

Participating in the Global Open Science/Open Data Space:

Towards a

Botswana National Data Forum and Strategy

A Position Paper

Drafted

by



About the Author

Joint Minds Consult (JMC) is an Education and Training think-tank that promotes research, training, knowledge development and management, and student support as key issues that enhance the development of the Human Resource in the Southern African Development Community (SADC) and sub-Saharan Africa. JMC is a Botswana Qualifications Authority certified research and training institute. The researchers are Dr Patrick Molutsi – Country Managing Partner and Principal Researcher; Dr Joseph Mwelwa, Founder, Senior Partner and Researcher; Dr. Kay H. Raseroka, Managing Partner, and Council Member of the Research Data Alliance (RDA).

Introduction

Botswana has developed from a very poor country – at independence in 1966 – to an upper middle income economy state (International Monetary Fund, 2016; World Bank, 2016). The country's Gross Domestic Product (GDP) per capita of less than US \$60 at independence has risen to over US \$4000 per capita per year in the mid 2000s (Government of Botswana, National Development Plan10, 2010; Government of Botswana, National Development Plan10, 2016World Bank, 2016). Such growth represents a degree of success that is a rarity on the African continent, (C.f. International Monetary Fund, 2016; World Bank, 2016). This has prompted social economic development observers and researchers to describe Botswana's pace of development as one of the rapidly transformed and peaceful countries around the world (Sebudubudu and Molutsi, 2011). Over a period of fifty (50) years, Botswana has invested in and built a wide range of governance, management, academic, research, private sector and non-governmental institutions and organizations. These currently constitute part of the country's social capital and a relatively comprehensive institutional infrastructure necessary for sustainable development.

Combined with a host of relevant policies, legal frameworks and comprehensive national strategies, Botswana's social capital and institutional infrastructure should now form key drivers of further national transformation and advancement. However, despite the noted progress, Botswana continues to face challenges, namely: the HIV/AIDS pandemic(which continues to infect and affect at least one quarter (25%) of the population causing death, disease, the rise of orphans, widows, widowers and consuming a large portion of the national health sector budget); persistent poverty; unemployment especially among women and youth; limited economic diversification away from the dominant mineral sector; food insecurity; and worsening climate change conditions are some of the major challenges facing the country as it enters the second half of the century since independence.

These challenges require systematic and sustained research to produce data for analysis to arrive at data driven solutions. Botswana's continued performance improvement must be anchored in national development and premised on research data informed policies and

efficient decision making processes. Unfortunately, progress in these areas is limited by fragmentation and lack of intra and inter-institutional interaction that require data and information sharing. Indeed, with the digital revolution, data and information sharing for development play a fundamental role in effective intra-national and international interaction within defined collaborative and partnership frameworks. And yet, despite many advances and engagements with the digital revolution, collaboration and partnerships on data and information sharing for development in Botswana hardly happen because institutions, government departments, ministries, parastatal organizations and the private sector still operate in data and information silos. Evidently, Botswana's research data and information systems remain significantly constrained and underdeveloped at government, institutions and ultimately at individual researcher level (cf. World Bank Open Data Assessment for Botswana, 2014).

Perhaps in recognition of these realities, Government efforts in the past to stimulate discussions on Open Data and development of an Open Data programme for Botswana are evident at the e-Government and at the Botswana Innovation Hub (BIH), (cf. Botswana Innovation Hub day seminar on Open Data, August, 2013), and the subsequent World Bank (Open Data Assessment¹ for Botswana, 2014). However, these laudable efforts lacked a truly national and comprehensive approach towards building consensus on an Open Data programme for Botswana. In particular data for research and data produced by research seems unfortunately to have been neglected. For example, significant stakeholders such as the University of Botswana and the Botswana International University of Science and Technology (BIUST), Botswana Institute for Technology Research and Innovation (BITRI), Colleges and Research Institutes were not included in the consultative process that informed the Open Data Assessment report, and yet these are the dominant players in research and in the generation and use of research data.

¹ The Open Data Assessment for Botswana established that Botswana was generally not ready for Open Data Program as ratings on all the indicators for readiness such as leadership, data access, management and procedures, infrastructure etc were below acceptable levels.

This Position Paper, therefore, forms the first comprehensive effort at galvanizing national level consensus and/or discourse on Open Data and Open Science with a view to developing a National Research Data Strategy for Botswana (NRDSB). It calls on Government, public and private universities and colleges, private sector organizations and citizen based non-governmental organizations to collaborate and partner on Open Data and Open Science to realize a higher potential for addressing Botswana's development challenges outlined above.

Vision of the Position Paper

The vision of this Paper is to develop a coordinated national strategy for research data which builds on a continuous dialogue between key research and academic institutions and government through the Ministry of Tertiary Education, Research, Science and Technology (MTERST) for the purpose of creating consensus on policies, legal frameworks, governance institutions and strategies required to enable Botswana to take full advantage of the global trends in data-driven Open Science (c.f. Science International, 2015a), in order to advance key areas of national research importance and increase the competitiveness of key research institutions in the country.

Rationale for Open Science

The case for Open Science and the concomitant need for Open Data can briefly be stated thus: a well coordinated process that leads to a national data forum and ultimately a NRDSB will result into a comprehensive Open Data programme that “could make a significant contribution to Botswana's economic and innovation goals. It could also help to improve the delivery of public services through making data more readily available to government decision makers [not to mention researchers and innovators]and developing the skills they need to use it effectively” (World Bank Open Data Assessment for Botswana, 2014:2) because the value of Data is in its use (Ibid, 2014:31).

However, the status regarding Open Science/Open Data urgently demand action for several reasons:

- First, Botswana’s research data is fragmented, inaccessible and underutilized by government, institutions and local researchers.
- Second, because of Botswana’s closed data culture, the country is less well placed to build scientific partnership with other countries with comparable data and with similar conditions as in Botswana. For example, countries such as Australia and Israel which have comparable soils, rainfall patterns, livestock disease patterns and stronger mineral economies (Australia) have considerable data and knowledge that have been created through concerted scientific and open data programmes. It is by building data expertise and by engaging with the open research data agenda that Botswana can build and benefit from research partnerships with relevant institutions in these countries.
- Third, Botswana has a lot to learn from open governments elsewhere in the world in terms of legal frameworks, institutional requirements and processes for Open Data. Open government is a necessity for enhanced democracy, advanced development, effective use of Information and Communication Technologies (ICTs) and in maintaining and sustaining an open and transparent society.
- Fourth, the global commitment to Open Data is too strong to resist; the key actors are re-making science and Botswana risks being left behind unless it engages actively and promptly. As the Science International Accord on Open Data in a Big Data World, makes clear, “the digital revolution of recent decades is a world-historical event as profound and more pervasive than the introduction of the printing press.” It has already transformed many aspects of civil society and science and the rate of change is unprecedented (Science International, 2015 a: 1).
- Fifth, the Open Data/Open Science movement emphasizes the values of a rational society, the need for scientifically informed and evidence based policy making and governance. Of fundamental importance here is the return to the original principles of science which require availability of data and evidence. The Royal Society succinctly

reminds us of the original nature of science and why it should remain an ‘open’ enterprise: “Since the 17th century, a fundamental axiom of science has been that the evidence (the data) that underpins a published scientific claim must be made concurrently open. This permits others to scrutinize the logic of the claimed relationship between evidence and concept, to repeat observations and experiments and to replicate results” (Royal Society, 2012).

- Sixth, the Open Data and Open Science movement is a call for action that engages government, research institutions, individual researchers and civil society. It calls on governments, institutions and scientists to re-visit their current practice of keeping data closed and a private commodity to be sold to other scientists. As the vision of Research Data Alliance (RDA), one of the leading proponents of Open Research Data, observes: “Researchers and innovators are openly sharing data across technologies, and countries to address the grand challenges of society” (RDA, Website, 2016). The Royal Society (2012) could not have put it much better: “Unless national science systems support and enable their communities to achieve re-defined standards of reproducibility, the work done by their scientists will fall far short of acceptable international standards” (Ibid:).
- Seventh, there are significant and time-sensitive opportunities to engage with these international developments. The open data movement brings with it huge opportunities and benefits which countries like Botswana with limited research funding, research infrastructure, small research communities and yet faced by similar global challenges pointed out earlier could benefit from. At the same time, there remain important advantages to be gained for those countries and research institutions that learn from lessons elsewhere and adapt quickly to the new circumstances of science and data sharing. Botswana will benefit immensely by tapping into these powerful networks if it embraced the Open Science/Open Data movement:
 - **CODATA and the African Open Science Platform Initiative:** Building on the principles laid out in the Science International (2015 b) Accord on Open Data in a

Big Data World, CODATA is directing an initiative to pilot a coordinated approach to Open Science in a number of African countries. “The development of an open science and innovation platform depends not only on the physical infrastructure for acquiring, curating and disseminating data and information, but also on protocols, policies and procedures in the science system that provide the structure and support to ensure that science objectives are achieved. An open science platform is conceived as an integrated set of arrangements that provides a policy, capacity-building and infrastructural framework for enhanced accessibility and impact. Above all, the initiative focuses on the creation of Open Science fora through which policies and coordination can be discussed and established.” *We recommend that Botswana should be one of the leading countries to engage with this initiative and help develop policies, protocols and practices for Open Science that are appropriate to and beneficial for African research institutions, countries and the continent as a whole.*

- **The Research Data Alliance:** The RDA was formed in 2013, but already, it counts 4,500 members from 115 countries. The Alliance is supported by leading organizations such the European Union, United States National Science Foundation, National Council on Standards and Technology and the Australian Department of Innovation. The Research Data Alliance is also supported by some of the leading research funding foundations around the world. *We recommend that Botswana research institutions, researchers and data experts engage and benefit from the advances created by collaboration within this international movement.*
- **The ICSU World Data System:** This is a trusted data services for global sciences. It is a membership and expertise organization for data repositories internationally. *Inter alia*, the WDS promotes the sharing of expertise and the standard procedures to be adopted by trustworthy data repositories. As data

repository services are developed in Botswana government and research institutions, there will be advantages to engaging with this organization.

- Eighth, given the profundity of change in the global landscape for data-driven research, for open data and open science, and concomitant data policies, there are serious risks that those countries that do not change, adapt, engage with global initiatives and promote the policies, skills, technologies and infrastructures necessary for a knowledge economy will find their research institutions, societies and economies marginalized. Fortunately, there are immediate and cost-effective means of adapting rapidly to these changing circumstances and opportunities. Most importantly, Botswana has significant strengths on which to build.

Current Trends and Policy landscape in Botswana

Botswana is not a complete stranger to the issues of Open Data and Open Government. For an example, in 2013, the government commissioned a study led by a technical team from the World Bank to assess Botswana Government's readiness to create an open government system. Hosted by the Botswana Innovation Hub (BIH) and assisted by the technical support team at e-Gov, the study was optimistic about the prospects for success from an Open Data programme in Botswana. However, after assessing and rating Botswana as falling below the required state of readiness, the Assessors concluded that:

...Botswana has many of the key prerequisites for the successful implementation and benefit realization from open data. If the Government wishes to seize the opportunity, it mainly needs to provide the high level political leadership and put in place the institutional structures, resources and capacity needed to achieve success (Ibid:3).

However, Botswana's traditional commitment to research data as the basis of policy and decision-making seems to have waned in recent years. Since independence Botswana has sought to develop a comprehensive institutional infrastructure to promote research and data to inform policies for development. From the early beginnings in the 1970s and 1980s, many government ministries and departments established research units. For example, the Ministries

of Agriculture, Education, Local Government and Lands, Labour and Home Affairs and Mineral Resources all had small research units manned by a few professional researchers to conduct relevant research in their areas of operation. This research generated data that informed policy and decision making in the respective areas of mandate. Indeed policies on settlement patterns, Self-Help Housing Schemes (SHHS), different agriculture schemes targeted to varying types of the farming community, social security and free primary education policies and subsequently free general education were informed by small scale, sector specific but carefully conducted and analyzed research.

At institutional level, institutions such as the University of Botswana established sections with portfolios for research and academics would conduct discipline-based research for academic purposes within their departments but also participated in national research on topical policy issues such as the impact of drought, environmental degradation and conservation, trade and economic policies and small enterprise development. These research activities formed the early stages of evidence-based research that guided policy and demonstrated government's commitment to research as the basis of decision making. Associated state agencies such as universities and policy research institutions played a key role in all this as policy and technical advisers to government.

The period from the second up to the fourth decades from 1976 to around 2006 saw establishment of national and regional research bodies and development of comprehensive policies with mandate and objectives to promote research and innovation in the country. In particular, state agencies known locally as para-statal organizations such as Rural Industries Promotions Company (RIPCO), National Food Technology Research (NAFTAC), Department of Agricultural Research, Botswana Institute for Development Policy Analysis (BIDPA) and others in the areas of health, water/hydrology, geology, business development, women and gender development, educational research, etc., all emerged and were consolidated during this period. Financial institutions in accounting, banking and insurance sectors also emerged and are currently part of the wider national research institutional infrastructure of Botswana.

The trade unions and their federations as well as non-governmental organizations in media/journalism, Botswana Council of Non-Governmental Organization (BOCONGO) and the Botswana Council of Churches (BCC) were all established during this period. The significance of this account to the current discourse is that today, all these institutions are part of the national research landscape because they both produce and consume data and information in their work.

One major area of development which has had a major impact on the country's research landscape has been the growth of public and private universities as well as colleges of higher education. There are now five (5) public universities namely: the University of Botswana (UB), Botswana International University of Science and Technology (BIUST), Botswana University of Agriculture and Natural Resources (BUAN), Botswana Open University (BOU) and Botswana Accountancy College (BAC). Three (3) private universities (Limkokwing, BA ISAGO and Botho) were established in early 2000s. About fifteen (15) private higher education colleges have been established in the past fifteen (15) years.

These academic institutions are naturally active in research endeavors with professors and their associations, student related fieldwork and consultancy work for government and private sector driven by these key players. However, like government ministries and departments, Botswana's academic institutions are not well networked and they too largely operate in data (and even knowledge) silos. Even where they network as in the case of Botswana Private Education and Training Providers (BPTEP), they do so for purposes of advocating for government support and protection against perceived rigid regulatory regimes by local regulatory bodies. Collaboration on research and research data can seem like the least immediate of their priorities. However, for the reasons adduced above, these institutions of higher learning must begin to collaborate and partner on Open Science and Open Data in order to enhance their contribution to national development.

The survey of the Botswana research landscape cannot conclude without reference to a brief discussion on the role and pervasive presence of state agencies in the areas of education and human resource development, telecommunication and mobile technology, accounting, finance

and insurance, health research and management, small business training, business support and financing, environmental conservation and tourism, military, policing and general security institutions. These agencies generate massive amounts of data and carry out research in areas covered by their mandate.

Upon taking Office in 2008 the current President, Lieutenant General, Dr Seretse Khama Ian Khama announced the establishment of the Agricultural Hub, Education Hub, Diamond Hub, Botswana Innovation Hub, Health Hub, Transport Hub, among others. The hubs were given broad mandates to transform the sectors in the areas of their operation. The hubs were therefore *de facto* research entities. In making sense of how the hubs went about operationalizing their mandates, the assumption is that before they developed strategies and initiatives to change their respective sectors, they first sought to understand what the sectors' constraints and challenges were before they implemented the strategies for change. A related assumption is that enormous and important data were generated by these hubs. Given this background, several key questions arise: Where are the data on these research activities? How was the research conducted? How were the data analyzed? For the advancement of research and development and for the improvement of the economy and society, it is essential that the data and knowledge created by major government initiatives should be available for civil society and for Botswana's leading research institutions.

The foregoing discussion has focused more on institutional evolution and arrangements that currently form the research landscape in Botswana. Nevertheless, although research units that characterized the early government departmental and ministries' structures have been lost or closed down, there have been a number of policies at national level that have pointed to government's continued desire to develop research. Key among these was the Botswana National Research, Science and Technology Plan of 2005 revised in 2011 (c.f. Ministry of Infrastructure, Science and Technology, 2011). The Policy seeks to promote research by developing co-ordination of research, funding of research, prioritizing science, engineering and technology and strengthening institutional governance of research in the country. Other new state agencies such as Statistics Botswana, the Human Resource Development Council (HRDC),

Botswana Qualifications Authority (BQA) and Botswana Bureau of Standards (BOS) among others are carrying out research and produce lots of data that need to inform development policy and strategy across board in the country.

This section has shown that the research and data landscape in Botswana comprise a multiplicity of players who operate both within and outside government but whose work is not coordinated or guided by common policies and standards. As a result, the data are both fragmented and inaccessible. *Given this background, it is plausible to assume that the country's investment in research may not be producing optimal outputs and outcomes required to address major economic, social and scientific challenges of development.*

This Position Paper seeks to create an opportunity for all the key players in the Botswana research landscape in both private and public institutions to begin to think of ways of working together to harmonize their research capacities towards a common view on Open Science/Open Data and the benefits that potentially would accrue and flow from Open data sharing to solving the challenges that confront communities in Botswana.

Areas of Excellence and Opportunity in Open Science and Open Data

Evidently, there are a number of areas of excellence in some of the country's research and data activities. For example, the University of Botswana for instance is conducting research of global standards in the following areas:

- Water and hydrological studies;
- Environment and conservation in fragile ecosystems such as the Okavango Swamps;
- Indigenous knowledge;
- Computing and Security
- Clean Energy/alternative energy resources

The Botswana International University of Science and Technology similarly conducts wide research in areas such as:

- Applied Mathematics

- Physics
- Geology
- Statistics
- Earth and Environmental Sciences
- Information Systems
- Computer Science
- Chemical Sciences
- Biological Sciences
- Mechatronics
- Telecommunications
- Civil and Environmental Engineering
- Mechanical Engineering
- Geological Engineering
- Mining Engineering
- Measurement and Industrial Instrumentation
- Electrical and Electronics Engineering as well as
- in Computer Engineering

The Botswana Vaccine Institute (BVI) produces first class livestock vaccines that are exported to countries such as Egypt and Ethiopia. The National Research on Food Technology (NAFTEC) is another agency which produces products of international standards and which can benefit from more global research data exposure. The creation and evolution of the BIH in 2008 provides a conducive environment for research and innovation promotion in the country. However, BIH has little control over what the rest of the players in the research community will do and prioritize. There are no clear policies and legal frameworks to enable either the Department of Research, Science and Technology (DRST) or the BIH to regulate research and data management activities in the country.

Given the limited funding, research infrastructure and limited number of skilled researchers in Botswana, there is an urgent need to begin to regulate and prioritize not only research activities but also the use of data.

In terms of development priorities Botswana needs research in the following areas:

- Drought and Climate Change
- Wildlife, Tourism and Indigenous knowledge
- Underground water/hydrology and geological research
- Health and diseases including HIV/AIDS
- Livestock medicine and food production
- Economic Diversification, job creation and sustainable business enterprises
- Energy and waste management
- Crime, drug trafficking and social support to families
- Bilingualism/multilingualism
- Language of education studies
- Digital content development for broadband

The above list is not exhaustive but it provides an indication of research areas that could benefit from Open Science and Open Data.

Realizing the Vision

In order to realize the vision of Open Science/Open Data, several steps have been and will continue to be taken namely:

- Advocacy and awareness raising seminars/symposia in Botswana: Key leaders in Open Science/Open Data from the RDA and CODATA were invited by Joint Minds Consult to conduct seminars and hold dialogue with key leaders at UB, BITRI, BIUST, Private Universities and also with the Permanent Secretary, Dr. Theophilus Mooko and his team at MTERST (7-11October 2016).
- Agreement by stakeholders from the University of Botswana and MTERST for a proposal on a coordinated course of action towards a national data strategy on Open Science/Open Data (10-11 October 2016).
- Development of a Position Paper with input from UB, BIUST, BUAN, BITRI, Private Universities, Government departments and MTERST (Circulation of draft Paper, 25 November 2016).

- Receive feedback on the Position Paper and incorporate feedback and revise the paper (26-30 November 2016).
- Begin Planning for a national dialogue on national data Forum (18 November 2016 – 30 January 2017).
- Present the Position Paper at the African Open Science Platform Side Event for Science Forum South Africa (7-8 December 2016).
- Circulate the Paper in Botswana for further input from public and private universities, government research departments, non-governmental organizations and the private business sector (12-31 January 2016).
- Revise the Paper and develop the final paper for formal circulation and discussion (1-8 February 2017).
- Send the invitation to stakeholders for a national dialogue in a National Data Forum (1-8 February 2017).
- Hold a National Data Forum and launch the White paper to promote dialogue on Open Science/Open Data (7 March 2017).
- Plan for a National Data Strategy consultative workshop for 7 May 2016.

A Framework for a National Research Data Strategy

The National Research Data Strategy for Botswana (NRDSB) needs to be developed by Botswana's leading experts in research and key institutions as has been outlined in the discussion above. Botswana needs to build on the Botswana Innovation Hub initiative of the 2013 Assessment on Open Data to rekindle the debate on Open Data/Open Science for Botswana. Most importantly these efforts need to be supported by the Government through the Ministry of Tertiary Education, Research, Science and Technology (MTERST) which provides the necessary leadership together with the universities and private research institutions. Additionally, institutions in Botswana need to own the NRDSB. To embed the NRDSB in its proper context, it is critical to examine the operational research and data use culture in the institutions outlined in this paper.

The World Bank Open Data Readiness Assessment for Botswana (2014) is an important document that should form part of the reference material in the discussions on Open Science/Open data at the National Data Forum because it covers relevant and specific indicators for Open Data frameworks. At the same time, the principles laid out in the Science

International Accord on *Open Data and a Big Data World*, are specifically targeted at promoting engagement with the imperatives for Open Science and open research data. The African Open Science Platform initiative is developing a programmatic approach to embedding these principles and there is an opportunity for Botswana to take the initiative and show leadership. Combined with and reflecting the national priorities also described, these documents and initiatives can help set the agenda for the national dialogue.

The National Data Forum and the NRDSB consultative workshop will be key events at which stakeholders and partners can define the NRDSB to advance key areas of Botswana's research and the excellence of the research institutions.

To provide a broad framework for these events, we recommend that the NRDSB should focus on the development of the following key elements of a national research data strategy:

- research data policies at a national level and at the key research institutions mentioned;
- a roadmap and strategy for infrastructure development; consideration of infrastructure for research institutions and shared 'national' services (i.e. each institution should develop its own data Centre or if need be a nationally coordinated 'shared service can be created;
- training and skills development with a focus on data skills for researchers and on 'data professional' roles for skilled staff in support of research projects (data stewards, data librarians, data analysts/scientists);
- institutional structures, responsibilities and capabilities within Government and non government institutions;
- more specific data management policies and procedures on archiving, de-archiving, accessing and usage, and to develop the most appropriate codes of conduct relating to issues of IP, personal and sensitive data etc;
- specific strategic implementations of the NRDSB to support national priority research areas and the development of expertise in open data at the key research institutions listed above;
- civic engagement and capabilities for Open Data among all stakeholders in Botswana;

- strong linkages and engagement with the African Open Science Platform, with CODATA, RDA and the Academy of Sciences South Africa (ASSAF).

Priority Areas and Actions

The priority actions in our quest to realize the vision on the National Research Data Strategy for Botswana are as follows:

- **First Priority Action:** to finalize and get the Position paper ready and circulated to the Permanent Secretary (MTERST) and key stakeholders in Botswana and cooperating partners at CODATA, RDA, African Open Science Forum and South African Science Forum.
- **Second Priority Action:** (a) to hold further meetings with the leaders in the University of Botswana and BIUST and the private universities, (b) Present to the Permanent Secretary (MTERST) the proposals on the way forward and seek approval and authorization for the first National Data Forum.
- **Third Priority Action:** to hold the actual NDS consultative workshop to begin to generate content for the NDS for Botswana.
- **Fourth Priority Action:** to complete the consultative and engagement programme to ensure that the NRDSB has full support from stakeholders, including the research institutions and the ministry.
- **Fifth Priority Action:** to implement the NRDSB specifically in relation to the priority research areas discussed above.

Conclusion

The purpose of this Paper is to promote Open Data/Open Science approach in Botswana. The limited research that is done in Botswana at government and institutional level outside government is not efficient and does not optimize the potential impact on development. The opportunities of the data revolution are not being mobilized to address national challenges: primarily because the data are either restricted or for cultural and/or infrastructural and technical reasons are simply not being made available for use by researchers in Botswana and

elsewhere. The research data are therefore underutilized and often unknown to the public and the research community. Yet it has been established that open data bring more economic, social and scientific value than the current fragmented research and data management systems, characterized by data and knowledge silos. This Paper has presented a strong and reasoned case for accelerated actions to enable Botswana to take advantage of the global Open Data phenomenon, to establish research and data sharing policies and practices that will accelerate key areas of nationally important research and to demonstrate leadership in Open Science platform initiatives at a regional level, and to build partnerships for the advancements of skills with those international organizations and countries that are spearheading the Open Data and Open Science revolution. The proposed national Stakeholder Conference in the first quarter of 2017 will help build consensus, assist in strategy formulation and action plans for the realization of the -vision on Open Science and Open Data in Botswana.

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