1 Poverty

Poverty is widespread and severe in Nigeria. The President's Deputy indicated that of 170 million Nigerians (currently estimated over 180 million), 110 million are living in extreme poverty.[158]

Economic development, along with transmission of benefits to those in poverty, has therefore been a main feature of Nigerian policy. The overall goal of economic development is improvement in human well-being. To attain Nigeria's Vision 20:2020 would, therefore, require the translation of the nation's economic growth into tangible improvements in the well-being of the majority of its citizens.[159]

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154 http://www.un.org/millenniumgoals/

155 http://m.news24.com/Nigeria/SciTech/News/NASRDA-to-promote-indigenous-competence-in-software-development-20140709, accessed 30 October 2015. Confirmed by Director General of NASRDA, 3 March 2016.

156 For reference to some of the studies see http://www.scribd.com/doc/31835015/The-State-of-ICT-in-Nigeria; http://myfinancialintelligence.com/telecoms-and-it/ict-becoming-bigger-contributor-nigeria's-gdp.

157 allAfrica, citing Omobola Johnson, Minister of Communications Technology, writing in The Guardian of Nigeria. Nigeria: Role of Information, Communications Technology in Health Systems Delivery, 6 August 2014, http://allafrica.com/stories/201408060588.html, accessed 12 February 2016.

158 Muhammadu Buhari's Nigeria to-do list, BBC, 'Letter from Sola Odunfa', 28 May 2015, http://www.bbc.co.uk/news/world-africa-32905067, accessed 11 November 2015.

159 National Planning Commission, Economic Transformation Blueprint, Nigeria Vision 20:2020; http://www.nationalplanning.gov.ng/images/docs/NationalPlans/nigeria-vision-20, accessed October 2015.

6.2.2 Security

Nigeria has for many years suffered from a variety of security shortcomings.[160] Of immediate concern and most troubling is the Boko Haram attacks and insurgency in northern Nigeria. This has resulted in internal displacement of about 2,152,000 people, and about 230,000 refugees.[161]

Satellite communication and surveillance capabilities can greatly assist in detection and prevention of insecurity, military and related actions.[162] Furthermore, the provision of satellite services also serves other SDG goals and Nigerian policy objectives. It will fulfil SDG Goal 9, to build resilient infrastructure, ... and foster innovation. Achieving SDG Goal 11 will be made possible by greater security that will lead to inclusive, safe, resilient and sustainable cities.[163]

6.2.3 Health

Nigeria's health objectives, and policies to support them, are expressed in Vision 20:2020. The Vision specifically addresses enhancing access to quality and affordable healthcare.[164] This is also consistent with the SDGs that carry the obligation to ensure healthy lives and promote wellbeing for all at all ages.[165]

In August 2014, the Minister of Communication Technology made the following observations:

> Sub-Saharan Africa carries a disproportionate share of global diseases. According to World Health Organisation (WHO) estimates, the region has 11 per cent of the world's population but carries approximately 24 per cent of global diseases. This situation is reflected in high maternal and infant mortality as well as low life expectancy indices.
>
> Nigeria's per capita spending on health is currently $161, comparing unfavourably with the $948 calculated by the WHO as the recommended total global spending on health per person per year. Inherent in this low per capita spend on health is an acute shortage of healthcare workers.[166]

The need to improve healthcare continues to be a concern and taken seriously by the Nigerian Government and health organisations. New measures, such as mobile clinics, are being promoted to improve the health of the population.[167]

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160 CIA, The World Fact Book, Africa: Nigeria; https://www.cia.gov/library/publications/resources/the-world-factbook/geos/ni.html, accessed 17 February 2016.

161 UNHCR and partners seek over US$500mill for Nigeria and CAR refugee crises, UNHCR Press Releases, 25 January 2016; http://www.unhcr.org/56a5f3bf6.html, accessed 17 February 2016.

162 See Sa'id Mosteshar, Evidence from Space, 2012; http://www.space-institute.org/app/uploads/1342722048_Evidence_from_Space_25_June_2012_-_No_Cover_zip.pdf.

163 Sustainable Development Goals; http://www.un.org/sustainabledevelopment/sustainable-development-goals/

164 http://www.nationalplanning.gov.ng/images/docs/NationalPlans/nigeria-vision-20-20-20.pdf, accessed October 2015.

165 Sustainable Development Goal 3.

166 allAfrica, citing Omobola Johnson, Minister of Communications Technology, writing in The Guardian of Nigeria. Nigeria: Role of Information, Communications Technology in Health Systems Delivery, 6 August 2014, http://allafrica.com/stories/201408060588.html, accessed 12 February 2016.

167 http://nigeriahealthwatch.com/accountability-now-a-summit-to-advance-newborn-and-maternal-health-in-nigeria/

There is some uncertainty how many programmes will be affected by the new Government that has not yet fully articulated its policies. The drop in the price of oil is also adversely affecting the Nigerian economy. However, maternal healthcare and improvement of child mortality is a high national priority. It is expected that services such as those delivered by the Project will be less affected than others.

6.2.3.1 Maternal and Child Health

According to the World Bank, in 2015 Nigeria accounted for 14% of all annual maternal deaths worldwide, second only to India at 17%. Similarly, Nigeria accounted for 13% of all global deaths of children under the age of five years, again second only to India at 21%.[168]

In February 2016 Senator Oluremi Tinubu, representing Lagos Central, said that the current poor indices in child and maternal health in the country continues to be a challenge to the Government.[169]

6.2.3.2 Vision 20:2020 Policy for Health

Vision 20:2020 articulates current problems and policy objectives related to health. [170]

The Vision document points to inadequate and poorly maintained facilities, a very high patient to doctor ratio and inefficient service delivery, all of which underlie the current shortcomings in the system.

6.2.3.3 MDG and SDG Strategies for Healthcare

As anticipated in Vision 20:2020, Nigerian MDG targets for child mortality, maternal mortality and nutrition were missed.

In order to deliver on the health-related MDGs, the Nigerian government implemented a wide range of initiatives, including the Integrated Maternal, New-born and Child Health Care Strategy, using the Ward Minimum Health Package. Access to primary health care is also being improved by increased investment in infrastructure, human resources, equipment and consumables. Implementation arrangements target local needs, which vary hugely from community to community and from state to state. There was also improvement in routine immunisation as a way of building on the successes of the near-eradication of polio.

The MDG goals for health also provided important targets for the improvement of the mental and physical well being of Nigerians.[171]

Save for the suggested revision of Vision 20:2020,[172] there is not yet a strategy declared to meet the SDG goals. However, as they continue to require access to healthcare by rural and poor populations, satellites bring similar, and in some aspects the same advantages as stated in relation to the MDGs.

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168 http://www.worldbank.org/en/news/press-release/2015/04/23/nigeria-world-bank-approves-us500-million-to-improve-maternal-and-child-health-achieve-the-saving-one-million-lives-goal, accessed 15 November 2015.

169 Paul Obi, Nigeria: Tinubu - Poor Health Indexes, a Challenge for Buhari, allAfrica, 17 February 2016; http://allafrica.com/stories/201602170361.html, accessed 23 February 2016.

170 http://www.nationalplanning.gov.ng/images/docs/NationalPlans/nigeria-vision-20-20-20.pdf, accessed October 2015.

171 http://www.ng.undp.org/content/nigeria/en/home/post-2015/mdgoverview/overview/mdg4/, accessed 15 November 2015.

172 See Section 6.1 above.

6.2.3.4 Consistency of Health Aspects of the Project with Nigerian & UK Policies

This Project contributes to achieving better maternal health and a reduction in child mortality in Nigeria. It improves efficiency in the delivery of these areas of healthcare, making the shortage of healthcare workers less acute by saving time and resources.

6.2.4 Infrastructure Development

6.2.4.1 Electricity Supply

A major barrier to the operation of communication systems in Africa, including Nigeria, is the lack of reliable supply of electricity, particularly in remoter regions. Currently there is rationing of residential use in favour of industry. The choice facing the government is whether to reduce industrial consumption to increase residential use, or vice versa. As in Kenya, the lack of reliable power supply in Nigeria is one of the barriers to the sustainability of the satellite-provided connectivity.[173]

The Nigerian Government is conscious of the need for early action to secure access to reliable electricity, but revenue reduction due to oil prices may slow the process. Speaking at the opening of the summit of the National Economic Council, President Buhari stated:[174]

> The infrastructure Development Fund should be fast-tracked to unlock resources so that infrastructural deficiencies can be addressed. ... In our determination to change we must and will ... put a stop to power shortages.
>
> [The] National Electricity Regulatory Commission (NERC), the regulatory authority, has a vital job to ensure consumers get value for money and over-all public interest is safe-guarded.

Nigeria is taking further action to meet energy needs in the near future by focusing on off-grid electricity generation. Speaking at a meeting with French delegates headed by France's Minister of Environment and Power, Mrs. Segolene Royal, alongside her Nigerian counterpart, the Minister of Environment, Amina Mohammed, Minister of Works, Power and Housing, Babatunde Fashola said "... power would be generated through the concluded 14 frameworks for solar panel projects embarked upon by the Federal Government."[175] This followed an earlier statement by the Minister of Environment that the Federal Government is planning to develop about 13 gigawatts of off-grid electricity from solar energy.[176]

This will improve prospects for satellite-delivered connectivity. Without such access the benefits provided by space systems are significantly diminished. Intermittent connectivity can make many applications less attractive or unusable, as in the case of certain financial services or security applications.

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173 See also Annex 3.

174 Nigeria Electricity, *Power Situation in Nigeria No Longer a Laughing Matter – Buhari*, 22 March 2016; http://www.nigeriaelectricityhub.com/?p=5593

175 Nigeria Electricity, *FG to Add 1206MW to National Grid Through Solar Energy – Fashola*, 17 March 2016; http://www.nigeriaelectricityhub.com/?p=5533

176 NAIJ.com, *FG To Develop Solar Electricity For Poorest Communities - Amina Mohammed*; https://www.naij.com/678710-nigeria-get-13000mw-solar-electricity.html

Data acquisition by satellite can also benefit the planning, efficiency and relative success of off-grid power sources. The data can be used to improve understanding of methods and systems employed in such power generation. This is an area where satellite communication systems can add significant value.

6.2.4.2 Information, Communications and Technology Services

ICT services depend on electric supply. Bank services, such as those of Ecobank Nigeria (part of pan-African Ecobank), need uninterrupted electric supply to keep ICT resources up to date. This is a Nigerian and regional priority. Nigeria, Ghana and Kenya have been motivated to consider nuclear power.

6.2.4.3 Mobile Phones

A significant number of Nigerians have access to mobile communication devices. These tend to be in urban areas.

However, in very remote and usually poor areas, mobile teams such as those served by the Project would normally be reliant on satellite phones, which are expensive to use. Provision of satellite service and connectivity under the Project can be less costly and can also allow the necessary transmission of large amounts of data.

6.3 PROJECT FIT WITH NV 20:2020 AND MDG

This Project serves both the Nigeria Vision 20:2020 (NV 20:2020) aims and the MDGs for improvement in maternal health and reduction of child mortality. It also fulfils the requirement to use radio spectrum in the service of healthcare.[177]

6.4 RELEVANT GOVERNMENT BODIES

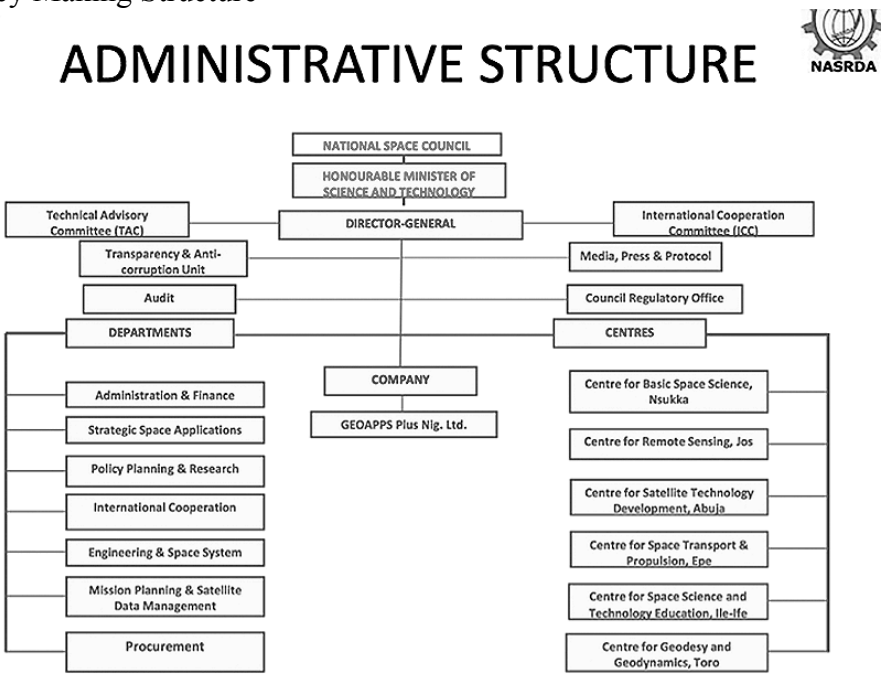
6.4.1 Nigerian Government from 2015

Although it has been possible to have some telephone conversations with Government officials and at the British Embassy in Nigeria, it has not been possible to arrange personal interviews in Nigeria. There is consequently no certainty about any new policies or the extent and manner in which existing policies will be carried forward. The position is not improved by the drop in the price of oil, which has a great impact on the Nigerian economy. Following the election of President Muhammadu Buhari Ministers were confirmed by the Senate and the Cabinet announced in November 2015.[178]

As noted above, improving electricity supply is a major policy focus of the Government, and will have a significant impact on satellite services.

177 http://www.nationalplanning.gov.ng/images/docs/NationalPlans/nigeria-vision-20-20-20.pdf, accessed October 2015.
178 http://ngex.com/nigeria/govt/officials/ministers.htm; All Africa, 5 November 2015, http://allafrica.com/stories/201511050097.html; and see http://ngex.com/nigeria/govt/officials/ministers.htm

6.4.2 Policy Making Structure



6.4.3 National Space Council

The National Space Council (NSC) is the highest policy making body for space science and technology development in Nigeria. The Ministry of Science, Technology and Information, and subsequently NASRDA and its various subsidiary bodies, are under its direction.[179]

6.4.3.1 NSC Membership

The NSC was established in 2013, along membership lines set out in the National Space Policy.[180] There is no indication as of February 2016 that the structure of the Council has changed by the new government, although there are new Ministers in place.

The composition of the council is as follows, including three Academic members:

1. The President – Chairman
2. The Vice-President – Deputy Chairman
3. Minister of Science & Technology
4. Minister of Communication Technology
5. Minister of Education
6. Minister of Defence
7. Minister of Interior
8. Minister of National Planning
9. Attorney-General of the Federation & Minister of Justice
10. Professor Elijah Mshelia
11. Professor Vincent Olunloyo
12. Professor Francesca N. Okeke

179 2013, http://www.gsdi.org/node/581, accessed 14 September 2015.

180 http://www.huhuonline.com/index.php/more-news1/1594-jonathan-inaugurates-national-space-council, accessed 11 November 2015. Text of speech at: http://www.radionigeriaibadan.com/speeches/118-president-goodluck-ebele-jonathan-inauguration-national-space-council-abuja.

13. Director-General, National Space Research and Development Agency (NASRDA)

6.4.4 NASRDA

NASRDA was established in April 1999 with six operational centres. However, its enabling powers were not established until 2010.[181]

> The Agency is charged with the mandate to consolidate all Space Science and Technology related activities in order to make a greater impact on developmental efforts in Nigeria. The National Space Research and Development Agency shall pursue the development and application of space science application and technology for the socio-economic benefits of the nation.[182]

The Space Policy and Strategy adopted by the Cabinet does not depart from this approach, or the intention to pursue the development of Nigerian space science and technology capability.

These intentions emphasize the development of indigenous space industry and capabilities. However, the declaration of international co-operation, and the interest in gaining knowledge from others with experience, would indicate a desire to take advantage of capabilities such as those being offered by the Project.[183]

These policies also encompass the encouragement of space applications and their use for the socio-economic benefit of Nigerians, in particular the improvement of health services.[184]

Professor Seidu O Mohammed, Director-General of NASRDA, [185] has also described space technology as an essential tool for Nigeria's socio-economic development, noting that it was capable of enhancing the quality of the lives of Nigerians.[186]

NASRDA promotes Nigeria's competence in developing, designing and building appropriate hard and software in space technology. The Agency is mandated to consolidate all Space Science and Technology related activities, in order to make a greater impact on developmental efforts in Nigeria.[187]

It is assumed the Director-General will continue to play a major role in the development of Nigerian space policy. It is reasonable to assume that the Policy is unlikely to undergo any significant change, although there is discussion of transferring responsibilities of Nigerian Communication Satellite Limited (NigSatCom) to NASRDA.[188]

The agency has successfully deployed the launched satellites, NIG.SAT2 and SAT X to cover the entire country and has embarked on Rocketry Programme aimed at developing local capacity for satellite production and launching amongst other activities.

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181 National Space Research and Development Agency Act, 2010; http://www.lawnigeria.com/LawsoftheFederation/NATIONAL-SPACE-RESEARCH-AND-DEVELOPMENT-AGENCY-ACT-2010.html

182 NASRDA Mission, http://www.nasrda.gov.ng/?q=about-us, accessed 18 Feb 2016.

183 Confirmed by NASRDA Interview 3 March 2016.

184 *Ibid*.; http://www.nasrda.gov.ng

185 Telephone discussion, 3 March 2016.

186 Space Technology Has Improved the Lives of Millions of Nigerians, Executive Intelligence Review, 9 December 2011, http://www.larouchepub.com/eiw/public/2011/eirv38n48-20111209/24-27_3848.pdf, accessed 3 March 2016.

187 http://m.news24.com/Nigeria/SciTech/News/NASRDA-to-promote-indigenous-competence-in-software-development-20140709; See also http://www.nasrda.gov.ng, accessed 11 September 2015.

188 See also http://www.nigeriacommunicationsweek.com.ng/telecom/fg-plans-to-sell-nigeria-communications-satellite

6.4.4.1 Compatibility of the Project with NASRDA Functions

The functions of NASRDA have a close connection to the mandate of the National Office for Technology Acquisition and Promotion (NOTAP). In assessing the compatibility of the Project and NASRDA aims and functions, it was therefore appropriate to consider the mandate of NOTAP.

6.4.5 NOTAP

NOTAP is a parastatal of the Science and Technology Ministry. Its mandate includes:[189]

- Encouragement of a more efficient process for the identification and selection of foreign technology;
- Development of the negotiating skills of Nigerians with a view to ensuring the acquisition of the best contractual terms and conditions in the transfer of foreign technology agreements;
- Provision of a more efficient process for the adaptation of imported technology;
- Registration of all foreign technology transfer agreements having effect in Nigeria;
- Monitoring on a continuous basis of the implementation of any contract or agreement registered pursuant to the Act setting up the Office;
- Commercialisation of R&D Results and Inventions;
- Promotion of locally generated technologies;
- Promotion of Intellectual Property; and
- Promotion and encouragement of the development of creative and inventive skills among Nigerian Scientists, Researchers, Inventors and Innovators.

6.4.6 Partnership Between NOTAP and NASRDA

In pursuit of its aims, NOTAP announced in September 2015 that it would work in partnership with NASRDA to promote technologies emanating from space science, for the benefit of Nigerians.[190]

6.4.6.1 Consistency of Project with NOTAP and NASRDA Aims

The Project is consistent with several functions of NASRDA[191] and of the mandate of NOTAP, as among other things it will serve in:

> (e) developing national strategies for the exploitation of the outer space and making these part of the overall national development strategies…

6.5 NIGERIAN SPACE POLICY

6.5.1 Space Policy Documents

189 http://notap.gov.ng/content/welcome-notap, accessed 11 November 2015.
190 http://www.notap.gov.ng/content/notap-partner-nasrda-promoting-space-science-technologies, accessed 14 September 2015.
191 National Space Research and Development Agency Act 2010, Sec 6(e); http://lawnigeria.com/LawsoftheFederation/National-Space-Research-and-Development-Agency-Act-2010.html, accessed 2 July 2015.

The most detailed and apparently complete document setting out Nigerian space policy that has been accessed in this research is undated. The title is 'National Space Policy' and it includes an Executive Summary, Application Areas, Scope of the National Space Programmes, an Annex on NASRDA and citations to previous documents along with membership information of a Technical Advisory Committee that developed the policy. This document, prepared by is posted on a non-governmental website.[192]

The 'National Space Policy' contains the following statement:

> The Policy Document and Programme attached herein are definitive and authoritative statements, roadmaps and signposts that, if faithfully followed, will transform Nigeria from the status of a consumer nation to an active participant in space technology and allied fields within three years.

It also states (at Section 5.2) that the National Space Council will be responsible for the development of the nation's policy guidelines on space activities.

It refers to three other documents:[193]

1. National Policy on Space Science and Technology, May 1993.
2. Nigerian Space Programme, A Blue Print for Scientific and Technological Development, September 2000.
3. Report of the Special Committee to Review Space Matters in Nigeria, October 2000.

Since the election in May 2015, neither the President nor another government official has articulated new policy in relation to space activities. There is no apparent reason to suppose that the policy has been altered.[194]

6.5.2 Overall Focus of Space Policy

Based on the available information, the National Space Policy of Nigeria enumerates a number of policy areas and acknowledges the need for cooperation in attaining its objectives. Specific aspects of the Policy are clearly relevant to the Project.

6.5.3 Role of NASRDA in Space Policy

NASDRA is charged with review of the national policy on space including long-range goals and developing a strategy for national space issues.[195] To achieve the objectives of the space policy, the Agency operates through its six Development Centres.[196]

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192 The website was set up by a Nigerian medical doctor. It includes current and archived news and commentary about Nigeria: http://www.dawodu.com. The document seems to date to about 2000, and may be a version of the document referred to as a 'National Space Policy' that was said by many sources to have been approved in 2001. This website is not an official Nigerian source or that of another body that can be taken as authoritative. However, the document does appear to closely parallel the 2010 presentation slides identified online and attributed to Professor Seidu O. Mohammed PhD, Director-General of NASRDA. The slide presentation is entitled "Nigeria Space Programme" and states that it was produced for the Bengaluru Space Expo 2010; http://www.bsxindia.com/so-mohammed.pdf, accessed 16 September 2015.

193 These have not been found in our research.

194 Confirmed by Director General of NASRDA, 3 March 2016.

195 National Space Research and Development Act, 2010, Sec 6(l); http://www.lawnigeria.com/LawsoftheFederation/NATIONAL-SPACE-RESEARCH-AND-DEVELOPMENT-AGENCY-ACT-2010.html

196 *Ibid.*, Sec 11(1).

6.6 SPACE POLICY TO FULFIL WIDER NATIONAL POLICY

6.6.1 Reduction of Poverty

Prof Mohammed has pledged that the Agency would continue to contribute its quota towards achieving NV 20:2020, and "enable Nigerians create jobs to drive away poverty from our fatherland".[197] Eradication of poverty has a direct impact on health.[198]

6.6.2 Healthcare Provision

Among the missions specified in the Space Policy for the use of space capabilities, the National Space Policy refers to the need for the "[d]evelopment of education and healthcare delivery systems both rural and urban".

> Sec. 6.2 Government shall use satellite communication system to enhance telecommunication services and *applications*.[199]

The Objectives of Section 6.2 include:

> (vii) Enhance healthcare delivery through telemedicine.

As the thrust of this Project in Nigeria is increased access to healthcare, it is consistent with the space policy objectives. If the technology can be adapted or extended to serve other policy areas, its benefits to Nigeria will be enhanced.

6.6.2.1 Telemedicine Project

In reference to earlier telemedicine project, it has been stated that:[200]

> "The Director-General has encouraged NASRDA to reactivate the Telemedicine project which he described as a viable technology capable of deploying healthcare to the much desired rural populace of Nigeria using space applications."

Although the Project has not focused on provision of telemedicine in its broad sense, the attitude to telemedicine is indicative of NASRDA policy compatibility with the Project aims.[201]

6.6.3 Security, Disaster Mitigation, Environment and Energy

Other advantages of space technology include the development and management of energy resources, disaster mitigation for human safety, and enhancement of national defence and security.

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197 News 24, 9 July 2014; http://m.news24.com/Nigeria/SciTech/News/NASRDA-to-promote-indigenous-competence-in-software-development-20140709, accessed 30 October 2015.

198 Health and poverty are inextricably intertwined: Sally Murray, Poverty and Health, Canadian Medical Association Journal, 28 March 2006; http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1405857/

199 Emphasis added. http://www.dawodu.com/space.pdf, accessed 5 November 2015.

200 http://www.notap.gov.ng/content/notap-partner-nasrda-promoting-space-science-technologies, accessed 12 February 2016.

201 On the availability of Telemedicine see http://telecomist.com/2015/08/nigerias-communications-satellite-reportedly-idle-in-space/

6.6.4 Development of Nigerian Space Sector

Nigerian Space Policy also focuses on the development of indigenous space capabilities. Its Vision Statement declares the intent:

> To make Nigeria build indigenous competence in developing, designing and building appropriate hardware and software in space technology as an essential tool for its Socio-Economic development and enhancement of the quality of life of its people.

The Policy includes:

> Section 1.2: Government shall develop a "critical mass" of Nigerians in the area of space science and technology to enable the country realise its objectives for achieving technological, industrial, commercial and economic self- reliance.[202]

This focus need not operate against use of non-Nigerian technology and systems. Nigeria already uses foreign systems and cooperates with entities in other countries to gain knowledge and capabilities it needs now. The Nigerian Communication Satellite Limited, NigComSat, has actively engaged with entities in China, the UK and others. But, as noted below, there may be longer-term implications of this focus, associated with cost.[203]

In line with the policy to involve a wider section of Nigerians in space related activities, the privatisation of NigComSat is being discussed, as noted below.[204]

6.6.4.1 Cost Factors

NASRDA's Director-General Prof. Seidu Onailo Mohammed has said it is "disturbing" that 97 per cent of the satellites covering Africa are foreign owned, and earning "millions" for their foreign investors.[205] He has urged Nigeria's government to take an urgent look at how it allocates space resources.

NASRDA's ambitions to increase the satellite communications capacity of Nigeria, and to reduce reliance on non-Nigerian providers, are matters to be considered in the long-term planning of the future services.[206] Clearly, cost is a major factor in the comparison between developing and using indigenous technology and using existing systems of non-Nigerian operators.

6.6.5 International Collaboration

The Nigerian Space Policy includes the following statement:[207]

> (a) Nigeria supports international cooperation for the peaceful uses of outer space for the benefit and interest of mankind.

202 National Space Policy, Application Areas, Chapter One, Development of Human Resources and Capacity Building, http://www.dawodu.com/space.pdf, accessed 5 November 2015.
203 http://www.nigcomsat.gov.ng/news.php; accessed 27 February 2016.
204 See Section 6.10.5 of this Report.
205 http://allafrica.com/stories/201508240072.html
206 Nigeria satellite policy slammed, Chris Forrester, August 24, 2015, http://advanced-television.com/2015/08/24/nigeria-satellite-policy-slammed/, accessed 22 September 2015.
207 National Space Policy, Section 9.2; http://www.dawodu.com/space.pdf, accessed 5 November 2015.

(b) Nigeria shall implement its space programme taking advantage of multilateral and bilateral cooperation with other space-related organisations in the world to promote domestic economic growth and development.

This again confirms Nigeria's commitment to cooperation in space activities and engagement of foreign systems. It may be useful here to bear in mind the requirements of the SDGs, which will provide an incentive to take advantage of the capabilities such as those offered by the Project.

Nigeria is party to several space cooperation agreements and arrangements, and it is open to greater cooperation with the UK. A good relationship already exists between NASRDA, NigComSat and UK satellite manufacturers.

6.7 Compatibility of Nigerian Space Policy with UK Space Policy

There is broad agreement between the two national space policies, particularly in relation to healthcare provision, the international development aims of the UK and Nigeria's aim to grow its national space sector.

6.8 Compatibility of IPSP with Nigerian Space Policy

From the analysis in this Report it is clear that the space-related policies of Nigeria are consistent with the objectives of the Project in relation to healthcare provision, peaceful use of space and development of international cooperative activities.

6.9 Law and Legislation

6.9.1 Communications Commission Act 2003

The provision of communication services and the operation of networks are governed by the Nigerian Communications Commission Act 2003, and Regulations under the Act. There is no specific reference to satellites in the Act, but there are frequency assignments and pricing provision that will apply to satellite systems. In addition, the Nigerian Communications Commission (NCC) issued Guidelines in 2008 governing the operation of commercial satellites.[208]

The Nigerian Communications Commission (NCC) has the sole and exclusive power to manage and administer the radio frequency spectrum for the communications sector, and in that regard to grant licences for and regulate the use of the radio frequency spectrum.

6.9.2 Satellite Communications Bill 2015

On 3 June 2015 the Nigerian Senate passed a record 46 bills into law in just 10 minutes. Among these was the Nigerian Communications Satellite Bill.[209] However, there is no indication that it has become law.[210]

208 The Guidelines can be found in Annex 3. Commercial Satellite Communications Guidelines, http://www.ncc.gov.ng/index.php?option=com_content&view=article&id=73&Itemid=88 / Legal-Guidelines_Commercial_Satellite_Communication.pdf.

209 http://allafrica.com/stories/201506040214.html, and http://www.placng.org/new/search_view.php?sn=159;&&title=SENATE%20PASSES%2046%20BILLS%20IN%20

6.10 REGULATION

6.10.1 Use of Spectrum to Meet Socio-economic Goals

The Nigerian Communications Commission (NCC) is responsible for the management of spectrum. It holds that radio frequency spectrum is one of Nigeria's key natural resources of great economic value as a result of its direct application in telecommunications, broadcasting, military operations, and scientific research in addition to a range of other socio-economic activities such as social services, law enforcement, education, healthcare, transportation, etc. It therefore encourages the use of spectrum for the purpose of providing access to healthcare.[211]

These factors make it mandatory for the government to develop policies that ensure optimal use of spectrum resource for the overall benefit of the nation. The NCC is charged with the responsibility to develop and adopt policies in accordance with policy objectives that will ensure this scarce resource is well managed.[212]

6.10.2 NCC Frequency Management Policy Objectives

To meet its obligations the NCC pursues the following objectives:

> To control and encourage the use of spectrum as an instrument for developing telecommunication which is an essential infrastructure for stimulating the economic growth and social development of the nation.
>
> To manage scarce frequency resource, especially in bands where satellite shares frequency with terrestrial systems and to encourage the use of satellite connectivity to un-served areas lacking terrestrial transmission infrastructure backbone.[213]

It would follow that any spectrum requirements of the Project are well aligned with the policy objectives of the NCC and benefit the nation.

6.10.3 ISP Regulation

If Internet Service Provider (ISP) services were to be provided the NCC Guidelines for Provision of Internet Services must be observed.[214]

6.10.4 Quality of Service and Access (Universal Service)

There are both Quality of Service and Universal Service requirements applicable to communication service providers. It seems unlikely that they will affect the envisaged

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ONE%20SITTING, accessed 3 March 2016. See also http://www.nassnig.org/page/the-legislative-process, accessed 11 November 2015.

210 Re: opposition to Presidential signature, see http://www.ngrguardiannews.com/2015/06/nlc-urges-buhari-not-to-sign-controversial-bills/

211 http://www.ncc.gov.ng/index.php/index.php?option=com_content&view=article&id=83&Itemid=97, accessed 14 September 2015.

212 *Ibid*.

213 *Ibid*.

214 Guidelines for the Provision of Internet Service (undated); http://nlipw.com/wp-content/uploads/Legal-Guidelines_ISP.pdf

provision of connectivity.[215]

6.10.5 NigComSat

Nigerian Communication Satellite Limited (NigComSat), the corporate entity established by the Nigerian Government to operate the Nigcomsat-1 communications satellite, is subject to the provisions of the Nigerian Communications Act of 2003 as far as the use of radio frequency spectrum is concerned. However, its day-to-day operations would ordinarily be governed by guidelines put in place for the operations of state-owned companies under the Federal Ministry of Science and Technology.[216]

There is some possibility that it will be privatised, with part of its development activities entrusted to NASRDA.[217]

6.11 OTHER FACTORS

6.11.1 Ease of Doing Business in Nigeria

In its Ease of Doing Business ranking for 2016 the World Bank puts Nigeria at 169th out of 189 economies. It ranks 20th for the protection of minority investors.[218]

Furthermore, difficulties between the President and the Assembly have marked the current President's tenure. Along with the rushed passage of 46 bills in 10 minutes in 2015, the 2016 Budget process has also been problematic.[219] It is arguably not particularly easy to do business in this environment.

6.11.2 Corruption

In May 2015 the BBC reported that the President's deputy said that 110 million out of Nigeria's population of 170 million were living in "extreme poverty" while the largest share of the nation's wealth was going into the pockets of a small percentage of the population. The author of the 'Letter from Nigeria' added that this situation has been brought about by "the ... corruption of the past six years, mainly fuelled by a cabal in the oil and gas industry".[220]

President Buhari has acknowledged the problem of corruption and expressed determination to eradicate it. One of the measures taken recently is the establishment of a single Treasury account for all Government receipts. It is expected that there will be greater transparency and more effective control of the use of funds.

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215 http://www.ncc.gov.ng/index.php?option=com_content&view=category&id=76&Itemid=104, accessed 30 October 2015. NCC Website, Regulatory Functions/Regulations, Regulations-Universal_Access.pdf, accessed 22 September 2015. Universal Access and Universal Service Regulations 2007, S. I. No. 31 of 2007.

216 Nigerian Federal Civil Service Circular – Reference No. SGF/ OP/1S.3/T.1/142 of 2nd August 1999. Guidelines are at http://www.ncc.gov.ng/index.php?option=com_docman&task=doc_download&gid=62&Itemid=53, accessed 3 March 2016.

217 Fabian Tarpael, FG Plans to Sell Nigeria Communications Satellite, Nigeria Communications Week, 17 February 2016; http://www.nigeriacommunicationsweek.com.ng/telecom/fg-plans-to-sell-nigeria-communications-satellite.

218 http://www.doingbusiness.org/data/exploreeconomies/Nigeria.

219 https://in.news.yahoo.com/botched-budget-embarrassing-says-nigerias-170925936.html

220 Muhammadu Buhari's Nigeria to-do list, BBC, 'Letter from Sola Odunfa', 28 May 2015, http://www.bbc.co.uk/news/world-africa-32905067, accessed 11 November 2015.

6.12 CONCLUSIONS ON NIGERIA AND UK PARTNERSHIP

Across the Nigerian policies in the relevant areas, from communications and spectrum utilisation to ICT and space, there were no impediments to the provision of the services offered by the Project. Nor is there any conflict between the policies in the UK and those of Nigeria.

The Project in Nigeria is consistent with the Nigerian national policy to improve healthcare in general, and advances it by facilitating access to healthcare in rural areas of the country. Further, it will accelerated the progress toward meeting the Sustainable Development Goals in relation to maternal and child healthcare. The continued provision of connectivity for this purpose will further advance achievement of the Sustainable Development Goals.

As noted, the Project advances the ICT ambitions of Nigeria and meets the requirements of the National Communications Council for the use of spectrum to improve the lives of Nigerians.

United Kingdom International Space Policy objectives are served by the Project in Nigeria in the longer term. Inmarsat services are to be exported to Nigeria, establishing a solid business foundation for future growth. The Project also meets a non-financial goal of closer interaction with Nigeria at a diplomatic and institutional level.

Although there has been criticism in Nigeria of the level of reliance on foreign satellites, it is unlikely to significantly affect the service provided under the Project. There are barriers to the early replacement of foreign service by a Nigerian service, including the lack of indigenous development of the necessary technology, and the cost at which it can be provided.

7 REGIONAL MATTERS

Kenya pursues close international relations within Africa and around the world. It is also a member of several regional trade blocs, such as the COMESA (Common Market for Eastern and Southern Africa, a group of countries that have agreed to co-operate in developing their natural and human resources for the good of all their people) and the EAC (East African Community). Its state agency KENTRADE (the Kenya Trade Network Agency), under the National Treasury, is also mandated to facilitate cross border trade. Likewise, there is great scope for economic expansion for Nigeria and its neighbours, particularly through ECOWAS and NEPAD (The New Partnership for Africa's Development), an African Union strategic framework for pan-African socio-economic development. The AU addresses social, economic and political problems: The United Kingdom's DfID is a partner, with its focus on poverty reduction and the MDGs.

7.1 INFRASTRUCTURE: ELECTRICITY SUPPLY

From Nigeria to South Africa, sporadic and limited power supply is a political problem as well as an economic and practical one.[221] Despite a decade of strong economic expansion, sub-Saharan Africa generates comparatively little electricity, limiting growth and frustrating its ambitions to catch up with the rest of the world.[222] All of sub-Saharan Africa's power generating capacity amounts to less than South Korea's, and a quarter of it is unproductive at any given moment because of ageing infrastructure. The World Bank estimates that blackouts alone cut down the gross domestic products of sub-Saharan countries by 2.1 per cent.[223]

Dominating South Africa's list of popular app downloads are ones that alert smartphone users to the risk or impending start of a blackout in their neighbourhood.[224]

Access to electricity in Africa is addressed by *Power Africa*, one of President Obama's policies for Africa. "It is a $7 billion project coordinated by the United States Agency for International Development ... with a goal of doubling electricity access in sub-Saharan Africa [by 2020]."[225]

Power Africa is intended to include the collective resources of the US Government, the World Bank, the African Development Bank, the Government of Sweden, the European Union, the African Union, the United Nation's Sustainable Energy for All, and more than 100 private companies. This initiative promotes off-grid solutions as the more likely to increase access to remote communities. A relatively large number of investors and partners

221 Weak Power Grids in Africa Stunt Economies and Fire Up Tempers, Norimitsu Onishi, New York Times online edition, 2 July 2015,http://www.nytimes.com/2015/07/03/world/africa/weak-power-grids-in-africa-stunt-economies-and-fire-up-tempers.html?hp&action=click&pgtype=Homepage&module=photo-spot-region&region=top-news&WT.nav=top-news

222 International Energy Statistics, US Energy Information Administration, http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm?tid=2&pid=2&aid=7, accessed 2 July 2015.

223 http://www.bdlive.co.za/opinion/2015/11/17/sub-saharan-africa-in-shadow-of-blackoutsa

224 Weak Power Grids in Africa Stunt Economies and Fire Up Tempers, Norimitsu Onishi, New York Times online edition, 2 July 2015, http://www.nytimes.com/2015/07/03/world/africa/weak-power-grids-in-africa-stunt-economies-and-fire-up-tempers.html?hp&action=click&pgtype=Homepage&module=photo-spot-region&region=top-news&WT.nav=top-news

225 *Obama's 'Power Africa' Project Is Off to a Sputtering Start*, New York Times, 21 July 2015; http://www.nytimes.com/2015/07/22/world/africa/obamas-power-africa-project-is-off-to-a-sputtering-start.html?_r=0

have committed more than US$1 billion for small-scale and off-grid renewable energy solutions. [226]
Data acquisition by satellite can enhance planning and add to the efficiency of energy distribution, as well as monitoring progress in improving access to electricity, adding to the benefits of space-based solutions.

7.2 Banking and Financial Access

Kenya enjoyed better financial access compared to other countries in the region.

The percentage of the population living within a 3km distance of a financial access touch point was 58.7% for Kenya, 44.1% for Uganda, 42.7% for Nigeria and 28.3% for Tanzania. In terms of financial access touch points per 100,000 people; Kenya had 161.7, Uganda 63.1, Tanzania 48.9 and Nigeria 11.4.[227]

7.3 MDGs and SDGs

The MDGs committed African nations to a global partnership meant to reduce poverty, improve healthcare services and promote peace, education, human rights, gender equality and environment sustainability.[228] As noted above, the Sustainable Development Goals encompass and broaden these commitments.

226 USAID *Power Africa*; https://www.usaid.gov/powerafrica/aboutus

227 Understanding and expanding financial inclusion in Kenya, Keynote speech by Prof Njuguna Ndung'u, Governor of the Central Bank of Kenya, at the launch of the FinAccess GIS Mapping of all Financial Access Touch Points 2014, Nairobi, 13 March 2014, http://www.afi-global.org/sites/default/files/publications/r140317a.pdf, accessed 16 October 2015.

228 http://www.un.org/millenniumgoals/

8 CONCLUSIONS

8.1 KENYA AND NIGERIA

Both Kenya and Nigeria are interested in developing indigenous space sectors, to advance their scientific and technical capabilities and to achieve their socio-economic policy aims. In so far as they exist, their space policies are formulated to meet these objectives.

Therefore, to assess the compatibility of the Project and the policies of Kenya and Nigeria, it was necessary to consider the wider policies of the relevant country.

In the case of Kenya, the provision of access to banking services has been considered largely in relation to its policy to reduce poverty, as the policy most directly affected by the Project. Access to financial services will also have an impact on a large number of other problems and assist in meeting Kenya's Sustainable Development Goals.

In Kenya, the Project provides access to banking services through agents in partnership with a bank that has demonstrated its effectiveness in serving the needs of poor customers in rural areas. This is fully consistent with the Kenyan policies to reduce poverty with potential impact on education and health, and to use spectrum for social and economic benefit of Kenyans.

In Nigeria, the service provided by the Project relates to maternal and child health information and support, although its impact will not be limited to health issues.

The service enabled by the Project in Nigeria provides direct improvement of the health of mothers and their infants. This serves both the Nigerian policy on maternal and child health, and Nigeria's obligations under its declared policy, including the Sustainable Development Goals.

8.2 THE UK

Nothing in either part of the Project is contrary to UK space policy or objectives. The Project advances many of the objectives of the UK Space Agency, including the growth of the space sector and creation of opportunities for closer links between the Agency and the governments of Kenya and Nigeria. The Department for International Aid is involved in the Project.

Furthermore, the IPSP provides “societal or economic benefits from the use of UK satellite or space technology for countries that currently do not have these benefits”. The Project also advances many of the UK’s international policy objectives. The Project has demonstrated that progress to date can be made self-sustaining, although there needs to be continuity of effort for lasting impact.

The Project is consistent with the criteria for funding under the FCO's Prosperity Fund Programme. It also meets some of the commitments of the UK under the Sustainable Development Goals.

Finally, the results of this Project can lay the groundwork for other UK departments and agencies, as well as those in the Partner Countries, to expand the benefits of satellite

services to a very wide range of aims and objectives.

9 ANNEX 1: ABBREVIATIONS

ACTED	Agency for Technical Cooperation and Development
A-G	Attorney-General
AIDS	Acquired Immunodeficiency Syndrome
ASI	Agenzia Spaziale Italiana, Italian Space Agency
AU	African Union
BGAN	Broadband Global Area Network
CA	Communications Authority
CCK	Communications Commission of Kenya
CEOS	Committee on Earth Observation Satellites
CGAP	Consultative Group to Assist the Poor
COMESA	Common Market for Eastern and Southern Africa
COPUOS	Committee on Peaceful Uses of Outer Space
DfID	UK Department for International Development
E-education	Application of Internet technology to the delivery of learning experiences
EAC	East African Community
ECOWAS	Economic Community of West African States
ESA	European Space Agency
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites
FATF	Financial Action Task Force
FCO	Foreign and Commonwealth Office, UK
FSD	Financial Sector Deepening
GDP	Gross Domestic Product
GSO	Geostationary Satellite Orbit
HAPS	High Altitude Pseudo-Satellite

HEO	Highly Elliptical Orbit
HIV	Human Immunodeficiency Virus
HLPP	High Level Prosperity Partnership
IAEA	International Atomic Energy Authority
ICT	Information and Communication Technology, or Information, Communication and Technology
ICTA	Information, Communication and Technology Authority
IGO	Inter-governmental Organisation
IPSP	International Partnership Space Programme
ISPL	The London Institute of Space Policy and Law
ITU	International Telecommunication Union
KENTRADE	Kenya Trade Network Agency
LEO	Low Earth Orbit
M-Pesa	Mobile Money (Pesa means money in Swahili)
MDG	Millennium Development Goals, UN
MoD	Ministry of Defence
MTP	Medium Term Plan
NASA	National Aeronautics and Space Administration
NEPAD	New Partnership for Africa's Development
NGO	Non-governmental Organisation
NV 20:2020	Nigeria Vision 20:2020
NASRDA	National Space Research and Development Agency
NOTAP	National Office for Technology Acquisition and Promotion
NPHCDA	National Primary Health Care Development Agency, Nigeria
NSP	National Space Policy, UK
RCMRD	Regional Centre for Mapping of Resources for Development

SDG	Sustainable Development Goals, UN
ST&I	Science, Technology and Innovation
STEM	Science, Technology, Engineering and Mathematics
UK	United Kingdom
UKTI	UK Trade & Investment
UN	United Nations
USAID	United States Agency for International Development
WHO	World Health Organisation
WP	Work package in the Sub-contract between Inmarsat and ISPL

10. ANNEX 2: KENYA

Benefits of Connectivity

In Kenya, as elsewhere, access to information and services are an important means of furthering social and economic advancement. Access to these can now be achieved through the Internet where connection exists. The expansion of mobile telephone networks has been helpful, but more solutions are needed.[229]

Business

Bandwidth availability has brought about the creation of iHub and Silicon Savannah that provide location and facilities for research and development of technologies. It has been stated of Silicon Savannah that:

> Nairobi, Kenya has become the tech hub of Africa, a niche that could be worth more than one billion dollars to the country in the next three years despite its 40% unemployment rate. Kenya is throwing all their eggs in the tech basket as they build a multi-billion dollar infrastructure in the form of a "Techno City" that will support 200,000.[230]

There are clear benefits in bringing similar connectivity to every village, with satellites where other means are not available or impractical. It has been asserted that the end user is indifferent as to how bandwidth is provided.[231]

Agriculture

Agriculture remains the backbone of the Kenyan economy, contributing 25% of GDP. About 80% of Kenya's population of roughly 42 million work at least part-time in the agricultural sector, including livestock and pastoral activities.

Over 75% of agricultural output is from small-scale, rain-fed farming or livestock production.[232]

Case study: potatoes

Most of the potatoes in Kenya are grown in Kinango, about 30 - 40 kms from Nairobi. A 90 Kg sack of potatoes from Kinango, worth at the farm gate KS1,000, in Nairobi costs KS3,000. Most of the money goes to brokers. Connectivity can help the farmer research prices and markets to get a fairer proportion of the crop value.[233]

In Kenya, the newspaper *Daily Nation* publishes commodity prices. Therefore, connectivity should help farmers to realise better profits.[234]

229 Interview AH.
230 BloombergBusiness, *Silicon Savannah: Kenya's Billion-Dollar Tech Bet*; http://www.bloomberg.com/news/videos/b/fa73fc02-c511-4824-806d-5656acdfae7c
231 Interview AH.
232 https://www.cia.gov/library/publications/the-world-factbook/geos/ke.html, accessed 31 October 2015
233 Interview AH.
234 Interview AH.

Case study: M-Farm

M-Farm, a service that gives farmers access to market prices for the cost of a text message and allows them to group together to buy and sell products, has won several supporters and awards. It is the kind of service Kenya could export to other poor countries.[235]

Mobile Phones and Pastoral Farming

The expansion of mobile phone technology into the rural areas has seen the arid and semi-arid land based Kenyan pastoral communities embrace the technology as well. The mobility of pastoralists presents challenges for the transfer of quality information on market prices. However, with recent advances in communication technologies (i.e. mobile phones) this constraint is rapidly disappearing.[236]

Use of mobile phone in arid and semi-arid lands has not been restricted only to the pastoral communities. NGOs working in these regions were among the first groups to embrace the technology. As Banks & Burge (2004) point out, mobile phone technology is being applied to an increasingly wide range of human activities and environment in which we live.[237] For example, Agency for Technical Cooperation and Development (ACTED) an NGO operating in Samburu County piloted a project aimed at mapping all the water points within Samburu County.[238]

The NGO deployed the mobile phone Nokia Data Gathering (NDG) technology to record key qualitative data from an extensive survey of water points and then mapped them onto an interactive online map. It worked in partnership with members of the local pastoral communities, government authorities and other NGOs involved in water and sanitation interventions within the County.

It follows that mobile phone use to move herds during drought does occur, but is limited to trusted family and community contacts. However, it is a phenomenon less influential on herd movement than violence and other factors.[239]

Non-Kenyan case study: E-Village

In India the Government and Unilever started a project, E-Village, and connected farmers to the Internet so they could check prices. This changed the dynamic of the transactions. Farmers became so savvy that they started to check crop futures on the Chicago market[240].

235 Upwardly Mobile, The Economist 25 August 2012, http://www.economist.com/node/21560912

236 Augustine Ayantunde, Shirley Tarawali and Iain Wright, Rangeland-based Livestock Production Systems in the Arid and Semi-arid Tropics: Challenges and Opportunities, International Livestock Research Institute, Issue Brief, November 2011.

237 Banks, K and Burge, R, Mobile Phones: An Appropriate Tool For Conservation And Development? Fauna & Flora International, Cambridge 2004; http://www.kiwanja.net/database/document/report_ffi_vodafone_icts.pdf

238 ACTED, Water Resource Mapping Enhances Development Planning in Northern Kenya, News, March 08, 2012; http://www.acted.org/en/water-resource-mapping-enhances-development-planning-northern-kenya

239 http://ir-library.ku.ac.ke/bitstream/handle/123456789/9864/Mobile%20Phone%20Technology%20and%20Natural.....pdf?sequence=1, accessed 31 October 2015.

240 AgWeb publishes daily prices, http://www.agweb.com/markets/futures/; and see FarmGain Africa, http://farmgainafrica.org/commodity-prices/kenya-markets-prices.

Mobile Phone Banking

M-Pesa was established in 2007. By June 2010 it had over 10m users, compared to 8.4m bank accounts.[241] M-Pesa stands for Mobile Money (Pesa means money in Swahili).

M-Pesa is a good model on the regulation of similar services. Once it became a success some argued that the financial regulatory law covered the service. 80% of Kenyans bank using M-Pesa through the service provided by the telephone companies who are regulated by telecom laws. The Governor of Central Bank held that M-Pesa is not regulated under banking laws. The argument that telecommunication companies providing M-Pesa service were behaving like banks and should be subject to banking laws and regulations was rejected. The arguments for banking regulation constrained M-Pesa development, until the Central Bank Governor's decision.[242]

Safaricom, the major telecommunication company providing M-Pesa service has reached most rural areas and is available to all. It has transformed the way business is done in Kenya. The areas not served are those without cell-phone service for lack of connectivity.[243]

It is a service operated by mobile telephones by means of which funds can be transferred between accounts of different people or entities.

Most banks also argued that this group have no phones and if they do they are illiterate and cannot use the phone. M-Pesa has shown both assumptions wrong; 80% of its customers are in this category. Most Kenyans, rich or poor, have phones; even illiterate people have found ways to use the phones. Now 80+% of Kenyans are connected to mobile phones and 80% of them use mobile money.[244]

Mobile Telephony Penetration

ITU 2015 statistics show 33.6 million mobile phone subscriptions in Kenya.[245] By contrast, the CIA Factbook estimated in 2014 that there were 180,000 fixed-line telephone subscriptions in Kenya.[246]

The Communications Authority of Kenya plans to increase penetration of mobile telephony to 90 per cent, broadband penetration to 10 per cent and Internet uptake to 70 per cent by the year 2018. Currently there are 31 million voice communication subscribers, 21 million Internet subscribers and about 26 million Kenyans using mobile money transfer platforms.[247]

241 http://www.safaricom.co.ke/mpesa_timeline/timeline.html.
242 Alliance for Financial Inclusion, Enabling Mobile Money Transfers, The Central Bank of Kenya's Treatment of M-Pesa; http://www.afi-global.org/sites/default/files/publications/afi_casestudy_mpesa_en.pdf, accessed 4 March 2016
243 Interview NACOSTI.
244 Interview ACTS.
245 http://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx, accessed 31 October 2015. Note: this figure is echoed in the CIA Factbook, https://www.cia.gov/library/publications/the-world-factbook/geos/ke.html.
246 https://www.cia.gov/library/publications/the-world-factbook/geos/ke.html.
247 Communications Authority of Kenya succeeds CCK, Kennedy Kangethe, 24June 2014, http://www.capitalfm.co.ke/business/2014/06/communications-authority-of-kenya-succeeds-cck.

Cost of connectivity and income

Current cost of connectivity to a mobile phone (where available) is about KSh 2,000.[248] The connectivity cost compares with the per capita income of about $1,300 (2014 est.) and much lower income of the rural poor.[249]

Mobile and Internet user figures 2013

Infrastructure deployment by many operators has resulted in competition leading to a relative reduction of tariffs and increased use of mobile phones and Internet. By September 2013, there were 31.3 million mobile subscribers and mobile penetration of 76.9%. At the same time, there were 25.1 million mobile money subscribers. Estimated Internet users were 19.1 million with 47.1% of inhabitants having access to Internet services. The international Internet bandwidth available was 60,900Mbps of which 41.8% was being utilised.[250]

Fixed broadband subscriptions in Kenya

According to the ITU, 0.19 % of Kenyans have fixed broadband connectivity.[251]

Development of Alternative Methods for Provision of Connectivity

Google is developing Project Loon, a system to provide Internet access through a network of drifting high-altitude balloons. At the end of July 2015 Sri Lanka said that it had signed an agreement to eventually bring the Loon Project to that country, although Google said many details remained to be worked out.[252]

Electricity Supply: Solar

A Press Release of 25 February 2015, Nairobi, Kenya states: A 2014 study by M-KOPA Solar and InterMedia shows that Kenya has emerged as a hot spot for off-grid solar, with 14% of the population surveyed using solar as their primary lighting and charging source. Kenya Power calculates that 30% of the population has access to the grid, which leaves up to 56% still relying on kerosene, batteries and candles.[253]

Payment Method

M-KOPA (M= mobile, KOPA= to borrow) has succeeded by making solar products affordable to low-income households on a pay-per-use instalment plan. Customers acquire solar systems for a small deposit and then purchase daily usage “credits” for US $0.45, or less than the price of traditional kerosene lighting. After one year of payments customers own their solar systems outright and can upgrade to more power.[254]

248 http://priceinkenya.com/pricelist.
249 CIA Factbook, accessed 31 October 2015; UN Data, http://data.un.org/CountryProfile.aspx?crName=Kenya, accessed 4 March 2016.
250 CCK, 2014. See also ICT Master Plan, https://www.kenet.or.ke/sites/default/files/Final ICT Masterplan Apr 2014.pdf, accessed 28 October 2015.
251 http://www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx, 31 October 2015.
252 http://www.nytimes.com/2015/07/31/technology/facebook-drone-project-is-a-step-closer-to-flight.html, accessed 26 October 2015.
253 http://www.m-kopa.com/press-release/kenya-emerges-as-solar-pv-hot-spot/, accessed 23 October 2015
254 http://www.m-kopa.com/press-release/kenya-emerges-as-solar-pv-hot-spot/, accessed 23 October 2015

All revenues are collected in real-time via mobile money systems (such as M-Pesa in Kenya). Embedded GSM sensors in each solar system allow M-KOPA to monitor real time performance and regulate usage based on payments. This connected design allows M-KOPA to process vast amounts of data (i.e. over 10,000 mobile payments per day) via the company's proprietary cloud platform, M-KOPAnet.[255]

255 http://solar.m-kopa.com/about/company-overview/

11. ANNEX 3: NIGERIA

Electricity Supply

The shortage of electricity generation dates back to independence in 1961 when Nigeria had a population of 25m, now 180m projected to 207m by 2020. Generating plant capacity has remained the same while demand has grown ten fold. At the same time aging plant efficiency has reduced. There is also reducing water level due to climate change that affects hydroelectric generation.

Nigeria's leaders have promised a stable power supply since the end of military rule in 1999. Yet as of 2015, the country's power generating capacity has remained virtually unchanged, about 6 gigawatts for a country of 180 million people. To put it in context, the United States, with 310 million people, has a capacity of more than 1,000 gigawatts.

In his inaugural address, Nigerian President Muhammadu Buhari said that his nation's attempts to overhaul its electricity sector "have only brought darkness, frustration, misery and resignation among Nigerians." He singled out unreliable power supply as the biggest drag on his country's economy.[256]

Power generation is separated from distribution. Power generation is inadequate for the demand. Problems also exist with the distributors in the middle. Satellites can form part of the system for the management of distribution to solve problems. There is a need to build infrastructure, but better management of resources will also be necessary.[257]

The Government has made improving the worst shortages in Africa a priority. It has to upgrade the network and is approaching other countries that could become customers. Nigeria is also planning reverse osmosis to increase water supply.[258]

ICT and Electricity

Partly because ICT systems depend on electric power supply, Nigeria and Kenya are examining nuclear energy. Nigeria meets the international requirement of the International Atomic Energy Authority (IAEA) to show that nuclear development would be only for energy provision. In October 2015 the IAEA conducted an internal review investigation and agreed that Nigeria should prepare to install power reactors. It is probable that Nigeria will be the second African country with nuclear generators, as Nigeria has greater financial capability than other African countries. The view is that in the next 5 to 10 years Nigeria will address its energy requirements.

Connectivity

A healthy proportion of Nigeria's population of over 181,000,000 has a mobile cellular subscription. The ITU's figures listed in November 2015 show that compared to about

256 Weak Power Grids in Africa Stunt Economies and Fire Up Tempers, Norimitsu Onishi, New York Times, 2 July 2015, at http://www.nytimes.com/2015/07/03/world/africa/weak-power-grids-in-africa-stunt-economies-and-fire-up-tempers.html?hp&action=click&pgtype=Homepage&module=photo-spot-region&region=top-news&WT.nav=top-news, accessed 2 July 2015.

257 Conversation with Dele Meiji Fatunla, Royal African Society, SOAS, 9 February 2016.; and conversation with Hubert Foy, Director, African Centre for Science and International Security (AFRICSIS), 25 February 2016.

258 Conversation with Hubert Foy, Director, African Centre for Science and International Security (AFRICSIS), 25 February 2016.

180,000 land-lines there are 139 million mobile cellular subscriptions, or 78 per 100 inhabitants.[259]

As of February 2015, Nigeria had an active voice subscriber base of about 142.5 million, a tele-density of about 101.8%, 83.2 million Internet subscribers and an Internet penetration rate of about 59.4%.[260]

Nigeria has achieved foreign direct investment (FDI) of about $32billion and a nine per cent contribution to the gross domestic product (GDP). It is obvious that even greater potential for development and expansion will exist in the economy when

Shareholders in the Nigeria's telecommunications industry say that Nigerians would benefit more from the successes recorded in the sector, if broadband penetration is developed and enhanced. Broadband infrastructure deployment would further expand the opportunities for growth in the industry, with its attendant benefits to the economy as well as the social life of the people. The NCC plans to expand broadband penetration from its present 18 per cent to 30 per cent level in 2018.[261]

There is clearly scope for space applications to bring additional connectivity, particularly in rural areas. One of the driving forces for greater connectivity is access to specific services, of which healthcare ranks highly in the policies pursued by Nigeria.[262]

NCC GUIDELINES

The provisions of these Guidelines apply only to:[263]

i) Commercial Satellite Services, i.e. those who provide service to third parties or who own satellite space segments or earth station for self-provision support of their businesses.

ii) Space Segment Providers, earth station providers, Bandwidth resellers, IDA operators, GMPCS providers and suppliers of user terminal.

iii) GSO and non-GSO satellites including LEO's, MEO's, HEO's, HAPS, and other similar orbits that may be developed in future.

iv) Those already providing services to Nigerian users prior to the release of this Policy and future satellite service providers.

c) For avoidance of doubt, all military and non-commercial government satellites are outside the scope of this policy. Equally, radio-navigation satellites, armature satellites, earth exploration and space research satellites, Broadcasting satellites and receive-only ground stations do not come within the scope of this policy.

259 ITU.
260 NCC And Broadband Growth, 8 May 2015, Leadership, http://leadership.ng/opinions/431756/ncc-and-broadband-growth, accessed 30 October 2015.
261 *Ibid*.
262 *Ibid*.
263 *Ibid.*, Various Licences, Scope, p.4.

Licensing Regulations

Licence types include Network Operator and Service Provider Licences, and Individual and Blanket Earth Station Licences. In relation to the latter:

> b) Every VSAT or mobile terminal shall be licensed individually, in addition to the network operator's licence.[264]

Schedule 2 provides that Individual Licences include Global Mobile Personal Communication by Satellite.[265]

Reliability and Cost Effectiveness

One objective of the Licensing Guidelines of the NCC is:

> v) To ensure that satellite space segment providers provide reliable, cost- effective and secured service to users in Nigeria under fair and favourable commercial and technical conditions. This provision, by extension, covers associated players in the supply chain as well as Earth Station service providers, Bandwidth Re-sellers and vendors of terminal equipment or franchise holders.[266]

Management and Administration of Radio Spectrum for Communications

The NCC has the sole and exclusive power to manage and administer the radio frequency spectrum for the communications sector, and in that regard to grant licences for and regulate the use of the radio frequency spectrum.

Spectrum

Spectrum is managed by the NCC under the Communications Act 2003.[267]

All telecommunications service operators are required to obtain the relevant licences from the Nigerian Communications Commission (NCC) via the licence application process and compliance with the stipulated requirements. The Act provides:

> 31. (1) No person shall operate a communications system or facility nor provide a communications service in Nigeria unless authorised to do so under a communications licence or exempted under regulations made by the Commission under this Act.

ISP Regulation

If Internet Service Provider (ISP) services were to be provided the Guidelines for Provision of Internet Services must be observed.[268]

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264 *Ibid*., Various Licenses, sections 10a and 10b, p. 9.
265 http://www.ncc.gov.ng/index.php?option=com_docman&task=doc_download&gid=408, accessed 15 September 2015, Legal-Regulations_Draft_Licensing.pdf.
266 NCC Website, Regulatory Functions/Guidelines, Legal-Guidelines_Commercial_Satellite_Communication.pdf, accessed 22 September 2015.
267 http://www.nigeria-law.org/Nigerian%20Communications%20Commission%20Act%202003.htm
268 *Ibid*.

Equipment Standards

4. Application for Type Approval

(a) An application for Type Approval must be made using the Commission's standard type approval application form, available from the Commission on request.

All equipment manufacturers, vendors and operators, including customer devices such as mobile phones and wireless adapters, must therefore ensure that their equipment conform to the applicable standards as mandated by the Commission before bringing them into Nigeria.

12. ANNEX 4: MDGS AND SDGS

UN MILLENNIUM DEVELOPMENT GOALS

The UN's Millennium Development Goals (MDGs) commit African nations to a global partnership meant to reach internationally agreed goals for socio-economic development.

Both Kenya and Nigeria aimed to meet the targets of MDGs.[269] These eight internationally agreed objectives for socio-economic development, emphasise:

- Elimination of extreme poverty and hunger;
- Universal primary education;
- Gender equality;
- Reduction in child mortality;
- Improvement in maternal health;
- Lower HIV/AIDS and major disease incidence;
- Environmental sustainability; and
- Better partnerships with international development partners.

The MDGs were targets to be met by the end of 2015. Following the MDGs, on 25 September 2015, countries adopted a set of 17 goals to end poverty, protect the planet, and ensure prosperity for all as part of a new sustainable development agenda. Each goal has specific targets to be achieved over the next 15 years.

UN SUSTAINABLE DEVELOPMENT GOALS

The UN's Sustainable Development Goals do not replicate the MDGs, but broaden the scope of the goals to be met. For example, MDG 4 and 5 respectively require the State to reduce child mortality and improve maternal health. Both requirements are integral parts of SDG 3 that creates the obligation to "ensure healthy lives and promote well-being for all at all ages."

The targets to be met under the SDGs are:[270]

1. End poverty in all its forms everywhere.[271]

   Poverty is more than the lack of income and resources to ensure a sustainable livelihood. Its manifestations include hunger and malnutrition, limited access to education and other basic services, social discrimination and exclusion as well as the lack of participation in decision-making. Economic growth must be inclusive to provide sustainable jobs and promote equality.

269 http://www.un.org/millenniumgoals/
270 Sustainable Development Goals; http://www.un.org/sustainabledevelopment/sustainable-development-goals/
271 By 2030, eradicate extreme poverty for all people everywhere, currently measured as people living on less than $1.25 a day; http://www.un.org/sustainabledevelopment/poverty/

2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture.[272]

   Preventing further loss of biodiversity, support for small farms and access to energy are critical elements in achieving this goal.

3. Ensure healthy lives and promote well-being for all at all ages.[273]

   Again, many factors contribute to healthy lives, including education, contraception, gender equality, eradication of poverty, prevention of substance abuse and early warning of health hazards.

4. Ensure inclusive and quality education for all and promote lifelong learning.[274]

   Gender disparity in education, insecurity and conflict, lack of scholarship and teachers are some of the factors that are adverse to universal and long-term learning.

5. Achieve gender equality and empower all women and girls.[275]

   This would involve prevention of violence against women, equal access to education, jobs and political office, among other measures.

6. Ensure access to water and sanitation for all.[276]

   There is sufficient fresh water on the planet to achieve this. But due to bad economics or poor infrastructure, every year millions of people, most of them children, die from diseases associated with inadequate water supply, sanitation and hygiene. Water scarcity, poor water quality and inadequate sanitation negatively impact food security, livelihood choices and educational opportunities for poor families across the world. Drought afflicts some of the world's poorest countries, worsening hunger and malnutrition.

7. Ensure access to affordable, reliable, sustainable and modern energy for all.[277]

   Access to energy is central to nearly all world challenges and opportunities. But, energy production is a major cause of climate change, necessitating the use of sustainable renewable sources.

8. Promote inclusive and sustainable economic growth, employment and decent work for all.[278]

   Sustainable economic growth will require societies to create the conditions that allow people to have quality jobs that stimulate the economy while not harming the environment. Job opportunities and decent working conditions are also required for

272 http://www.un.org/sustainabledevelopment/hunger/
273 http://www.un.org/sustainabledevelopment/health/
274 http://www.un.org/sustainabledevelopment/education/
275 http://www.un.org/sustainabledevelopment/gender-equality/
276 http://www.un.org/sustainabledevelopment/water-and-sanitation/
277 http://www.un.org/sustainabledevelopment/energy/
278 http://www.un.org/sustainabledevelopment/economic-growth/

the whole working age population.

9. Build resilient infrastructure, promote sustainable industrialization and foster innovation.[279]

   Investments in infrastructure – transport, irrigation, energy and information and communication technology – are crucial to achieving sustainable development and empowering communities in many countries. It has long been recognized that growth in productivity and incomes, and improvements in health and education outcomes require investment in infrastructure.

10. Reduce inequality within and among countries.[280]

    Inequality still persists and large disparities remain in access to health and education services and other assets.

11. Make cities inclusive, safe, resilient and sustainable.[281]

    Common urban challenges include congestion, lack of funds to provide basic services, a shortage of adequate housing and declining infrastructure. The challenges cities face can be overcome in ways that allow them to continue to thrive and grow, while improving resource use and reducing pollution and poverty. The future we want includes cities of opportunities for all, with access to basic services, energy, housing, transportation and more. Support least developed countries, including through financial and technical assistance, in building sustainable and resilient buildings utilizing local materials.

12. Ensure sustainable consumption and production patterns.[282]

    Each year, an estimated one third of all food produced – equivalent to 1.3 billion tonnes worth around $1 trillion – ends up rotting in the bins of consumers and retailers, or spoiling due to poor transportation and harvesting practices.

13. Take urgent action to combat climate change and its impacts.[283]

    Climate change is now affecting every country on every continent. It is disrupting national economies and affecting lives, costing people, communities and countries dearly today and even more tomorrow. People are experiencing the significant impacts of climate change, which include changing weather patterns, rising sea level, and more extreme weather events. The greenhouse gas emissions from human activities are driving climate change and continue to rise. They are now at their highest levels in history. Without action, the world's average surface temperature is projected to rise over the 21st century and is likely to surpass 3 degrees Celsius—with some areas of the world expected to warm even more. The poorest and most vulnerable people are being affected the most.

279 http://www.un.org/sustainabledevelopment/infrastructure-industrialization/
280 http://www.un.org/sustainabledevelopment/inequality/
281 http://www.un.org/sustainabledevelopment/cities/
282 http://www.un.org/sustainabledevelopment/sustainable-consumption-production/
283 http://www.un.org/sustainabledevelopment/climate-change-2/

Therefore it is critical to:

- Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries;
- Integrate climate change measures into national policies, strategies and planning; and
- Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning.

14. Conserve and sustainably use the oceans, seas and marine resources.[284]

    Our rainwater, drinking water, weather, climate, coastlines, much of our food, and even the oxygen in the air we breathe, are all ultimately provided and regulated by the sea. Throughout history, oceans and seas have been vital conduits for trade and transportation. Careful management of this essential global resource is a key feature of a sustainable future.

15. Sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss.[285]

    Forests are home to more than 80 per cent of all terrestrial species of animals, plants and insects. Due to drought and desertification each year 12 million hectares are lost (23 hectares per minute), where 20 million tons of grain could have been grown. Micro-organisms and invertebrates are key to ecosystem services, but their contributions are still poorly known and rarely acknowledged.

16. Promote just, peaceful and inclusive societies.[286]

    Ensure public access to information and protect fundamental freedoms, in accordance with national legislation and international agreements.

17. Revitalize the global partnership for sustainable development.[287]

    Long-term investments, including foreign direct investment, are needed in critical sectors, especially in developing countries. These include sustainable energy, infrastructure and transport, as well as information and communications technologies. The public sector will need to set a clear direction.

The international commitments to advance the MDGs and now the SDGs must affect all policies pursued by national governments. These goals play a prominent role in the assessment of policies in this Report.

For the reasons given above, references to the more specific MDGs encompass the SDGs and measures to advance the former also advance the SDGs.

284 http://www.un.org/sustainabledevelopment/oceans/
285 http://www.un.org/sustainabledevelopment/biodiversity/
286 http://www.un.org/sustainabledevelopment/peace-justice/
287 http://www.un.org/sustainabledevelopment/globalpartnerships/