BITRI

BOTSWANA INSTITUTE FOR TECHNOLOGY RESEARCH AND INNOVATION

BITRI NEWSLETTER

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TECHNOLOGY SOLUTIONS FROM YOU TO US FOR YOU

contents

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MISSION

To conduct needs-based technology research that provides sustainable innovative solutions through co-creation and collaboration with local and international stakeholders.

VISION

To be the leading technology solutions provider that transforms lives.

Teamwork

We operate and innovate through teamwork, and although we expect individual expertise, the team performance takes priority. The value of innovation through teamwork includes behaviour such as valuing contribution, accepting diversity, pro-active approach, collaboration and co-creation.

Excellence

We expect and encourage unquestionable technical and operational excellence in planning, executing, monitoring and continuously improving everything we do.

Empathy

We interact, operate and generate solutions that optimally balance the interest of all stakeholders

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CEO's Foreword

BITRI as a corporate brand that is built upon the foundation of "…identifying, developing and/or adapting appropriate technology solutions that provides sustainable innovative solutions through co-creation and collaboration in line with national priorities and needs of Batswana" prides itself in doing just that; a research institute that has established deep relations with its customers and stakeholders and delivers on its brand promises.

The era of COVID-19 pandemic calls for a shift in the way we as a nation have been doing things, as well as our habits on a micro level. Simple habits such as washing of hands, sanitizing of surfaces to maintain cleanliness and observing social distancing protocols have complemented efforts of the Government of Botswana and health professional who have been entrusted with coordinating efforts aimed at arresting the spread of the pandemic.

BITRI has also kept its brand promise by providing solutions that are relevant, including but not limited to the development of an e-Permit platform to control movement of persons during the State of Public Emergency; development of a digitally controlled mechanical ventilator prototype that can assist patients in need of respiratory support; as well as donating five hundred (500) units of masks to the Ministry of Health and Wellness to be used in the Corona virus mitigation exercise.

In our other contribution, we repurposed some of our facilities and dedicated some of our Researchers for the purpose of producing the 10 000 litres of hand sanitisers. The Ministry of Tertiary Education, Research, Science and Technology and the De Beers Group made generous donations towards procurement of raw material and containers for the production of the sanitisers.

Another of our key COVID-19 interventions has seen BITRI entering into an agreement with Eagle Medical Industries, a local company based in Tlokweng for the production of medical masks for a period of four months to assist in COVID-19 mitigation. The agreement stipulates that BITRI will produce and supply at least 300 metres of nanofibre membrane per week to Eagle Medical Industries, who will in turn produce 1000 masks per week. BITRI will control the quality of the nanofibre membrane during the production process. The project is currently ongoing.

BITRI places utmost value in its workforce and all its stakeholders, and to that effect, the organization is committed to doing all necessary to maintain the highest levels of observation of COVID-19 protocols. The organization has instituted measures that include but are not limited to some employees working from home to accomplish the desired decongestion of office space and common areas. With this arrangement, the organization still strives to achieve seamless delivery of service and maintenance of service standards. The organization has also installed automated sanitizers in strategic places around its premises for use by staff and clients visiting our offices to minimize the risk of contracting COVID-19. Messages regarding protocols such as regular washing of hands, sanitizing, wearing of facial masks and maintaining the recommended social distancing are regularly buttressed through various channels of communications. BITRI, together with the rest of the nation shall overcome this pandemic.

This edition of the newsletter carries succinct articles on the BITRI Fleet Management System and the Building Materials Science (BMS) Testing Laboratory. The fleet management system is intended to help organisations to reduce and minimize overall costs related to fleet mismanagement/ misuse and optimize fleet management process efficiencies through proper fleet scheduling (usage & maintenance), implementation of fleet authorization levels, fleet tracking and condition monitoring. The BMS Testing Laboratory serves to assure the quality of building materials used for the businesses in construction and property development, as well as the customers and clients who wish to ascertain that they are getting value for money and inhabiting structures which are sound and fit for purpose. These are two of the several ready-for-market products and services, and we shall use this publication and other channels to promote awareness and uptake of our other offerings.

The BITRI Board of Directors, Management and staff entrusted with ensuring financial sustainability and success of BITRI are forever engaged in seeking avenues to investigate problems that the organization is best positioned to solve, and in collaboration with stakeholders, develop sustainable solutions. We are indebted to your continued support and engagement, and as a team, we can help the Government of Botswana achieve the ideals of economic diversification, and 'Prosperity for All.'

Prof Shedden Masupe
PhD, SMIEEE, Pr.Eng
Chief Executive Officer

BITRI Shares its COVID-19 Initiatives with Stakeholders

BITRI management recently went live on BTV to update stakeholders on the organisation's COVID-19 initiatives, Mandate as well as key projects and services.

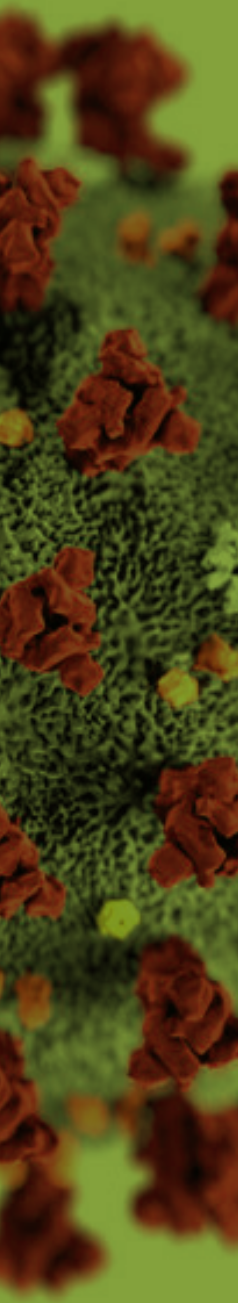
Dr. Mbongwe began the session by outlining the BITRI Mandate, and the six thematic research areas, and explained that the outbreak of the pandemic complemented the mandate of BITRI and research projects, with the re-purposing some of its research facilities to expedite the development of COVID-19-related solutions.

Dr. Sebusang expanded on initiatives under the Technologies Department, that cover Energy, Information Systems Technologies and Electronics & Communications divisions.

The BITRI Acting Executive Director – Natural Resources and Materials Prof James Darkwa, hoisting a sample of a surgical gown made from the BITRI-produced nanofiber membrane. The gowns provide superior protection for personnel during surgical procedures. BITRI Director – Research and Partnerships Dr Bathsheba Mbongwe (left) looks on.

Dr. Sebusang informed the audience that BITRI designed and developed the Government portal to enhance ease of access to information, adding enhancement such as arrangement of menu in accordance to categories of service needs across all functions of government.

BITRI also volunteered to develop an application programming interface (API) or backbone that would define interactions between multiple software intermediaries and the central data storage point. These intermediaries, in the



case of the solution developed by BITRI, are vendors and innovators who have developed COVID-19 applications that perform functions related to the collection of information from different organisations, including but is not limited to retail stores, offices and hospitals. "This, then make it easy for those entrusted with coordinating the COVID-19 relief and management to do contact tracing and come up with initiatives to prevent the spread of the disease," expounded Dr. Sebusang.

Dr. Sebusang further stressed that the platform will still be used beyond its current purpose to access information, provided one has been rightly granted access.

Dr. Sebusang also shared that BITRI has developed a digitally controlled mechanical ventilator prototype that can assist patients in need of respiratory support. The application of this ventilator is not only limited to COVID-19, but also to several other respiratory complications like pneumonia, asthma and bronchitis and may be used for patient management, should the need arise. "The ventilator is lightweight, consisting of a portable control unit and mechanism which can be carried effortlessly from place to place, making it ideal for emergency operations," expounded Dr. Sebusang. He said that BITRI is in consultation with Botswana Medicines Regulatory Authority (BoMRA) for assessment to determine if the device meets the set efficacy, quality and safety standards as per the mandate of the latter organisation. The other development is a splitter that would allow for use of a single ventilator by two patients. The viewers also got to appreciate a prototype of the plastic masks that can be cleaned and re-used by only changing the nanofibre filtering the viruses. These masks were developed in the BITRI 3D Printing Laboratory (Additive Manufacturing).

Prof Darkwa spoke to the contributions made by BITRI through the Natural Resources and Materials Department, including a nanofibre material with a Viral Filtration Efficiency (VFE) of >99.9%. The nanofiber material can be used to manufacture health/medical masks for medical practitioners and areas of outbreak of pandemics such as COVID-19 and has features that offer superior protection against viruses in comparison to other products available on the market.

Prof. Darkwa shared that BITRI has entered into an agreement with Eagle Medical Industries in Tlokweng to produce medical masks for a period of four months to assist in COVID-19 mitigation, with BITRI producing and supplying at least 300 metres of nanofibre membrane per week to Eagle Medical Industries; who will in turn produce 1000 masks per week. Prof Darkwa also informed stakeholders that before the outbreak of COVID-19, BITRI had already partnered with the University of Liverpool in tackling bacterial and viral epidemics through a project titled 'Tackling Infections to Benefit Africa' (TIBA). The project focuses on the use of genome sequencing to identify the genetic makeup of viruses that cause diseases and build epidemiological data which will help with transmission dynamics, evolution of the organism of interest (mutations etc.) and identifying index cases and building data on strains. The bulk of the work in this project, is based on the MinION, a sequencing device manufactured by Oxford Nanopore. The MinION is a pocket-sized device which applies nanopore sequencing technology to nucleic acid analyses, with far reaching applications including real-time bacterial metagenomic community analysis, subtyping, and long read scaffolding for whole genome sequencing of organisms, to name but a few. "The advantage of this device is that it is can be used in the field (outside the lab) and yields results in short turnaround times," enthused Prof. Darkwa.

Through the interaction during the Q&A sessions, viewers got the opportunity to ask pertinent questions related to the Mandate and scope of BITRI.

BITRI Produces 10 000 Litres of Hand Sanitiser for the COVID-19 Relief Effort

Botswana Institute for Technology Research and Innovation (BITRI) produced and donated 10 000 litres of hand sanitiser to the Government COVID-19 Relief Fund during a ceremony held at the Office of the President garden on June 11, 2020. BITRI repurposed its facilities and dedicated some of its Researchers for the purpose of producing the hand sanitisers. The Ministry of Tertiary Education, Research, Science and Technology and the De Beers Group donated funds towards procurement of raw material and containers for the production of the sanitisers.

The Chief Executive Officer of BITRI, Professor Shedden Masupe, highlighted that both BITRI and BIUST produced equal amounts of the sanitiser in order to expedite production in light of the urgent need to dispatch the products to those who need them now. "Both institutions prioritise institutional capacity and collaboration with other organizations and institutions. We are therefore grateful to have collaborated as leaders in the technology space locally, but also thankful to have collaborated with De Beers Group, another leader in the field of technology, over and above its role in the diamond industry," said Masupe.

Received by the Minister of Presidential Affairs and Public Administration Mr Kabo Morwaeng, the hand sanitisers will be distributed to those in need.

Minister Morwaeng commended the companies and individuals who donate towards the COVID-19 relief effort for embodying the values of Botho, Kagisano and Boipelego, adding, that he hoped that future generations will embody the same compassionate spirit and stay true to the values that Botswana was founded upon. A total of P936, 815.87 cash and goods worth over one (1) million Pula in-kind were donated by ten (10) entities during the ceremony.

BITRI Director – Research and Partnerships Dr Bathsheba Mbongwe, giving stakeholders an overview of the BITRI Mandate and the organisation's contribution towards the fight against the COVID-19 pandemic.

BITRI Director – Research and Partnerships Dr Bathsheba Mbongwe (far left), De Beers Group Chief Financial Officer Susanne Swanker-Tettey (2nd from left), and MOTE Deputy Permanent Secretary – Policy Development & Research Oupa Masesane (centre) handing over the donation. On hand to receive the donation were Minister of Mineral Resources, Green Technology & Energy Security Honourable Lefoko M. Moagi (second from right), and Minister of Presidential Affairs, Governance and Public Administration Honourable Kabo N. S. Morwaeng (right).

BITRI, University of Cambridge, Cambridge Enterprise, Universidade Lurio and University of Namibia Partnership **Winners of the PraxisAuril Knowledge Exchange (KE) Awards Team of the Year**

PRAXIS AURIL

The BITRI/Cambridge Partnership was awarded team of the year for their joint project on "Advancing the impact of University-generated knowledge in the Southern African Development Community (SADC) through Academia-Industry partnerships Initiative" during a KE Awards Digital Ceremony that was held on Wednesday 24 June. Dr Bathsheba Mbongwe and Dr Sara Serradas Duarte (Cambridge) represented the Team at the Digital Ceremony and further delivered a joint acceptance speech on behalf of the entire team.

The KE Awards celebrate the people who help to initiate and deliver impact and outcomes from publicly funded research through a diverse range of partners and activities. This celebration of knowledge exchange is more relevant than ever in 2020, as UK universities and research organisations mobilise quickly in response to the COVID-19 crisis. This has demonstrated the value of long-term investment in the research base and also in knowledge exchange.

BITRI and Cambridge had identified an opportunity, conceptualized and secured funding for the programme. Responding to the need of building R&D and technological capacity in the SADC region, this initiative defined Academia-Industry knowledge-exchange structures and practices that are conducive to local prosperity. The international knowledge-exchange team from the UK, Botswana, Mozambique and Namibia co-created and delivered the initiative – convening over fifty contributors from ten research institutions and seventeen actual SADC knowledge-exchange cases on aquaculture, agriculture, water treatment, conservation, climate change and tech and indigenous knowledge-based approaches to health. The project was sponsored by UK Global Challenges Research Fund.

Advancing such Academia-Industry ecosystems is also important for UK Higher Education Institutions (HEIs) seeking to deliver impact in these regions. As reviews of Newton Fund and GCRF grants note, failure to address innovation diffusion in ODA-target countries is a major obstacle to achieving the funding goals.

Introducing the BITRI Fleet Management System - Fleetell®

The BITRI Fleet Management System (FMS) supports the day to day management of organizational fleet, with the aim to reduce and minimize overall costs related to fleet mismanagement/misuse and optimize fleet management process efficiencies through proper fleet scheduling (usage & maintenance), implementation of fleet authorization levels, fleet tracking and condition monitoring.

Key features of FMS include the following:

Vehicle Inventory Management – FMS enables fleet managers to keep track of all information about their fleet including vehicle details, service history, usage, mileage and accident reports.

Vehicle Requests and Allocation Workflow – FMS allows staff to submit requests and transport officers to allocate vehicles after the necessary approvals have been made.

Live Vehicle Tracking – FMS includes GPS-based tracking capability which allows the system to show the location, direction and speed of a vehicle in real time, vehicle fuel consumption, notifications for vehicles going out of designated zones (geo-fencing), and notification for drivers/intruders fiddling/ removing tracker module. Data is transmitted from the tracking device to the system via cellular networks. Should the vehicle go out of network coverage, tracker module saves all data – the data would eventually be synchronized/uploaded into servers upon entering network coverage.

Key Usage Parameters Capture – With the appropriate tracking device installed in a vehicle, FMS can connect to the vehicle's onboard computer and gather key parameters such as mileage and fuel consumption. The data can then be used for analytics and reporting.
Alerting – The system can be configured to provide various alerts via email, SMS and instant web notification for reckless driving behaviour, over-speeding, fuel and maintenance events, geo-fencing, etc.

Reporting – FMS generates various reports such as location history, trips undertaken, vehicle users, frequency of usage

Product Benefits

1. It's an adaptable system implying that it is customizable to the client's requirements.

2. It allows end-users to receive real time communication from their fleet through an embedded tracker which complements the system.

3.In addition, this is a proprietary software which is offered exclusively to entities or individuals.

Licensing Options

1. Software as a Service (SaaS)- Subscription Based; and

2. Once off Purchase.

Target Market(s)
Government functions and entities including but not limited to, Councils, Land Boards, Parastatals, Tertiary Institutions, security forces, as well as enterprises in the private sector.

Contact us at communications@bitri.co.bw to book for a demonstration of the FMS, and get your company a solution that offers improved fleet management efficiencies, at competitive prices.

The BITRI Building Materials Science (BMS) Testing Laboratory

The BMS Testing Laboratory is located at West Campus, BCET (Botswana College of Engineering & Technology) in Gaborone, Botswana. Currently, the BMS Testing Laboratory boasts a Schedule of Accreditation as per ISO/IEC 17025: 2017, by SADCAS (Southern African Development Community Accreditation Services) for Compressive Strength (Concrete Masonry Units) and Tensile Strength (Metals); falling under Civil Engineering & Mechanical Engineering respectively.

The BMS Testing Laboratory's serves clients in the construction industry, Research & Development (R&D) institutions, academic institutions and the general public, in Botswana & the SADC region.

The BMS Testing Laboratory also has capability to test for the following:

- Abrasion Resistance
- Fineness (Blaine)
- Tensile Splitting (for pavers)
- Water Absorption (for masonry units)
- Water Retention (for mortars)

The BMS Testing Laboratory is currently developing capacity for Cement Testing, specifically:

- Setting Time
- Compressive Strength

It is the BMS Testing Laboratory's primary objective to expand the scope of the Schedule of Accreditation to include the above test methods, going forward.

For inquiries, please contact Mr. Tshiamo Ketlhoilwe using the contact details that follow:
Tel: (+267) 360 7528; Mobile: (+267) 7758 5445; Email: tketlhoilwe@bitri.co.bw

Triple Threat: COVID-19, Climate Impacts and Economic Downturn: Challenges and Opportunities to Food Sovereignty and Security in Botswana

Botswana Institute for Technology Research and Innovation Climate Change Lead Researcher Professor Nnyaladzi Batisani will lead a team of researchers to explore the combined long-term impacts of COVID- 19, climatic impacts and the looming economic downturn on horticultural food security and sovereignty in Botswana. The title of the research is "Triple Threat: COVID, Climate Impacts and Economic Downturn: Challenges and Opportunities to Food Sovereignty and Security in Botswana".

The research will investigate issues such as how COVID-19 affected sourcing of production inputs, demand and marketing of produce as well as relationships between producers and retailers. Other questions will include the challenges before COVID-19; were they magnified or lessened because of COVID? Is COVID-19, a chance for local producers to proof themselves? Spatial clustered farms, an opportunity for cooperative marketing? Synchronized cropping, a tool to consistent horticultural supply? The research will also look into the potential for integrating horticulture with; dairy, piggery, poultry, cattle stud breeding and meat processing because of the proximity of most horticultural projects to towns and major settlements.

The research team will collect data on farm location coordinates and size, current production by crop and cropping calendar, farm water resources, farm labour, production challenges, marketing channels and challenges as well as opportunities. Climate change and economic performance scenarios will be factored in as externalities. Data will be collected telephonically and online using farmer databases from farmers associations and extension workers across the country. Maps of horticultural production sites will be constructed from farm location coordinates.

TECHNOLOGY SOLUTIONS
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TECHNOLOGY

solutions that provide

SUSTAINABLE

Innovative Solutions

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