

ISSN: 1019-6404
VOLUME 77 NO. 1
DECEMBER 2015



THE ZIMBABWE ENGINEER





Adalet Fire Engineers

In Collaboration with Chubb Fire(SA)

Suppliers, Installers, Repairs, Service of Fire Extinguishers, Fire Alarm Systems, Fire Sprinkler Systems & Plumbing Both Domestic And Industrial Equipment

Your Safety, Our Priority



HARARE BRANCH

Tel: 04-759484/5
Cell: 0772 363 739/ 0712 596 327
Email: adaletfire@zol.co.zw
saleshre@adaletfire.com

BULAWAYO BRANCH

Cell: 0772 499 323
Hotline: 08644 077 045
Landline: 09 73304/5
Email: adaletfireengineers@gmail.com
salaesbyo@adaletfire.com

You Can Visit Us On:

www.adaletfire.com [Adalet Fire](#) [Engineers Adalet Fire Engineers](#)

Elroi Designs: 09-880334/ 0772 655 592

BOARD MEMBERS 2014-2016

256 Samora Machel Avenue East, Eastlea
P.O. Box 660 Harare
Tel 263 4 746821/746716 Telefax 746652
Email:zie@zie.co.zw;prisca@zie.co.zw
Membership: wilson@zie.co.zw;alice@zie.co.zw
www.zie.org.zw

President:

Kapumha Tendai Noah FZweE, Pr Eng

Deputy President

Rwodzi Israel FZweE, Pr. Eng

Vice President

Mavhiya-Bhiza Farai FZweE, Pr.Eng

Senior Vice President

Mhonde Godknows FZweE, Pr. Eng

Treasurer

Munhumutema Paipa GN FZweE, Pr. Eng

Deputy Treasurer

Masiyiwa-Chamisa Nancy MZweE, Pr.Eng

Immediate Past President

Tumbare Michael James Dr. FZweE, Pr. Eng

Chief Executive Officer

Diarra Sanzan Dr. FZweE, Pr. Eng

Corporate Board Members

Choto Bernard MZweE, Pr. Eng
Fende Lloyd Pararai FZweE, Pr Eng
Gudukeya Loice MZweE, Pr. Eng
Kwenda Ronald James FZweE, Pr. Eng
Ndiweni Bongile MZweE, Pr. Eng
Nhachi Betty FZweE, Pr. Eng
Zimwara Siba Chido MZweE, Pr. Eng

Area & Branch Chairpersons

Dube King Faso FZweE, Pr. Eng- Midlands
Goriwondo William FZweE, Pr. Eng- Matebeland
Mhuka Chamunorwa Brooke FZweE, Pr. Eng – Mashonaland
Ndiyamba Steven MZweE, Pr.Eng - Masvingo
Njunga J MZweE, Pr. Eng- Manicaland
Moahayi Wilson MZweE, Pr. Eng-Hwange
Marunga Anthony MZweE, Pr. Eng-ZIE South Africa
Mukahadira Edmond MZweE-Kariba

Technician Member

Waniwa Veronica Pr.TechEng

Graduate Member

Nyakutsikwa Beverly GZweE

Student Member

Shoniwa Kundai

Women in Engineering Representative

Mavhiya-Bhiza Farai FZweE, Pr.Eng

National University of Science and Technology Representative

Dlodlo Zwelibanzi Brian Dr. FZweE, Pr. Eng

SIRDC Representative

Gweme Fred FZweE, Pr. Eng

Harare Institute of Technology Representative

Manyuchi Mercy Musaida Dr. MZweE, Pr. Eng

University of Zimbabwe Representative

Makurira Hudson Dr. MZweE, Pr.Eng

Chinhoyi University of Technology Representative

Manyumbu Edson MZweE, Pr.Eng



CONTENTS

CEO'S DESK	2
UNESCO AFRICA ENGINEERING WEEK 2015	4
MEET THE ZIE STANDING EXECUTIVE COMMITTEE	26

The Zimbabwe Engineer is an official magazine of the Zimbabwe Institution of Engineers
256 Samora Machel Avenue East, Eastlea
P.O. Box 660 Harare
Tel 263 4 746821/746716 Telefax 746652
Email:zie@zie.co.zw;prisca@zie.co.zw
Membership: wilson@zie.co.zw;alice@zie.co.zw
www.zie.org.zw

ZIE EDITORIAL SUB-COMMITTEE

Dr. Hodson Makurira (Chief Editor), Prof. Godfrey Dzinomwa, Dr Farai Karonga, Dr. Mercy Manyuchi, Dr. Z.B Dlodlo, Prof. Innocent Nhapi, Prof Charles Mbohwa, Dr. Edward Dintwa, Wilson Banda (Secretariat)

Published by:

436 Ettington Road, Greystone Park, Harare, Zimbabwe
Tel: +263 4 861811 / 08644078900

Layout and Design: Wizdom Tayengwa
(wizdomtay@gmail.com)





Welcome you all to the November 2015 issue of the Magazine.

The major event of this year has been the UNESCO Africa Engineering Week which was the combination of the induction of over 300 school children to Science, Technology, Engineering and Mathematics (STEM), the 8th ZIE Biennial Congress, the World Council of Civil Engineering (WCCE) General Assembly and the ECZ Workshop on Anticorruption and Transparency.

The UNESCO Africa Engineering Week was jointly organized by UNESCO, the Engineering Council of Zimbabwe and the Zimbabwe Institution of Engineers. The Event which gathered together over 350 national, regional and international delegates, took place in Victoria Falls from 14 to 19 September 2015 at the Elephant Hills Resort. ZIE Biennial Congress witnessed presentations of over 35 quality papers on topics ranging from core engineering, general sciences to sustainable infrastructure development for the socio-economic advancement of humankind in general.

The 2015 edition of the National Engineering Students Awards Competition (NESAC) took place on 30 October at the Harare Institute of Technology. The overall winning project was: "Production of virgin paper from bagasse as a value addition strategy" By Auxilliah T. Chiwanga from Harare Institute of Technology who won The Eng. Paul Kodzwa Floating Trophy for 2015 and Miniature Trophy which remains forever in the possession of Auxilliah and a \$1000 cash prize.

Accreditation Board

The ECZ based and coordinated Board of Accreditation for Universities and Polytechnics Engineering Programmes has now been put in place. The Committee is chaired by Eng. D. Mareya. In essence, the terms of reference of the Accreditation Board are as follows:

- Develop accreditation standards for approval by the ECZ.
- Assess engineering education providers and programmes of study (for both Universities and Polytechnics) to determine whether they meet the approved accreditation standards, and
- Make recommendations and give advice to the ECZ about accreditation functions and associated issues.

Nominations and Elections of new Board

The term of office of the current Board, with the exception of the Executive Committee members expires on 31 March 2016. In terms of Section 25 sub-section 1 of the Institution's Statutory Instrument 1987, calls for nominations to the ZIE Board have been sent out and the deadline for nominations is 15 January 2016. Only members who are up to-date with the payment of their subscriptions for 2015 qualify to nominate, to be nominated and to vote for membership to the Board of the Institution. In terms of Section 23 of the Statutory Instrument, students cannot vote.

Subscription fees and professional licensing for 2016

As 2015 ends, I would like to remind members, both individuals and affiliate firms to plan for the payment of their 2016 subscriptions fees. They are a pre-requisite to the professional licensing and in addition, all Professional Engineers and Professional Engineering Technicians are required to fill-up their Continuous Professional Development Points (CPD) logs for onward transmission to the Engineering Council of Zimbabwe latest by 31 December 2015. Kindly check your mail box for a downloadable copy of the log sheets. Meanwhile efforts are being made to upload the same onto the ZIE website for your convenience in due course. Your up to date subscriptions and your completed continued professional development (CPD) log sheets will enable you to be considered for the Engineering Council of Zimbabwe licensing for 2015.

ZIE offices will remain open throughout the holiday's period in December 2015 and early January 2016.

On a parting shot some food for thoughts:

In order to be counted, do not play it safe!

No one has ever achieved greatness by playing it safe. And ironically, in this very rapidly changing world, playing it safe is one of the riskiest things you can do. To get back on track means being brave and fearless, because playing it safe is deciding you don't want to grow anymore.

I wish you all good health and a prosperous life during the course of the New Year 2016.

Dr S. Diarra
Chief Executive Officer



Promoting value and growth

INFORMAL TENDER INVITATION

1. SCOPE OF SERVICES REQUIRED

ZERA is inviting bids from reputable service providers for the provision of the following;

Tender No	Description	Qty	Closing Date
ZERA INF 12/2015	Solar PV system design and installation training	1	31 December 2015

2. DETAILS OF BIDDING DOCUMENTS

The bidding documents may be obtained by interested service providers upon payment of a non-refundable tender fee of **\$10.00** at the ZERA Accounts Office, 14th Floor Century Towers 45 Samora Machel Avenue, Harare.

3. SUBMISSION OF TENDER DOCUMENTS

Bids documents must be submitted in sealed envelopes and endorsed on the outside with the advertised tender number, the description of tender, the closing date and must be posted in time to be sorted into Post Office Box CY 308 Causeway Harare or hand delivered to The Commercial Director, 14th Floor, Century Towers, 45 Samora Machel Avenue, Harare on or before 10:00hrs on the closing date.

Contact Phones: +263 4 780 010, 772 550, 799 796, 253 461, 799 797

Fax: +263 4250 696

Email: admin@zera.co.zw

www.zera.co.zw

UNESCO AFRICA ENGINEERING WEEK 2015



Eng. Marwan Abdelmahid
WFEO PRESIDENT

AEW MESSAGE FROM THE WFEO PRESIDENT

WFEO is honoured to be partners for the UNESCO Africa Engineering Week Initiative, an Initiative lead by UNESCO and the WFEO Capacity Building Committee. WFEO is privileged to have two WFEO Standing committees hosted by African Countries, which are The Engineering Capacity Building Committee hosted by the Engineering Council of South Africa, and the Ethics and Transparency Committee hosted by the Engineering Council of Zimbabwe. These committees have done sterling work in furthering the goals of the Engineering profession, and we acknowledge and commend the efforts that they are doing in collaboration with partners in Africa, and the World.

This year we would also like to endorse a new initiative, The Africa Engineering Alliance, which intends to bring together partners throughout Africa, to support and drive capacity building projects, using mainly resources from the African continent. This would indeed form part of the solution to support the goals for Infrastructure Development within Africa, by ensuring that we work together to build a pipeline of Engineering Professionals of a world class standard.

WFEO has also been instrumental in establishing a web based platform, The Compendium, to share Capacity Building knowledge and tools. In addition WFEO has developed the Africa Catalyst, a capacity building project, which intends to focus on building institutional capacity to improve Engineering Education and promote professionalization. More detailed work of our two committees and the aforementioned projects will be addressed during the course of this conference by the committee Chairs Engineer Martin Manuhwa, and Engineer Yashin Brijmohan.

GRATITUDE EXPRESSION

The ZIE Board, President, Members and Secretariat would like to express sincere indebtedness to all delegates who graced the ZIE and ECZ hosted Africa Engineering Week Conference held in Victoria Falls from the 14th to 19th September 2015. May the Almighty God bless you all in all your endeavors. Keep on keeping on and be goal driven to leave a legacy for the younger generation. Profound gratitude goes to all the event's corporate sponsors. You certainly made the hosting of the once-in-lifetime event a success.

AEW MESSAGE FROM UNESCO



Prof. Hubert Gijzen
UNESCO Regional Director

The second Africa Engineering Week, held in Victoria Falls, Zimbabwe from 15 to 19 September, comes at a critical juncture, as we advance towards the target date for the Millennium Development Goals, as we shape a new global development agenda to follow 2015.

Later this Month, the UN General Assembly in New York, will adopt the draft outcome document on the post- 2015 development agenda entitled: “Transforming Our World: The 2030 Agenda for Global Action”. Agenda 2030 presents a universal agenda, for all countries, which emphasizes the need for transformational shifts to achieve the dual objective of poverty eradication and sustainable development. Such transformational shifts will be needed in a number of sectors, such as energy, food production, water management, sustainable cities, and others. These transformational shifts, however, will not happen by themselves - we need to ‘engineer’ the road towards a sustainable future.

In doing so, we need more engineering, and we need more engineers. The shortage of engineers is a major concern in Africa and across the world where there has been declining interest and enrolment of young people, especially women. Engineering is vital in addressing basic human needs, improving the quality of life and creating opportunities for sustainable prosperity on a local, regional, national and global level. More young people need to take up engineering careers and making that choice depends on access to the necessary science, technology, engineering and mathematics (STEM) curriculum as well as having access to effective guidance, communications and role models.

Addressing sustainable development within current climate change challenges will require innovative engineering and technology-based solutions. Engineering capacity and competence building activities are critical to ensure an adequate supply of engineers to work on these global challenges. Such activities are particularly important in Africa, where the per capita number of engineering professionals is lower than in other regions. Given this engineering deficit, activities that promote awareness of engineering as a career as well as show how youth studying science, technology, engineering and mathematics (STEM) can become part of the solution have high priority. To increase engineering capacity in Africa, UNESCO, in cooperation with our partners, established the Africa Engineering Week.

Almost all of the 17 proposed Sustainable Development Goals under Agenda 2030 (SDGs) relate to engineering. With the creation of the SDGs, engineers will need to play a decisive role in their success. The activities during Africa Engineering Week will increase the visibility of engineering as a discipline; it will strengthen the position of engineering in Africa; it will raise awareness on the importance of engineering, science and technology for the successful implementation of the Agenda 2030. As such the Africa Engineering Week fulfills an important advocacy role towards attracting younger generations to engineering to achieve a much higher goal, which is to ensure that transformational change, inclusive economic empowerment, peace and sustainable development, will characterise Africa’s further development towards the future we want for all people in Africa.



**AEW 2015 FOREWORD
FROM THE CHAIRMAN OF
ENGINEERING COUNCIL
OF ZIMBABWE (ECZ):
Eng. MARTIN MANUHWA**

My distinguished colleagues, On behalf of the organizing committee, and indeed the Engineering Council of Zimbabwe (ECZ) and all its partners, it gives me great pleasure to welcome you all to the 2015 UNESCO Africa Engineering Week (AEW) taking place at the majestic Victoria Falls in Zimbabwe from the 14th to the 19th of September 2015. This year's event is particularly memorable for its variety of special activities, which include the World Council of Civil Engineers General Assembly, Zimbabwe Institution of Engineers (ZIE) Congress and the ECZ and

World Federation of Engineering Organisations (WFEO) Anti-Corruption Workshop.

The aim of the Africa Engineering Week is to create a strong engineering community in Africa with robust links between Government, Industry and Academia. Engineering is pivotal to economic development and social well-being of all nations. As the World adopts the Sustainable Development Goals this year, it is more prudent to encourage students to study engineering by "supplementing Science, Technology, Engineering and Mathematics curriculum with practical engineering applications, and to incite more African countries to participate ensuring the sustainability of these efforts." School children will be exposed to career guidance and mentoring by seasoned engineering practitioners. AEW VIP Delegates: Eng. Martin Manuhwa (3rd of front row) flanked by Prof. Jonathan Moyo and Honourable Vice -President E. D. Mnangagwa

The visibility of engineering must be enhanced further by encouraging African Governments to support research and training opportunities for the next generation of engineers that will deliver innovative solutions to society's problems. The knowledge exchanged will be of the highest quality and of strategic and high technical level to offer you the unique opportunity to meet local and international experts to discuss engineering developments in infrastructure delivery. This year's theme "Engineering innovation for accelerated infrastructure development

for Africa" is a clarion call for Africa to leap frog in its infrastructure delivery so as to solve the challenges we are facing as a continent. It is our view that the critical decisions being made on infrastructure investment require suitable professional advice, as early as possible and taking into account the full cycle of the infrastructure asset. There is now a greater expectation to do more with less; to be more creative and innovative; to maximise the solutions available; to offer SMART infrastructure that is more responsive to the needs of society.

We believe that a quick turnaround for Africa's development agenda can be achieved through investment into infrastructure, building and construction industries. There is immediate benefit to the economy at both national and individual levels. Our perspective is that the reconstruction and development process in Zimbabwe should be integrally linked to the reconstruction and development of the economy. We see the Africa Engineering Week as a rare opportunity for all stakeholders in Africa to recommit to a vision of a transformed industry contributing towards the realization of national social and economic goals.

While thanking UNESCO and the World Federation of Engineering Organisations for giving Zimbabwe an opportunity to host this year's event, I wish all the delegates the best during this very crucial second edition of the Africa Engineering Week.





UNESCO AFRICA ENGINEERING WEEK

**Eng. Tendai NH Kapumha
ZIE PRESIDENT**

It is my great honour to welcome you to the second UNESCO Engineering Week in Africa in the resort town of Victoria Falls. I believe we have chosen a venue that guarantees a successful technical conference amid the culture and scenery of Zimbabwe. Our technical program is rich and varied with keynote speech from highest levels at political, professional levels, with around 140 technical papers in plenary sessions and between 3 parallel oral sessions. Besides, there are alternative activities for spouses and other visitors and delegates. We also expect to provide technical demonstrations, and numerous opportunities for informal networking.

The UNESCO AFRICA ENGINEERING WEEK will feature research talks, industry presentations, panels, tutorials, demonstrations, and workshops. It will also have the participation not only of practising professionals but also school children who will have the foretaste of the profession as they would share in all sessions. It will also provide an opportunity for networking and socializing. This conference has a multidisciplinary focus. I was delighted to learn that almost 400 delegates are in attendance from countries in Africa and globally.

This is a great opportunity to hear about the work being done by the local professional body, the Zimbabwe Insti-

tution of Engineers, the ECZ and local Companies, Universities and research Institutions. If you do not belong to either organization, we welcome you to join us and learn about the benefits of becoming a member of the Zimbabwe Institution of Engineers and the rationale for being a registered professional engineer or technician. By attending the conference, you will become a part of the regional engineering practitioner history and help create a vision for engineering practitioners of the future. Despite the difficult economic situation and the dramatic events of March 2015, we received a large number of high quality contributions from around the world. Our involvement in all key infrastructure elements for the revival and sustenance of the economy as we provide expertise in energy, water, roads, rail, air transport, waste water, environmental aspects, housing, mining and mineral processing amongst many. Now more than ever we must approach new infrastructure projects with resilience in mind.

I know that the success of the conference depends ultimately on the many people who have worked with us in planning and organizing both the technical program and supporting social arrangements. In particular, we thank the Planning Committee and its Chair Eng Israel Rwodzi for their wise advice and brilliant suggestion on organizing the technical program; the Editorial Committee for their thorough and timely reviewing of the papers, and our sponsors who have helped us to keep down the costs of the UNESCO Africa Engineering Week for all participants. Recognition should go to the Local Area Committee members who have all worked extremely hard for the details of important aspects of the conference programs and social activities. We look forward to a historic UNESCO AFRICA Engineering week in Victoria Falls.

ZIMBABWE ANNUAL BRIDGE BUILDING COMPETITION

The ZIE BBC was held again this year. Lafarge Cement (Pvt. Ltd) was the major sponsor for the ZIE National BBC and AECOM (a South African engineering consultancy firm) has again retained the naming-rights in major sponsorship for the international competition. The international competition was held at the Sandton Convention Centre in Johannesburg on Friday 28 August 2015. Zimbabwe was proudly represented by St. John's College of Harare at the SAICE convened international competition. St Johns College came 5th out of 19 participating schools. The best bridge managed to sustain 155kg. St. John's bridge carried a load of 72kg. This comes against a background of a model bridge St. John's College designed and constructed on Saturday 1 August 2015 that managed to carry a load of 101.18kg. The second best bridge was that of Zimuto High School of Masvingo that gave-in at a load of 48.18 kg. Nyamhunga High School's bridge came third with a breaking-load of 38.18 kg. Below is a photo of St. John's college model bridge and that of the Team Zimbabwe at work represented by Daniel Pascoe, Muhammed Valera and Rukudzo Nyakanda. The team went on to showcase their prowess at the UNESCO AEW Conference held in Victoria Falls. They battled it out with Gebhuza High School of Hwange and Mosi-oa-Tunya of Victoria Falls.



COMBINED RESOLUTIONS OF UNESCO AFRICA ENGINEERING WEEK AND ZIE 8TH BIENNIAL CONGRESS

RESOLUTION 1

To form the African Engineering Alliance which will be aligned to the African Engineering Community and in collaboration with relevant Government Ministries.

That in the interim until the operationalisation of the African Engineering Alliance, the UNESCO AEW to be spearheaded by the WFEO Capacity Building Committee in collaboration with the WFEO Ethics and Transparency Committee and in consultation with FAEO and its regions.

RESOLUTION 2

To host one UNESCO Africa Engineering Week annually, the host for which will be chosen through a rigorous bidding process involving UNESCO, the Africa Engineering Alliance, FAEO and WFEO through the Capacity Building Committee.

RESOLUTION 3

Realizing that Science, Technology, Engineering, Art, Mathematics and Innovation (STEAMI) provide the essential means for facilitating economic, social and cultural transformations at national and global levels and that success of national development policies will often largely depend on the extent of integration of modern Science, Engineering and Technology in their implementation.

The delegates, therefore, resolved that African Governments should endeavour to foster policies that promote STEAMI in order to engender the creation of well engineered and sustainable infrastructure that will deliver the SDGs through Agenda 2030 for a productive and stable society in Africa.

RESOLUTION 4

African Governments to deliberately create quotas for local engineering professionals who will carry-out engineering works where capacity exist, through structured Joint Ventures (JVs) with foreign expertise.

RESOLUTION 5

The UNESCO Africa Engineering Week delegates noted that policy makers often use political decisions to solve technical problems due to the lack of Engineers and Technicians in policy making positions in Africa. Delegates also realize that countries like China and Brazil have a large percentage of engineering technocrats in their Governments and have leveraged these skills to spearhead tremendous development in their countries.

They therefore resolved that Governments must facilitate the inclusion of engineering professionals in policy making decisions, as Board members and technocrats advisors to their Governments via their Professional Bodies and Engineering Councils.

RESOLUTION 6

Observing that Engineers play a critical role in fueling the global economy and that industry needs highly educated, entrepreneurial engineers to ensure innovation and technological leadership.

The delegates therefore resolved that African industries need a new breed of engineer: technically broad, commercially savvy and globally adept with soft skills and entrepreneurial capabilities.

Governments and Industries to facilitate the Development and commercialization of excellent engineering research outputs.

RESOLUTION 7

NOTING the need to develop regional centres of excellence and hubs for a strategic critical mass in Accreditation development to facilitate Mobility of Engineers in Africa which will lead to sharing of known effective models within/ across sectors and nations.

It was resolved that Regional Accreditation for engineering academic programmes be initiated and carried out in Africa along the lines of IEA to foster easier mobility of engineering professionals. This will be done via FAEO regional structures and the Africa Engineering Alliance.

RESOLUTION 8

To institute mandatory Registration and Licensing of all Engineering Firms and individuals (Contractors, Consultants or Industrial Companies with engineering components) by Engineering Councils.

All Engineers and Technicians practicing in AFRICA should be regulated by Engineering Councils where they exist and these should be created if absent. Foreign Firms and their employees should be bound by law to register and be granted the practicing certificates before commencing any work in any African country.

The Title Professional Engineer (Pr. Eng) or Pr. Eng. Tech should be protected by law and used only by competent licenced and registered engineering professionals.

RESOLUTION 9

Resolution to carryout the Needs and Numbers Assessment and Infrastructure Development Score-Card Study Project to be done by the Engineering Councils with support from SAFEQ/FAEO/WFEO and African Governments.

Phase I: Needs and Numbers: This study will determine the adequate numbers of engineering professionals needed to meet the current and future National Development Goals.

Phase II: Scorecard Report: Assess the state of the Infrastructure at present and what must be done to make it world class. Future infrastructure requirements and costs of building the infrastructure will also be availed to policy makers.

RESOLUTION 10

- It was observed that the number of female engineers and young engineers is still low in Africa.
- It was therefore resolved that each country should create a Women in Engineering Division and a Young Engineers & Future Leaders Chapter.
- It was further resolved that governments, industry and professional bodies should promote the girl child to take up STEAMI subjects

UNESCO Africa Engineering Week Conceptualisation

The inaugural UNESCO Engineering Week in Africa was held in South Africa at the University of Johannesburg. The second edition will take place from 14 to 19 September 2015 at Victoria Falls, Elephant Hills Resort, Zimbabwe. During this week students in schools across Africa will participate in educational activities to get a clearer view on what engineering is; they will be introduced to interesting career paths in engineering and they will be involved in hands-on activities.

Background

Addressing sustainable development within current climate change challenges will require innovative engineering and technology-based solutions. Engineering capacity and competence building activities are critical to ensure an adequate supply of engineers to work on these global challenges. Such activities are particularly important in Africa, where the per capita number of engineering professionals is lower than in other regions. Given this engineering deficit, activities that promote awareness of engineering as a career as well as show how youth studying science, technology, engineering and mathematics (STEM) can become part of the solution have high priority. To increase engineering capacity in Africa, the UNESCO Engineering Initiative (UEI) in cooperation with our partner Intel Corporation would like to establish an Africa Engineering Week which will be owned by Africans.

Many countries, including the United States, Canada, Australia, UK, and Ireland currently hold national engineering weeks, which have been very successful in promoting awareness of engineering as a career among students as well as demonstrating the need for engineering to achieve sustainable development through the three pillars: social, economic, and environmental. Activities that celebrate engineering as well as educational programs that encourage students to pursue engineering studies are held during this week. In both the United States and Ireland, Engineering Family Days give families the opportunity to see engineering in action through demonstrations and hands-on activities, such as water rockets, LEGO robots, and solar orbiter heat shields. In addition, the UK and Australia have created engineering activity packs, which feature downloadable activities, such as construction of a solar cooker or a straw bridge, to facilitate engineering discovery for primary and secondary students during this week.

The activities during Africa Engineering Week will increase the visibility of engineering, which is particularly important in the continent where there is a great need for engineers to achieve the Millennium Development Goals (MDGs) and the Sustainable Development Goals (SDGs).

Africa Engineering Week

The UNESCO Africa Engineering Week is planned to take place in Victoria Falls, Zimbabwe.

- An engineering Congress organized by the Zimbabwe Institution of Engineers
- A Workshop on Infrastructure and Corruption Prevention by the Engineering Council of Zimbabwe, WFEO Ethics and Transparency Committee, WFEO Capacity Building Committee and FAEO and SAFE0
- Industry Cluster displays led by the Ministry of Higher and Tertiary Education, Science and Technology Development (National Manpower

Development Committee and Zimbabwe Manpower Development Fund)

- Educational activities, such as constructing a solar cooker or a straw bridge, which can be incorporated in the science curriculum of primary and secondary school students
- Public awareness events, such as Family Fun Day, where families can learn about engineering through hands-on activities and demonstrations (LEGO robots, water rockets, etc.), hosted by local engineering chapters and national organizations
- Mentoring events, such as Introduce a Girl to Engineering Day, where professional engineers come to schools to talk about practical applications of STEM
- University activities and events, such as lectures in conjunction with university students to highlight the engineering faculties and university “open days” to introduce youth to undergraduate and postgraduate studies of engineering.

Objectives

The aim is to increase the visibility of engineering and its role in sustainable development, to encourage students to study engineering by supplementing STEM curriculum with practical engineering applications, and to incite more African countries to participate ensuring the sustainability of these efforts. The activities during Africa Engineering Week will increase the visibility of engineering, which is particularly important in the continent where there is a great need for engineers to achieve the Millennium Development Goals (MDGs) and the Sustainable Development Goals (SDGs).

Students in some schools in Africa will participate in educational activities, for example Kano kits containing a Raspberry Pi single-board computer will be distributed among the schools so students get familiar with the study field of computer science.

The Africa Engineering Ceremony will be hosted by Engineering Council of Zimbabwe (ECZ) in collaboration with the Zimbabwe Institution of Engineers (ZIE). The Ceremony will take place at the majestic Victoria Falls Elephant Hills resort and a week of exciting hands-on activities is planned.

Sub-Themes

- Africa Engineering Reports,
- Building Capacity in Science and Engineering,
- Science for a Sustainable Future,
- Building Capacity in Science and Engineering,
- Science for a Sustainable Future

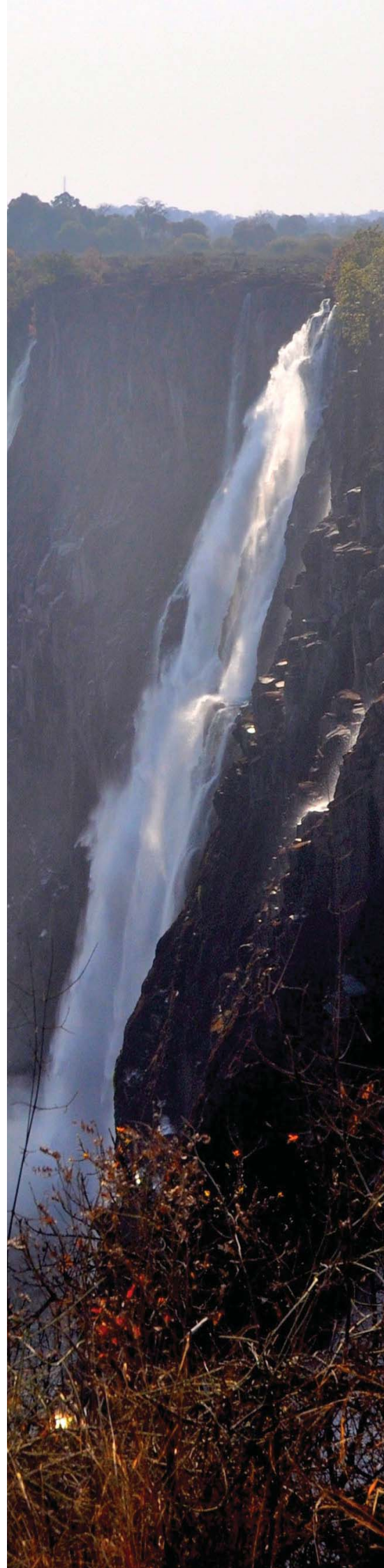
Overview of Activities

Educational Activities

- Use downloadable teacher guidelines and student materials, developed by Engineers Australia, to conduct hands-on activities with primary and middle year’s students (<http://www.engquest.org.au/index.cfm>)
- Construct a solar cooker
- Construct a newspaper dome
- Construct a straw bridge
- Quizzes and animations associated with projects
- o Use downloadable engineering activity packs, developed by

Engineering UK, to conduct hands-on activities with secondary school students (<http://www.britishtscienceassociation.org/get-engineering>)

- Make a water filtration device
- Construct a self-propelled helicopter
- Construct a prototype assembly line



• Engineering career resources

Public Awareness Events

o Organize Engineering Family Day, similar to Discover Engineering Family Day in the United States (<http://www.engineeringfamilyday.org>) or Family Fun Day in Ireland (<http://www.engineersweek.ie/events-2013/>) with:

- Interactive children’s workshops
- Engineering in action demonstrations, such as underwater periscope, heat shields for solar orbiter, or a robotic arm

Mentoring Activities

o Organize School Visits, where professional engineers visit primary and secondary school students and talk about practical applications of STEM

o Organize mentoring activities for girls, similar to the South African Women in Engineering (SAWomEng) GirlEng program (<http://girleng.sawomeng.org.za/>). This program was started in South Africa, but is now growing to Namibia and Kenya and soon to other countries in Africa. The aims are to facilitate interactions between girls and engineering professionals by:

- Talking to a class of high school girls about engineering careers
- Inviting a group of girls to your company or lab for a tour
- Organizing a job shadow day for middle and high school girls

Among the activities listed above, some will be implemented during the Africa Engineering Week in Zimbabwe, while others will be carried out in the rest of the African countries across the continent.

Do you want to monitor and control...

- Flow in steam, liquids, gases, slurries and solids ?



- Level in tanks, silos for liquids or solids ?

- Pressure in vacuum, differential or gauge applications ?



- Temperature?

- pH, ORP, dissolved oxygen, turbidity, conductivity, COD, BOD or similar?



Adderley
Since 1994

Website : www.adderleyafrica.com
e-mail : adderley@iwayafrica.co.zw

Telephone : +263 4 495595
Mobile : +263 712 800905

UNESCO AFRICA ENGINEERING WEEK TOPICS COVERED

Date: 14 – 19 September 2015

Venue: Elephant Hills Hotel, Victoria Falls

THEME: Engineering Innovation for Accelerated Infrastructure
Development for Africa, Post 2015

OPENING AND READING OF CREDO OF THE AFRICAN ENGINEER: Eng. I. Rwodzi : Co-ordinator AEW

WELCOME REMARKS: Hosting Engineering Council-Eng M. Manuhwa : Engineering Council
of Zimbabwe Chairman & WFEO Vice President

WELCOME REMARKS FROM THE HOST CITY: Mayor of Victoria Falls His Worship – Councilor Sifiso Mpofu

UNESCO KEY NOTE ADDRESS: Engineering the Future for Sustainable Development: Dr. Hubert Gijzen,
Regional director and Representative , UNESCO Regional Office for Southern Africa

WCCE ADDRESS-WCCE PRESIDENT: Dr Tomas Sancho

WFEO ADDRESS: WFEO President – Marwan Abdelhamid

FAEO ADDRESS: FAEO President – Eng. Mustafa Shehu

SAFE0 ADDRESS: SAFE0 President – Dr. Ignasio Ngoma

UNESCO ENGINEERING AND PROJECTS IN AFRICA: Rovani Sigamoney, UNESCO

INTEL AND ITS ROLE IN AFRICA: Mr. Thabani Khupe

INSTITUTION OF CIVIL ENGINEERS (ICE) UK AND PROJECTS IN AFRICA DELIVERY: Eng. Peter Morris

THE STATUS OF WOMEN IN ENGINEERING IN SADC: Hema Vallabh - Women Engineer (SA) Co-founder
Technical Women Program report back-Berverly Nyakutsikwa (GZweIE)

LAUNCH OF THE ZIE WOMEN IN ENGINEERING (WIE) DIVISION: Eng. Farai Mavhiya-Bhiza

OUTCOMES OF THE AFRICA COMMUNITY ACCESS PROGRAMME: Eng. Nkululeko Leta

RENEWABLE ENERGY: the future of Africa-Eng. Gloria Magombo

LAUNCH OF THE ZIE CHEMICAL ENGINEERING DIVISION: (CED)-DR. Diarra

ETHICS AND CORRUPTION PREVENTION IN INFRASTRUCTURE PROJECTS: Dr. Emilio Colon – Past President
WCCE

ANTI-BRIBERY MANAGEMENT SYSTEMS STANDARDS (BS 10500 AND ISO 37001):

Eng. Martin Manuhwa – Vice President WFEO and WCCE Chair for Capacity Building

ANT-CORRUPTION MEASURES IN CONSTRUCTION PROJECTS: Mr. P. Chakanyuka

PROGRAMMES FOR INFRASTRUCTURE DEVELOPMENT IN AFRICA: Dr. M. Van Veleen

INNOVATIVE ENGINEERING PRACTICES IN INFRASTRUCTURE-ENG. M. MANUHWA: WFEO Vice President and
Ethics and Transparency Committee

WFEO CAPACITY BUILDING COMMITTEE: Launch of the Africa Engineering Alliance under the auspices
of UNESCO-Eng. Yashin Brigmohan : WFEO Vice President and Chair for Capacity Building Committee

THE ZIMBABWE MANPOWER DEVELOPMENT FUND 'S ROLE IN INNOVATIVE INFRASTRUCTURE DELIVERY:
Mr. F. Mandizvidza –ZIMDEF CEO

**NATIONAL HUMAN CAPITAL REQUIREMENTS FOR THE ACCELERATED INFRASTRUCTURE DEVELOPMENT
AND MAINTENANCE TO MEET ZIM-ASSET REQUIREMENTS AND BEYOND:**

Commissioner Tendai Bare – NAMACO Chairperson

ADDRESS BY THE MINISTER OF HIGHER AND TERTIARY EDUCATION, SCIENCE AND TECHNOLOGY

DEVELOPMENT ADDRESS: Hon. Prof. Jonathan Moyo (MP)

ADDRESS BY THE MINISTER OF LOCAL GOVERNMENT, PUBLIC WORKS AND NATIONAL HOUSING ADDRESS:

Honourable Saviour Kasukuwere

KEY NOTE ADDRESS: Guest of Honour-Honorable Vice-President E. D. Mnangagwa

(Standing in for His Excellency- President Robert Mugabe)

GLOBAL PERSPECTIVES ON INNOVATION IN WATER: Mr. Justin Abbott -Director: Arup UK

FOOD TECHNOLOGY CONCEPTUALISATION: Dr. E. M. Khosa ZERA Board Chairperson

THE STATE OF RAILWAY INFRASTRUCTURE IN ZIMBABWE: Eng. Makamache

WATER COMPETITION (HIGH SCHOOL STUDENTS): Mzilikazi High School (Bulawayo)

BRIDGE BUILDING COMPETITION: St. Johns College (Harare);Gebhuza High School (Hwange) and Mosi oa Tunya High School (Victoria Falls)ZIE BBC Committee

WELCOME REMARKS BY ZIE PRESIDENT: Eng.T.N.H. Kapumba

DESIGN AND DEVELOPMENT OF AN ANAEROBIC BIO-DIGESTER FOR APPLICATION IN SEWAGE SLUDGE DIGESTION FOR BIOGAS AND BIO-SOLIDS GENERATION USING ACTI-ZYME AS BIO-CATALYST: M. M. Manyuchi

R. L. Marisa, D. I. O. Ikhu-Omoregbe and O. O. Oyekola

ECONOMIC FEASIBILITY FOR A PLANT TO CAPTURE 8TPD METHANE GAS FROM SEWAGE SLUDGE FOR THE PRODUCTION OF ELECTRICITY: T. Patsanza and M.M. Manyuchi

TOWARDS KNOWLEDGE-BASED INDUSTRY IN THE ZIMBABWEAN ECONOMY: A CASE STUDY OF ENGINEERING, PROCUREMENT AND CONSTRUCTION MANAGEMENT (EPCM) SERVICES:

B. Mahomva and W.M. Goriwondo

COMPARISON OF THE FIDIC CONTRACTS WITH THE ZIMBABWE GENERAL CONDITIONS OF CONTRACT:

P. Morris

DEVELOPMENT OF AN ASSET MANAGEMENT TOOL FOR A POWER PLANT: L. Masiyazi, T.Garikayi and

G. Kwinjo

DESIGN AND AUTOMATION OF A COMBINED FURNACE TOP-HOLE DRILLING MACHINE AND

SEALING MUD GUN: P. Mlambo, H. Musaidzi, N. Mabasa, and H.N. Dera

MINERAL BENEFICIATION AND VALUE ADDITION IN ZIMBABWE: Does Zimbabwe have the capacity?

N.N. Masiyiwa Chamisa, Maggie Vera Nzuma

THE ROLE OF ZINARA IN INFRASTRUCTURE DEVELOPMENT: Mr. Albert Mugabe (ZINARA Board Chairman)

DEVELOPMENT OF A WEB-BASED WORKSHOP MONITORING SYSTEM: D. Museka, L. Masiyazi,

G. Nyakujara and M. Dzanya

DEVELOPMENT OF A SOIL NUTRIENT AND MOISTURE CONDITION MONITORING SYSTEM USING FUZZY

LOGIC: M. Chikuruwo, T Zvawashe, T Mhere, P. Mupfumira, M. Dzanya

POWER CABLE THEFT DETECTION: R.P. Hita, R. Gonye and B. Mtunzi

DESIGN OF AN AUTOMATED EGG SEATER SUITABLE FOR A LOW COST CABINET EGG INCUBATOR: Chirinda N, Kanhukamwe QC, Mangaliso B, Chiwanza M.

DEVELOPMENT OF A PERFORMANCE MONITORING SOFTWARE FOR A THERMAL POWER PLANT

IN ZIMBABWE: K. Masaire, W. Tumbudzuku, S. Mhlanga, B. Sarema and D. Zimwara

DESIGN AND DEVELOPMENT OF A FOOD WASTE PELLETIZER: R. Masike, W. Mutenhabundo and

R. Muchadenyika

OPTIMIZATION OF LINT FIBRE CLEANING BASED ON MACHINE VISION SYSTEM: D. Simango, H. Musaidzi,

O. Dzobo, T. Garikayi and E. Mungofa

TECHNO-ECONOMIC ANALYSIS FOR PAPER PULP PRODUCTION FROM BAGASSE AS A

VALUE ADDITION STRATEGY: M. M. Manyuchi and A. T. Chiwanga

OPTIMIZATION OF A MAIZE SHELLER FOR MAIZE SEED PRODUCTION: G. Tigere, M. Dzanya,

D. Museka and H. Mashonganyika

DEVELOPMENT OF AN OPTIMISED ONLINE DIAMOND SAMPLING SYSTEM: M. Dzanya, T.Garikayi,

L. Masiyazi and A. Mukusha



Eng. Marwan ABDELHAMID is the current President of the World Federation of Engineering Organizations (WFEO) since September 2013. He is a graduate Civil Engineer from the University of Belgrade, and General Secretary of the General Union of Palestinian Engineers (GUPE) in Palestine. He has been devoted to the WFEO for over 36 years as a member of the Executive Council as well as Vice President, and has been awarded three times for outstanding services to the WFEO. He served as President of the Federation of Arab Engineers from 1987 to 1989, and was involved in several Committees and task forces also as chairman of Standing Committee for the Promotion and Creation of Engineering Institutions in Developing Countries within WFEO. He has held many positions such as, Director of Department in the National Company in Algeria, Advisor to the Algerian Minister of Housing, Member of the Council of Arab Ministers representing Palestine, Permanent representative of Palestine in the United Nations Organization for Human Settlements, Technical Advisor to late President Arafat, Deputy Minister of Housing in the Palestinian Authority, Ambassador of Palestine to Greece, Technical Advisor to President Abbas, and President of Palestine Mortgage & Housing Corporation and Consultant in Housing Policy and Strategy.

Eng. Marwan is as a multicultural citizen, fluent in English, French, Serbian and Arabic, and his deep interest and passion for Sciences and Engineering has influenced his two children respectively serving as Dr Urologist and Architect.



Dr. Ignasio Ngoma graduated from the University of Malawi in 1986 with a B. Sc. Degree in Civil Engineering. He obtained his M. Sc. Degree in Structural Engineering from the University of Liverpool in England. He obtained his Doctor of Philosophy Degree (Ph.D.) from the University of Pisa in Italy. He is the Past President of the Malawi Institution of Engineers where he served as its President from 2009 to 2011. He also served as served Honorary Secretary. Dr. Ngoma is President of the Southern Africa Federation of Engineering Organizations (SAFE) where he also served as Vice President and President Elect from 2012 to 2015. Dr. Ngoma is a member of the American Society of Civil Engineers, M.ASCE, from 1998 to present. He is Director of the Malawi Transportation Technology Transfer Centre at the University of Malawi where he also served as Head of Civil Engineering Department from 1997 to 2001. He lectures in Structural Engineering and Transportation Engineering and serves in the University of Malawi Senate. Dr. Ngoma's research interests are in low cost building materials for housing and roads. He has served in various committees of the Malawi Government including as council member of the National Construction Industry Council from 1997 to 2001. He is chairperson of Pamodzi Consulting Limited a civil engineering firm. Dr Ngoma also serves in SADC projects and he is currently Team Leader of two Association of Southern Africa National Road Agencies projects one on synthesis of innovations in regional road technologies and the other on training needs for human capacity development.



Eng. Martin Manuhwa is the current chairman of the Engineering Council of Zimbabwe (ECZ), and immediate past president of the Southern African Federation of Engineering Organisations (SAFE). He is the Vice President of the Federation of African Engineering Organisations (FAEO), and the World Federation of Engineering Organisations (WFEO) and chairs the WFEO Ethics and Transparency Committee. Eng. Manuhwa also chairs the World Council of Civil Engineers (WCCE) Education, Training and Capacity Building and sits in its Executive Committee as Vice President. Martin is the Managing Director of Zimbabwe Africa Infrastructure Development Group (ZAIDG) a company that specialises in Engineering Procurement and Construction Management (EPCM). ZAIDG is the Zimbabwean partner of Hatch Goba Africa (Pty) Ltd, an international multi-disciplinary and multi-sectoral engineering consultancy delivering infrastructure, mining and metals, and energy projects using world-class practices and processes. Martin's engineering practice is in energy, construction projects, worksite project implementation and management. He taught part time and still supervises MBA graduate students at the University of Zimbabwe. His research interest is in the use of Management Information Systems in Engineering Construction and Project Management and he is pursuing a Doctorate at the University of Cape Town (UCT) in that field. He sits in the advisory Council of the London based Global Infrastructure Anti-Corruption Centre (GIACC). Eng. Manuhwa is a past president of ZIE. He also sits in various boards at home and abroad.



Tendai N.H. Kapumha (ZIE President) is currently a Managing Consultant at Hedgehog Fox Consulting, a multi-disciplinary management and engineering firm with projects all over sub-Saharan Africa. He is a highly talented professional and qualified consultant, able to identify and exploit opportunities by developing and implementing appropriate and timely strategies. Engineer Kapumha is a Professional Engineer as well as a Chartered Engineer, a proven general manager, commercially astute, with experience in power, telecommunication, road and rail infrastructure, steel processing, manufacturing, services, consulting, project delivery and project portfolio management. He has skills and experience in business renewal and turnarounds, able to establish and maintain profitable long-term relationships with customers and stakeholders, with proven ability to focus organization resources on critical issues and achieves profit targets in both the short and longer terms. Tendai is an exceptional and exemplary leader, who can strategically position and optimize designs, manufacturing, operations, logistics, marketing and sales, to deliver value to customers and profit to stakeholders. He has honed policy development skills and experience.

At home he has held the following leadership position in the respective engineering companies; Commercial Director - Telecel Zimbabwe, Managing Director - BMA Fasteners, Managing Director- General Beltings, Chief Executive Officer - CAPS Holdings. Tendai led a team of international consultants to turnaround Namibian parastatals, Road Contractor Company in successfully structuring a massive business turnaround. He led a team of multi-disciplinary engineers, planners and environmentalists in designing all bulk infrastructures for the greater Port Harcourt City, Rivers State Nigeria. This is a two million inhabitant extension of the existing Port Harcourt City. Chaired GIBB Nigeria and sat on the boards of three other GIBB subsidiaries on the African Continent.

Eng. Kapumha has been on the Zimbabwe Institution of Engineers Executive Committee for six years and has chaired the Awards Committee prior to this. He has been a non-executive director of the National Oil Company of Zimbabwe and currently sits on the boards of Con-tech Contractors and Beehive Institute of Technology. He holds a B.Sc (Eng) Honours degree in Electrical Engineering from the University of Zimbabwe, a diploma in Marketing and a Masters in Business Leadership from the University of South Africa (2000). He is a Fellow of the Zimbabwe Institution of Engineers, a member of MIET, a member of the Institute of Directors, Southern Africa.

He is a professing Christian and fellowship at the United Methodist Church, is married to Angeline and has three children.

.....



Prof. Hubert Gijzen (The Netherlands) holds a PhD in Environmental Biotechnology, and has an established career of over 33 years in both academics and in international cooperation. He has worked in academic institutions and universities, the Dutch Ministry of Foreign Affairs, in Embassies abroad, in International Institutes and the United Nations (UNESCO). Throughout his career, he has lived and worked in various countries and regions (Europe, Africa, South America and Caribbean, South Asia, South-East Asia), in a range of senior functions as Full Professor and Chair in Universities, as a diplomat, Regional Representative, Team leader, and currently as UNESCO Regional Director and Representative. He has implemented short missions to over 100 countries, and has developed and managed large capacity building, research and cooperation programmes and projects in various countries and regions. He has a broad experience in fund raising and project management, including the large scale EU funded R&D project SWITCH (about 50 million US\$) on “Water in the City of the Future”, for which he served as Project Director, and which earned the IWA Sustainability Award in 2012. Besides his current work as a UNESCO Regional Director and Representative, he continues to hold positions as full Professor at UNESCO-IHE Institute for Water Education (since 1995) and at Wageningen University. Hubert has published about 400 articles and books, and presented numerous keynotes and conference presentations in the fields of water management, microbiology, environmental sciences, biotechnology, biomedical research, and in sanitary and environmental engineering. He also covered topics on international cooperation, sustainable development, the MDGs, climate change, and on the emerging Post-2015 development agenda. He is a member of several international scientific and technological associations, and he also serves in various international advisory functions and on Boards of prestigious S&T Institutes and programmes.

Hubert Gijzen joined UNESCO in 2006 as the Director of the UNESCO Regional Science Bureau for Asia and the Pacific, based in Jakarta. Besides, he was the UNESCO Representative for Brunei Darussalam, Indonesia, Malaysia, the Philippines, and Timor Leste. He also served as a member of the UN Regional Directors team (UNDG – Asia Pacific), and the UN Regional Coordination Mechanism (ESCAP). Since 1 January 2015, Hubert was appointed as the Regional Director of the UNESCO Regional Office for Southern Africa in Harare (Zimbabwe) and UNESCO Representative to Zimbabwe, Botswana, Lesotho, Malawi, South Africa, Swaziland, Zambia and to the SADC. He also serves on the UN Regional Directors team for Eastern and Southern Africa (UNDG-ESA).



Justin Abbott is a Director at Arup with over 25 years consulting experience covering a wide range of water and environmental projects undertaken in both the UK and overseas. His areas of knowledge focus on the sustainable management of water, with expertise in environmental impact, water scarcity and risk, wastewater treatment, water quality and urban water management. He is currently chairing a UK research project looking at how we can begin to quantify the multiple benefits that green/blue infrastructure provide, to allow us to develop stronger business cases that will hopefully inform better planning decisions. Prior to this he was lead author of a national UK report that scoped the opportunities and barriers for delivering Water Sensitive Design in urban areas in the UK, drawing on international experience. He is lead author for the RICS document entitled “Land Use Planning and Water Use” and acted as technical lead on Arup’s recent report for WRG 2030 entitled “Managing Water Use in Scarce Environments”. At Arup he is responsible for managing a range of water projects; he is currently examining water issues associated with the growth of the textile sector in Bangladesh, and in his role as Global Water Skills leader his co-ordinates Arup’s water skills development and research activities.

.....



Eng. Dr. Mercy Manyuchi is a Professional Chemical Engineer working at Harare Institute of Technology as a researcher and head of department for the Chemical and Process Systems Engineering Department. Mercy’s research interests lie in wastewater treatment and waste management. She has 3 filed patents in these areas. Mercy is also an Environment consultant for HIT Enviro and an active member for the ZIE Women in Engineering Division and is a ZIE Board Member.

.....



Rangarirai Paul Hita is a 24 year old male who has just attained a Bachelor of Engineering Honours Degree in Electronic Engineering from the National University of Science and Technology. His research interest is in engineering design and renewable energy, which can be employed to develop solutions towards solving the society’s problems. He has hands-on experience on power systems protection which he attained as an engineering attaché at Zimbabwe Electricity Transmission and Distribution Company (ZETDC) in 2014.



Prof. Innocent Nhapi is an expert in sanitary and environmental engineering with experience in project implementation, education and development. His experience includes working for a municipal council in Zimbabwe, for the University of Zimbabwe, the National Community Water and Sanitation Training Institute (NCWSTI) in South Africa and the WaterNet Project (regional capacity building project in Southern Africa). From October 2005 to October 2008, he was with the UNESCO- IHE Institute for Water Education as a Project Manager on an NPT-funded Water Resources and Environmental Management (WREM) project at the National University of Rwanda where he was involved in staff development and setting up MSc. and research programmes in Water Resources Engineering and Management. From 2009 to February 2013 he was with the Department of Civil Engineering, University of Zimbabwe as a SADC-WaterNet Professorial Chair in IWRM. In January 2014 he joined the Chinhoyi University of Technology in Zimbabwe. He has experience and research interests in catchment environmental planning, pollution prevention strategies, pollution modeling, and urban water systems management. He does consultancy work for the World Bank and others on urban water supply, sanitation and environmental planning and management.



Eng. Ngoni Chirinda is a full time industrial & manufacturing engineering lecturer at Harare Institute of Technology. He also heads the Technology Centre at the same Institute. He has been in the academic environment for ten years until to date. He holds an M Sc Degree in Manufacturing Systems & Operations Management and a B Tec Degree in Production Engineering. He has taught Solid Mechanics throughout his academic life more than any other course and gained interest in designing for strength and life. He also taught advanced manufacturing technology and manufacturing systems design courses for postgraduate degree at the University of Zimbabwe, MSOM programme, and taught operations management at National University of Science and Technology, PUMBA programme. He has also developed and taught a number of short term courses at Harare Institute of Technology. He has written and published about ten research papers in the fields of advanced manufacturing technology, technology education and sustainable renewable energy systems. He has wide industrial experience that covers machining production, plastic processing and plant in-service inspection and maintenance. He is the current Board chairperson of ISC Quip Pvt Ltd. Company and Board member of Vidalsh Enterprise. He has participated and chaired in several industrial committees over the years that includes ZIE, NAMACO and SAZ ME committees. He is the current chairperson of the SADCAS Advisory Committee for Inspection in Zimbabwe. He has interest in community development and personal life development outside his profession.



Dr. Patience Siwadi is the Deputy Director of the Graduate School of Business Leadership, Midlands State University, Zimbabwe. The school is the only AABS accredited Graduate School in the country. She lectures in Strategic Management, Marketing and Business Communication. Patience is a PhD holder, from North West University in South Africa. Her thesis is in the area of Dynamic Managerial Capabilities looking at integration of social capital, corporate governance and technological capabilities for business performance in the Zimbabwe manufacturing sector. She has research interests in strategy implementation, business communication, social entrepreneurship, strategies for livelihoods resilience and food security and is actively involved in Zimbabwe's economic recovery. She is a consultant in development and business, and also a motivational speaker and trainer.

.....



Engineer Bernard Musarurwa is a Fellow of the Zimbabwe Institution of Engineers (FZweIE) and an ECZ registered Professional Engineer (Pr.Eng). He is also a Member of the Zimbabwe Association of Consulting Engineers (ZACE) since 1990. He is the Managing Director of CPP Zimbabwe. Engineer Ben holds double major Bachelor of Science degrees, one in Civil Engineering and the other in Geological Engineering. He has extensive experience in the fields of geotechnical engineering, construction materials, road pavement design, quality management systems, highway design, transportation and highway engineering. Eng Musarurwa has a total of 33 years of post-graduate experience, all of which have been in the civil engineering field as a Consultant, which has covered every aspect of the engineering requirements of roads projects, including feasibility studies, detailed engineering design, road rehabilitation, with emphasis on pavement and geotechnical materials engineering.

.....



Eng. Peter Morris is a freelance consultant based in Harare. He has a BSc (Eng) in Civil Engineering from the University of Cape Town and MSc, DIC in Public Health Engineering from Imperial College London. He worked for ten years at the City of Harare where he had been a bursary student. He researched ways to economise servicing of high density housing areas and drafted practice guidelines for design and construction of water and sewers. He was responsible for design and supervision of servicing of high density housing areas including in Highfield, Dzivaresekwa, Chirambahuyo, Glen View and Warren Park and carried out a successful loss reduction exercise in Highfield. In 1983 he joined the consulting firm John Burrow and Partners, now Ncube Burrow, and became Managing Director in 2000. Most of his work was in the water sector including water treatment, water pumping, large diameter trunk mains, reticulation, outfall sewers, sewage pumping and sewage treatment works. He has been based in Zimbabwe but has also worked in Swaziland, Mozambique, Zambia, Botswana, Mauritius and Tanzania. In 2010 while on attachment to UNICEF Harare he worked on

emergency rehabilitation of water supply systems and was able to reveal the linkage between power supply and water provision. A freelance since 2011, he has carried out assignments for local consultants, the World Bank, GIZ and Danida. These include work on the National Water Policy; support to Harare, Bulawayo, Gweru, Norton, Kadoma, Kariba and Chinhoyi; and oversight of construction of 30 magistrates courts. Eng Morris is the Immediate Past President of the Zimbabwe Association of Consulting Engineers and is the Institution of Civil Engineers Country Representative for Zimbabwe. He has served on a number of Standards Association of Zimbabwe committees and chaired the drafting committee for SAZS ISO 10845 Construction Procurement.



Engineer Simon Chinguwa is an experienced engineer both in training and industry. He holds BEng Honours degree in Industrial and Manufacturing Engineering and a Master's degree in Manufacturing Systems and Operations Management from UZ. He currently is a lecturer for Thermofluids and Engineering Mechanics. He worked for Harare Polytechnic, Tobacco Processers Zimbabwe (TPZ), Swedish Motor Corporation, Aluminum Industries, Load engineering before joining the University of Zimbabwe. As a member of the university fraternity Eng. Chinguwa has published several papers in international journals. He is a distinguished himself as a consultant in Power Generation, Design and Manufacture. Eng. Chinguwa is a member of the Zimbabwe Institution of Engineers and a registered Professional Engineer.



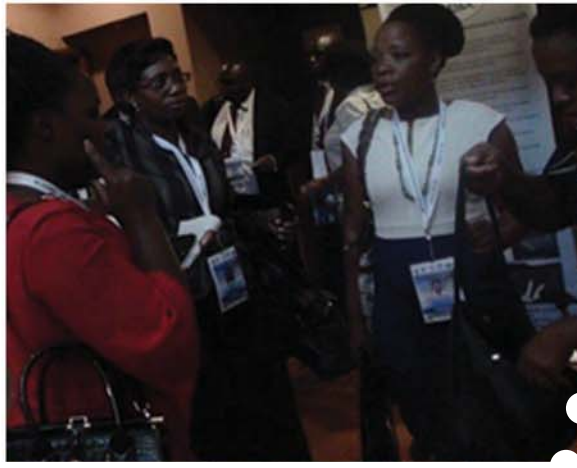
Mary Nyaradzayi Hughslar Chikuruwo is a holder of an MTech degree in Engineering Design (JNTUH, India), MEng in Manufacturing Engineering & Operations Management (NUST, Zimbabwe), BTech in Industrial and Manufacturing Engineering (HIT, Zimbabwe) and is a class one fitter and turner (including machining). Currently working as a lecturer at Harare Institute of Technology. Her areas of research interest are automation and robotics, reliability engineering and artificial intelligence.



Engineer Donald Museka (B.Eng (Hons), MZweE) is an assistant lecturer in the Department of Industrial & Manufacturing Engineering at the Harare Institute of Technology (HIT) since 2012. Before joining HIT he worked at Mutare Board and Paper Mills (MBPM) and Power Electrical Engineering. As an academic, his research interests in Computer Applications and Manufacturing Systems Engineering have seen him publish his own research and peer review research papers in the fields of design, manufacturing systems and industrial optimisation. As a data analyst and optimisation consultant he has produced software for raw material and product tracking, environmental control and monitoring of waste water in local beverage manufacturing firms and the hospitality industry using such basic software applications as Microsoft Excel, ARENA Simulation, SPSS earning him the nick-name „Xcel Master. One of his students used Microsoft Excel in optimizing process control and production of management reports for real-time decision making at a local beverage manufacturing company. As an assistant lecturer, he has taught and continues to teach Computer Applications, Concurrent Engineering and Manufacturing Systems. His excellent organisational and leadership capabilities led to his appointment as technical committee member of the first ever Planetary Scientific Research Center (PSRC)-HIT Joint Conference 2015. He is a current graduate member of the Zimbabwe Institution of Engineers.



Dr Ester Mpandi Khosa, PhD is a retired Academic and Research Scientist (Biotechnology). She is a Registered Nutritionist with the Allied Health Professionals Council (AHPC) of Zimbabwe and with the Nutrition Society of Australia (NSA). She is the current Chairperson of the Zimbabwe Energy Regulatory Authority (ZERA) Board. She was the first ever Research Scientist at the Scientific and Industrial Research and Development Centre (SIRDC), and later became the Director of the Biotechnology Research Institute. She is Director of Breakthrough Consultants (Pvt) Ltd for microbiology, nutrition and food technology consultancy, and is an expert on bio-ethanol production. Her proudest achievement in her entire life and career development is that of rising from being a housemaid at a tender age of 14 years, in which capacity she worked for her school fees for the next seven years, to becoming a renowned Biotechnologist and Scientist.



UNESCO AFRICA ENGINEERING WEEK IN PICTURES



JRG

Jabulani Kuphela

'Our Lord Reigns'



J.R. Goddard Contracting

is a wholly Zimbabwean company which provides turn-key solutions for the Mining and Construction Industries in Southern Africa.

With 33 years of experience, we offer specialised services in Bulk Earthworks, Civils, Dam Construction, Masonry Structures and Open Cast Mining.

Having completed over 200 contracts since inception and operating a fleet of over 120 major items of earth moving equipment and a transport fleet of over 100 vehicles and ancillary equipment, J.R. Goddard Contracting is dedicated to the growth of Africa.



J R Goddard Contracting is a company founded on Christian principals and has been at the forefront of the construction industry in Zimbabwe since 1982. The company currently owns and operates 120 major items of earth moving equipment and boasts a transport fleet of over 100 vehicles and items of ancillary equipment.

J R Goddard Contracting is very proud of the reputation that they have built in Zimbabwe and recognises that their employees are their most valuable asset. They currently employ over 200 salaried staff members and over 1,100 waged workers. They remain solidly committed to their employees' health, safety and well-being. In turn their teams work hard to uphold their company principles of integrity, hard work, honesty, passion and determination.

J R Goddard Contracting strive to not only create jobs, but emphasizes the safety and health of its people and of the communities impacted by its projects.

J R Goddard Contracting specialise in large-scale earthworks and bulk load-and-haul operations across Zimbabwe and currently involved in several high profile projects across Zimbabwe. They also have the equipment, expertise and knowledge to undertake civil construction projects such as heavy reinforced concrete, surfaced and gravel roads, pipeline and sewer laying, masonry and building works. They serve as the main bulk earthworks and civil works contractor on a variety of mines across Zimbabwe. As a result J R Goddard has established permanent teams, dedicated to civil construction requirements on the Zimbabwean mines. These works include the construction of tailings dams, return water dams, pump stations, reservoirs, leach pads, main & secondary access roads, hard standings, fuel and explosive facilities, raise-bore foundations, conveyor foundations, crusher & screening plant foundations, portal excavation & development, workshops, offices, stores facilities, construction & mining accommodation facilities, sewers and water works.

J R Goddard has developed the skills required to building access and haul roads for the transportation of construction and mining equipment to remote areas and these skills have progressed into the construction of public roads, bridges and culverts.

Most recently, J R Goddard Contracting have become involved with the Group Five reconstruction of the Plumtree to Mutare national road which has included the construction of three state of the art toll plazas at Figtree, Bulawayo and Gweru. These have been constructed to a first world standard and have earned J R Goddard Contracting considerable praise and acclaim.

J R Goddard Contracting has built and been majorly involved in the construction of over 100 dams throughout the country to date. Amongst these are the construction of the Bembezaan Dam, Risitu Dam, Howe Mine Dam, Biri Dam, and Mteri Dam.

J R Goddard Contracting's experience extends particularly to the construction of masonry dams and weirs. They have taken on some significant projects in this regard, such as the massive Gungwa Weir in Triangle and the Manyame Balancing Dam below Chinoyi. As a result they have earned a reputation as the leading masonry contractor in Zimbabwe and have spent years perfecting this construction technique, using water-retaining rubble masonry. Their flagship project is most certainly a 42 metre high Lucia-Poort Arch Dam at Unki Mine. It was built with 23,000m³ of masonry and is one of the highest dams of its kind in the world. J R Goddard Contracting is also experienced in canal systems. Projects in this category include the Mteri Dam West Bank Canal, Risitu Dam Canal and Safari Dam Canal Schemes.

JRG
Jabulani Kuphela
www.jrgzimbabwe.com





MEET THE 2015–2017 ZIE STANDING EXECUTIVE COMMITTEE

The Standing ZIE Executive Committee was ratified by the Institution's Annual General Meeting of 8 May 2015. The AGM was held at Meikles Hotel. The Executive Committee is made up of the following engineering professionals, drawn from a diversity of engineering experience, viz: Eng. Tendai. N. H. Kapumha, Eng. Israel Rwodzi, Eng. Godfrey Mhonde, Eng. Farai Mavhiya–Bhiza, Eng. Paipa Gerald Munhumutema, Eng. Nancy Masiyiwa–Chamisa, Dr. Michael J. Tumbare and Dr. Sanzan Diarra. The ZIE Executive Committee is to be in office for the period 1 April 2015 to 31 March 2017. The ZIE Board, Members and Secretariat would like to take this opportunity to congratulate the Executive Committee and wish them well during their tour of duty. It is no fluke that you have been chosen by the generality of the ZIE membership to stir the ZIE ship in the subsequent lap. This is a clear demonstration of the trust and confidence that the Zimbabwean Engineering professionals have in your leadership in carrying out the mission and vision of the Institution. It is for the benefit of all and sundry that we here–in–under outline the credentials of the standing ZIE Executive Committee:

POST	NAME
President	Eng. T.N. H. Kapumha
Deputy–President	Eng. I. Rwodzi
Senior–Vice–President	Eng. G. Mhonde
Vice–President	Eng. F. Mavhiya–Bhiza
Honorary Treasurer	Eng. P. G. Munhumutema
Deputy Treasurer	Eng. N. Masiyiwa–Chamisa
Immediate Past–President	Dr. M. J. Tumbare
CEO	Dr. S. Diarra



ISRAEL RWODZI (Eng) is a holder of a B.Sc Eng. (Hons) in Civil Engineering, FZweIE, MBA. He is the current Deputy President ZIE. Israel is an approved Engineer for Large Dams; Secretary of the Dam Safety Advisory Panel of Zimbabwe; Secretary for Large Dams Division; Member of the Rotary International, Harare West. He is the Zimbabwe National Water Authority (ZINWA) Water Supplies Operations Director. Outlined below is Israel's professional tour of duty in the Zimbabwe Water Sector:

- 1989- Designs Engineer, Department of Water Development (DWD)
- 1997 Chief Designs Engineer, DWD
- 1999 Principal Designs Engineer DWD
- 2000 Chief Designs Engineer, ZINWA
- 2004 Mazowe Catchment Manager, ZINWA
- 2007 Director, Water Supplies, ZINWA
- 2009 Director Maintenance & Engineering Services, ZINWA
- 2011 Director Operations, ZINWA
- 2012 Director Special Projects, ZINWA
- 2014 Director Water Supplies and Operations, ZINWA
- Independent Non-Executive Director (Zambezi River Authority, (ZRA),
- Non-Executive Director, Zimbabwe National Roads Administration (ZINARA)
- Member of Civil and Real Estate Committee, National Advisory Manpower Employment Council (NAMACO).



GODKNOWS MHONDE (ZIE Senior-Vice-President) is currently the Managing Director of CGM Consulting Engineers- Executive Director of ZESA Holdings. He is a holder of the following professional qualifications: Bachelor of Technology in Mechanical and Production Engineering; Master's in Business Leadership; Fellow of the Zimbabwe Institution of Engineers; Professional Engineer, registered with the Engineering Council of Zimbabwe (ECZ); Member of the South African Institute of Refrigeration and Air Conditioning; Member of the Chartered Institution of Building Services Engineers and a Member of the Zimbabwe Association of Consulting Engineers.



Farai Mavhiya-Bhiza (ZIE Vice-President) is a qualified Chartered Engineer with a Bachelor of Technology (Honours) Electrical Engineering attained in 1994 at the University of Zimbabwe. She is also a holder of an ACCA Certified Diploma in Accounting & Finance (2002). Eng Farai is a certified Quality Assurance Internal Auditor (ISO 9001:2008). She is a registered Professional Engineer with the Engineering Council of Zimbabwe (ECZ) and is a Fellow of the Zimbabwe Institution of Engineers. Eng Farai has served as a Board Member of the Zimbabwe Institution of Engineers for the past seven years and is also the Deputy Chairperson of the Acts & Rules Committee of the Institution. Eng Farai is the current Deputy Chairperson of the Engineering Council of Zimbabwe, which regulates and governs the engineering profession in Zimbabwe. She also sits on the ZESA Holdings (Pvt) Ltd Board as a Non-Executive Director. She is currently an Associate Director at Arup Zimbabwe Pvt Ltd, one of the leading International firms specializing in Consulting engineering and planning for the built environment. Eng Farai has more than twenty years' experience in building services engineering for various projects which include residential, industrial, commercial and institutional. She has worked on projects located in different countries including Swaziland, Botswana, Zambia and Zimbabwe. She is a member of the World Federation of Engineering Organisations (WFEO) "Women in Engineering" and "Engineering and Environment" standing committees. She is the current Chairperson of the ZIE Division of Women in Engineering, established to improve the visibility of Women in Engineering, Science and Technology.

She is married to Fumai and the couple is blessed by a daughter.



Pasipaipa Gerald Nhemachena-Munhumutema (ZIE Honorary Treasurer) is a qualified electrical engineer. He is registered with the Engineering Council of Zimbabwe and is a Fellow of the Zimbabwe Institution of Engineers. He completed his graduate traineeship with Union Carbide Zimbabwe –Zimasco Kwekwe Smelter, joining the Zimbabwe Reinsurance Company as a Risk Control and Engineering Underwriter before going into banking. As a banker, he worked for Standard Chartered Bank Zimbabwe, Trust Bank and ZABG Bank where he was the General Manager – Retail Banking. He later joined the Reserve Bank of Zimbabwe as a Deputy Division Chief in charge of Payment Systems Oversight, Policy and Research, Projects and Risk Management in the National Payment Systems Division. He was then seconded to Fidelity Printers and Refiners (Pvt) Ltd where he worked in various capacities as a Senior Manager in charge of Projects, Technical Services Support, Production Planning and Business Performance and was the Head of Audit and Risk at the time of leaving Fidelity Printers. Eng. Munhumutema is currently the Director in charge of Technical Services, Operations and Risk Management at Aurex Holdings (Pvt) Ltd. He is a board member of the Zimbabwe Institution of Engineers, where he is the honorary treasurer. Paipa holds a Bachelor of Science Honours Degree in Electrical Engineering (UZ); Masters' in Business Administration (NUST); Certified Diploma in Accounting and Finance and Certificate in Project Management (PRINCE2-UK).



Dr. Michael J. Tumbare is the Immediate Past-President of the Zimbabwe Institution of Engineers. He holds a B.Sc (Eng) (Hons) (1978), MBA (1996) and PhD (2000) degrees. He is a Fellow of the Zimbabwe Institution of Engineers (FZweIE), the Engineering Institute of Zambia (FEIZ), the Institute of Civil Engineers (FICE) (UK) and the Zimbabwe Academy of Sciences (FZAS). He is also an Associate of the Chartered Institute of Arbitrators (ACI Arb) (UK) and has been gazetted as an Engineer for Large Dams in Zimbabwe. Dr M. J. Tumbare is currently a Senior Lecturer at the University of Zimbabwe in the Department of Civil Engineering.



Dr Sanzan Diarra (PhD; Pr Eng.; Cert. Arb.) is a registered Professional Engineer and a certified arbitrator from the Royal Chartered Institute of Arbitrators (UK). He is currently the Chief executive officer of the Zimbabwe Institution of Engineers (ZIE), a post he occupies since July 2007. He has been a Board member of ZIE from 1994 and served two terms as Deputy President of the Institution. He is the Chairman of the Adjudication Committee of the Research and Intellectual Expo (RIE), Chair of the Celebration College Board of Trustees, Member of the Celebration Holdings International (CHI) Board, member of the Board of Trustees Alpha Zimbabwe, member of the Engineering Council of Zimbabwe Accreditation Board and member of the Institute of Directors of Zimbabwe. Dr. Sanzan Diarra has been an independent consultant in the area of environmental protection and logistics for the United Nations agencies, the World Health Organisation, UNICEF, UNESCO and UNDP from 2002 to date in a number of African countries. In February 1988 Dr Diarra took up a lecturing position at the University of Zimbabwe where he was also the Coordinator of the Bachelor of Technology programme in Civil Engineering. He subsequently joined the National University of Science & Technology (NUST) in Bulawayo in 1994, where he co-founded and chaired the Department of Civil & Water Engineering from 1994 to 2004. He served as Acting- Dean of Engineering between 1996 and 2001. In between, he also lectured at the Harare and Bulawayo Polytechnics. His interest of teaching and research and consulting lies in the areas of structural engineering, construction materials, project management, environmental protection, logistics and alternative dispute resolution (ADR). Dr Diarra worked as a teaching assistant and PhD candidate in the Department of Structures and as structural engineer in the Consulting Unit of the University of Architecture & Civil Engineering in Sofia Bulgaria and the Structural Engineering Department in the Engineering Consulting firm of the Municipality of Sofia, for the period 1978 - 1988. He holds an MSc. (1978) and PhD (1988) degrees in Civil / Structural Engineering from the University of Architecture & Civil Engineering in Sofia Bulgaria, a certificate in Arbitration from the UK Chartered Institute of Arbitrators and is a member of the Association of Arbitrators in Southern Africa. Dr Diarra is married to Thando an Economist. They have two daughters Lee and Sophie and two sons William and Racine Alexandre.



Eng Nancy N. Masiyiwa Chamisa is a holder of an MSc degree in Mechanical Engineering (CUJAE, Havana, Cuba), an MSc in Manufacturing Systems & Operations Management (UZ, Harare, Zimbabwe), MBA (ESAMI, Arusha, Tanzania) and Research Methods (UZ, Harare, Zimbabwe). She is a member and current Deputy Treasurer of the Zimbabwe Institution of Engineers (ZIE) and professional engineer registered with the Engineering Council of Zimbabwe (ECZ). Nancy is a business engineering strategist of repute who has made her mark in the corporate and public sectors both at senior management and board levels. She is a seasoned professional with strong leadership and communication skills with over 20 years of progressive experience and expertise in strategic planning & consulting, business analysis & strategy development, leadership development, project management, measurement & verification of energy systems and training delivery.

She has a passion for research work and her paper on Beneficiation & Value Addition of Strategic Resource Minerals is a demonstrated support for Zimbabwe Economic Blue-Print – ZIMASSET. Nancy is currently working for the University of Zimbabwe and studying towards the attainment of a doctorate degree.

Special Notice: Advertising on the ZIE Website

The Zimbabwe Institution of Engineers is kindly offering organisations an opportunity to advertise on the Z.I.E website (www.zie.org.zw). The associated investment Per Month (VAT Inclusive) in US Dollars is a) Top Banner-\$150.00, b) Side Banners \$250.00 each & c) Bottom Banner is \$150.00 .

Contact the Zimbabwe Institution of Engineers on +263 4-746821/746652 wilson@zie.co.zw +263 772 881 050 or Hansole Investments Pvt on +263 4-740291/0772278161 or admin@hansole.org

Guard Against Non-Engineering Professionals

By Wilson Banda-Membership Services & Training Officer

Cell: 772 881 050 Email: wilson@zie.co.zw Phone: +263 4 746821



It is the mandate of the Zimbabwe Institution of Engineers (ZIE) to ensure that all engineering work in the country is done by qualified and experienced professional engineers and engineering technicians. The emphasis comes in the wake of the mushrooming of hundreds of individuals masquerading as engineering professionals. The pseudo engineers have in the past endangered the public. For instance, cases of collapsing structures and electrocution of members of the public were handled by the Institution. Engaging non-engineering professionals has also seen unprecedented increase in project costs as a result of incurring additional arbitration costs and correctional costs. It is the purpose of this installment to warn the public against giving engineering projects of any magnitude to non-qualified engineering professionals. Experience has shown that people think it is often cheaper to engage pseudo engineers but the opposite is true.

Of late, housing co-operatives, NGOs and middle-income households have been the worst targets for shoddy engineering work. ZIE condemns such work and the 'non-engineering architects' and feels obliged to empower the public. To be forewarned is certainly to be forearmed. The public should always consult rightful engineering professionals for tasks demanding informed engineering decisions, skills and competencies. The engineer or technician you engage must be registered by both ZIE and ECZ (Engineering Council of Zimbabwe) and should produce a valid annual practicing license.

Furthermore, it should be on record that in terms of the law, ZIE has a Code of Professional Ethics designed to cover all eventualities, expressing broad ethical principles. The code indicates the manner in which engineers and technicians are required to conduct themselves in a number of situations that are frequently encountered in their tour of duty. In other situations, members are required to order their conduct in accordance with the principle that in any conflict between a member's personal interest and fair and honest dealing with other members of the public, his/her duty to the public must prevail.

In these rules 'member' means a ZIE member of any grade, excluding Affiliated Organisations.

Rule 1.0. A member, in the course of his employment and in pursuance of his profession, shall have due regard for the public interest.

Rule 1.1. A member, in the course of his employment and in pursuance of his profession, shall have due regard to the Environmental Code /Professional Practice.

Rule 2.0. A member shall act for his employer or for his client as a faithful agent and trustee and shall discharge his duties with integrity.

Rule 2.1. A member whose professional advice is not accepted shall take all reasonable steps to ensure that the person overruling or neglecting his advice is aware of any danger which the member believes may result from such overruling or neglect.

Rule 2.2. A member shall not misrepresent his qualifications to a prospective employer or client and shall render only such professional service for which he is qualified by training and experience.

Rule 2.3. A member, without disclosing the fact to his employer in writing, shall not be a director of, nor have financial interest in, nor be agent for, any company, firm, association, partnership, syndicate, any other association of persons which is not a body corporate or person carrying on any business which is or may be involved in the work to which his employment relates; nor shall he receive remuneration for his services from more than one source for the same service or work.

Rule 2.4. A member shall pay due regard to the intellectual property of any other party.

Rule 3.0. A member shall act in a manner to uphold the honour, dignity, integrity and reputation of the profession.

Rule 3.1. A member shall take all reasonable steps to maintain and develop his professional competence by attention to new developments in science and engineering relevant to his field of professional activity and shall assist persons working under his supervision to do so.

Rule 3.2. A member shall not publicly express an opinion on an engineering subject unless he is informed of the facts relating to that subject and has disclosed to the person or persons to whom the opinion is directed any association he may have with any party which may benefit from his statement, and then only when founded on adequate knowledge and honest conviction.

Rule 3.3. A member shall not, in self-laudatory language or in any manner derogatory to the dignity of the profession, advertise or write articles for publication, nor shall he authorize any such advertisement or article to be written or published by another person.

Rule 4.0. A member shall not falsely, maliciously or recklessly injure or attempt to injure whether directly or indirectly the professional reputation, prospects or business of another member of the engineering profession.

THE ROLE OF ENGINEERS IN THE RECONSTRUCTION OF ZIMBABWE

By Eng. Bernard Musarurwa

The infrastructure in Zimbabwe has virtually collapsed from the 'jewel' that the late former President Mwalimu Julius Nyerere of Tanzania implored the then Prime Minister Mugabe to "look well after" at independence in 1980. The roads in Harare, and indeed most other roads networks countrywide, have collapsed such that they now virtually all require to be reconstructed, which situation was caused largely by the lack of timely maintenance and upgrading commensurate with demand. There are incessant and endemic electricity power outages, due to low generation capacity to meet demand, which is being exacerbated by the current low volume of water in Lake Kariba.

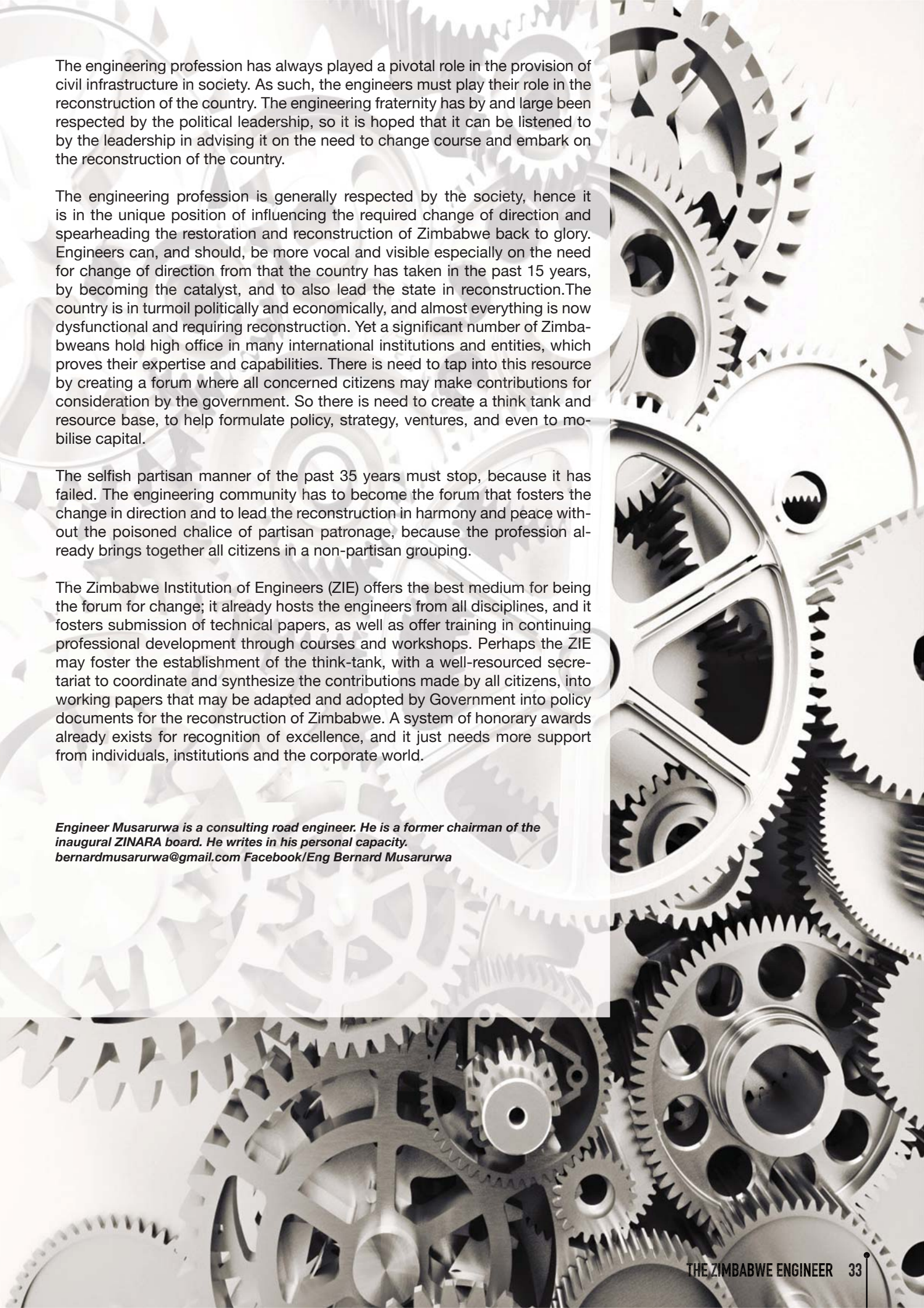
There is no or only intermittent municipal water supplies in most parts of Harare, which is the same case as well in most other towns; this sad situation largely emanating from inadequate capacity to treat and supply water, with not many new reservoirs constructed since 1980.

Most sewage treatment plants around the country have been allowed to become dysfunctional, with few new ones built since 1980, thus most municipalities are releasing raw sewage into the natural drainage systems, some of which like in the case Harare are in the same catchments as the reservoirs supplying its potable water, thus making the treatment of the water more expensive.

The bottom line is Zimbabwe has failed to maintain the infrastructure that it inherited in 1980 at independence, and to upgrade and expand it commensurate with the increase in the population, which population has almost quadrupled in the 35 years since independence. There has been uncontrolled and unsanctioned urban sprawl around Harare, and elsewhere, spawned by the so-called "land barons", without due provision of essential services like roads, water and sewage reticulation. This is a ticking time-bomb for a major disease outbreak as the unfortunate residents are forced to use shallow wells alongside shallow pit latrines, which scenario poses a huge potential for cross-pollution of the water sources, a recipe for disaster.

Thus there is need for massive rehabilitation, reconstruction and expansion of the roads, railways, water supplies, sewage treatment plants, electricity power generation, and all other services, to meet the needs and demands of the current and future population. The decimation of the 'jewel' to where there are chronic shortages of essential services like water and electricity is a sad indictment of the ineptitude and failure of post-colonial Zimbabwe, to maintain and upgrade the infrastructure to a point where reconstruction has become inevitable. The infrastructure literally has collapsed, and it now urgently requires full reconstruction and upgrading, with most of it dilapidated beyond rehabilitation.

The priority areas or sectors which require reconstruction of the infrastructure are to provide adequate roads, electricity power and water supplies to service both industry and the people. An adequate and efficient infrastructure base is essential for the economy to function properly. A safe and serviceable road network is vital for the efficient movement of goods and people. Continuous and adequate supplies of electricity and water are fundamental for the efficient performance of industry and commerce, as well as for human consumption. The rampant corruption, populist policies, political patronage, general ineptitude, and reluctance to listen to and accept logical technical professional advice, are some of the reasons the 'jewel' that Zimbabwe was 35 ago has been made the basket case that was once a bread basket, a position that the country can and deserves to be restored back to.



The engineering profession has always played a pivotal role in the provision of civil infrastructure in society. As such, the engineers must play their role in the reconstruction of the country. The engineering fraternity has by and large been respected by the political leadership, so it is hoped that it can be listened to by the leadership in advising it on the need to change course and embark on the reconstruction of the country.

The engineering profession is generally respected by the society, hence it is in the unique position of influencing the required change of direction and spearheading the restoration and reconstruction of Zimbabwe back to glory. Engineers can, and should, be more vocal and visible especially on the need for change of direction from that the country has taken in the past 15 years, by becoming the catalyst, and to also lead the state in reconstruction. The country is in turmoil politically and economically, and almost everything is now dysfunctional and requiring reconstruction. Yet a significant number of Zimbabweans hold high office in many international institutions and entities, which proves their expertise and capabilities. There is need to tap into this resource by creating a forum where all concerned citizens may make contributions for consideration by the government. So there is need to create a think tank and resource base, to help formulate policy, strategy, ventures, and even to mobilise capital.

The selfish partisan manner of the past 35 years must stop, because it has failed. The engineering community has to become the forum that fosters the change in direction and to lead the reconstruction in harmony and peace without the poisoned chalice of partisan patronage, because the profession already brings together all citizens in a non-partisan grouping.

The Zimbabwe Institution of Engineers (ZIE) offers the best medium for being the forum for change; it already hosts the engineers from all disciplines, and it fosters submission of technical papers, as well as offer training in continuing professional development through courses and workshops. Perhaps the ZIE may foster the establishment of the think-tank, with a well-resourced secretariat to coordinate and synthesize the contributions made by all citizens, into working papers that may be adapted and adopted by Government into policy documents for the reconstruction of Zimbabwe. A system of honorary awards already exists for recognition of excellence, and it just needs more support from individuals, institutions and the corporate world.

***Engineer Musarurwa is a consulting road engineer. He is a former chairman of the inaugural ZINARA board. He writes in his personal capacity.
bernardmusarurwa@gmail.com Facebook/Eng Bernard Musarurwa***



MINISTER OF LOCAL
GOVERNMENT, PUBLIC WORKS AND
NATIONAL HOUSING
Hon. SAVIOUR KASUKUWERE

MEET THE ENGINEERING COUNCIL OF ZIMBABWE (ECZ) LINE MINISTER

Hon. Saviour Kasukuwere (MP) was born in Mt Darwin, Mashonaland Central Province in Zimbabwe. He graduated from the University of Zimbabwe and holds a BSc Honours Degree in Political Science and a Master's Degree in International Relations. He joined the Public Service in 1988 and served for 8 years before retiring in 1995. After retiring from the Public Service, he ventured into business and formed a holdings company in the transport sector called Migdale Transport, which acquired two companies namely Commercial Transport and Johnstone Motor Corporation. Following successful business ventures in the transport sector, he diversified into the energy and financial services sectors where he established vibrant business enterprises. All his companies have regional presence in the SADC region.

He served as ZANU PF Provincial Youth Chairman for Mashonaland Central in 1998 rising to become a member of the ZANU PF Central Committee and Politburo in 2001. He was elected Deputy Secretary for Youth Affairs in 2001 and re-elected again in 2004. He was appointed Secretary for Indigenisation and Economic Empowerment in 2009, charged with spearheading the party's policy on the empowerment of Zimbabweans before being appointed as Secretary for the Commissariat in December 2014. Honourable Saviour Kasukuwere was elected into Parliament at a youthful age of 29 in the year 2000 and has been re-elected on four occasions. In 2005 he was appointed Deputy Minister of Youth Development and Employment Creation. Having successfully served as the Deputy Minister, Honourable Saviour Kasukuwere was later appointed Minister of Youth Development, Indigenisation and Empowerment in February 2009 and strongly agitated for the empowerment of indigenous citizens. In 2013, Honourable Saviour Kasukuwere was appointed the Minister of Environment, Water and Climate and subsequently moved to the Ministry of Local Government, Public Works and National Housing in July 2014. The Ministry superintends the Engineering Council Act 27:22.

Aside from all this, Honourable Saviour Kasukuwere is a devoted husband to his wife Barbara and the couple has three children. When he is not occupied with work, he enjoys playing golf and likes reading political books.

Construction Review is tailored to the needs of members of relevant associations, government bodies and other personnel in the building and construction industry as well as suppliers of plant & equipment, materials and services in Africa.

GROWTH IS INEVITABLE

This is a paramount reason why the construction industry remains a feasible, constant and profitable venture during the most profitable or dismal of economic forecasts.

This multi-billion dollar industry influences every corner of society through direct and indirect effects that new developments have on nations. Whether a new bridge, building, entertainment complex, residential development or office facility, new developments spawn surges of interest, business opportunities and employment in any given area.

Unlike most of Europe or North America, the vast majority of Africa is still in the development phases, as most countries are considered developing nations.

This lends a great opportunity for various stakeholders to influence the shape and future industries the continent will take on. With such emergent developments, infrastructural advancements and balanced foreign investment occurring throughout Africa, long gone are the days of Africa being considered a 'dark continent'. Instead the future is very bright for local and foreign investors that are willing to implement sustainable developments for an attainable future.

Robert Barnes



The role of process instrumentation in water treatment plants

Article by Matthew Shadwell



Example of a treatment plant

Many experts feel that fresh water will be one of the most sought after resources in the near future. A combination of a growing human population, increased industrialisation and an increased environmental awareness is predicted to cause a greater demand for good quality water. Recently there has been a change in the legislation for water quality in South Africa and in Zimbabwe we have seen an increased drive by city councils and the Environmental Management Agency to control effluent quality. As mentioned by Muserere [1] Harare is facing serious water challenges and there needs to be an improvement in its water treatment systems.

What does this mean in an engineering context?

More and more factories have recently put in or are in the process of installing either treatment systems for their incoming water or effluent treatment systems for their waste. In either scenario to maximise efficiency in energy and chemical use it is critical to monitor and control key parameters. Many older plants work on the philosophy that samples taken every couple of hours are sufficient to control the treatment process adequately. While this is generally true it can be very wasteful if the plant conditions change between samples. Variable speed drives have also become affordable and efficient which has allowed motors and pumps to be much more finely controlled and energy efficient. These factors lead us to online monitoring and control systems.

Examples of options for online monitoring

New treatment plants are being built with programmable logic controller (PLC) control systems that automate the plant, allowing finer control and the reduction of human errors. This leads to a more consistent final product and also a more efficient usage of consumables such as dosing chemicals and energy. A simple example of energy efficiency is that when a motor (or pump) has its speed halved the power used by it is reduced by a factor of four. In a treatment plant it is hence more efficient to run pumps at the required rate rather than at a set speed. Of course for a PLC system to function it needs to have the process conditions monitored continuously and that is where process instrumentation comes in. Parameters typically monitored include:

- Flow
- level
- pressure
- pH
- dissolved oxygen
- nitrate
- turbidity
- chlorine

[1] S. Muserere , "Integrated approach to Harare water management", *The Zimbabwe Engineer*, volume 74 number 1 p22-30, Sep. 2011

In existing plants a partway solution is often taken to bridge the stage from a fully manual to a PLC controlled system. For example this could simply be the online monitoring of pH at the inlet which then is used to send a control signal to a dosing pump to correct any imbalances.

Quality and performance concerns have also seen the increase in online monitoring and recording of the parameters listed above even if they are not used directly for control purposes. An example of the usefulness of continuous monitoring and recording is the ability to create flow or dissolved oxygen profiles for a plant with respect to time.

New online instrumentation and control options

The field of process instrumentation has been compared to the computing industry where equipment has a generational lifespan that can be as little as five years. One of the more recent developments has been the introduction of the Memosens digital system from Endress + Hauser. Memosens has brought several major benefits over traditional online monitoring systems and they include:

- An inductive interface between the probe and the transmitter meaning that corrosion and moisture cannot affect the measured signal
- The calibration is stored on the probe so changing the calibration at a measuring point can be as simple as swapping in a new probe.
- A new multi-parameter controller, the Liquiline CM44x family, with plug and play capability for the type of measurement probe which includes pH, dissolved oxygen, turbidity, ammonium, nitrate, potassium, chloride, free chlorine and conductivity



The Liquiline CM442 installed at a water treatment plant. [2]

The controller is a full PID controller and is also capable of feed- forward control. Feed-forward control may not be familiar to many people but basically it means that when a settled system experiences a sudden change it may be desirable to react proportionally to the change. An example of such is a water treatment plant that experiences a sudden halving of inflow. A flowmeter measuring the flow rate is able to 'warn' the controller that there has been a halving in inflow and the controller can decrease the volume of the pH correction dosage by half to compensate.

Where does that leave the situation today?

In conclusion the increased need for good quality water will require more plants and more efficient plants. As a result there will be a corresponding increased need for process instrumentation, whether it is a small standalone unit or system or even a fully automated plant.

If you need more information on process instrumentation options please feel free to contact Adderley on +263 4 495595 or visit our website at www.adderleyafrica.com.

[2] Endress + Hauser, "The perfect team: Multiparamter controller Liquiline CM442 and its sensors", document IN051C/07/en/02.10, p3

URBAN TOLL GATES

By Eng. Bernard Musarurwa

The issue of urban toll gates has become topical in Zimbabwe. In the late 1990's, most urban councils clamoured for toll gates on the major roads leading into and out of their cities and towns, ostensibly for the purpose of raising revenue to maintain the main roads passing through the cities and towns, by targeting the through traffic, with the local traffic already paying for roads through vehicle licensing, which at the time was done through the local authorities and post offices.

Vehicle licensing was taken over in 2010 by the Zimbabwe National Road Administration (ZINARA), an entity set up in 2000 under the Ministry of Transport for the purpose of the collection and accrual of road user charges to the Road Fund for disbursement to the designated road authorities for the maintenance of roads. Government, through the Ministry of Transport, is responsible for the provision, operation and maintenance of all public roads at both central and local level, though this role may be delegated to the designated road authorities, and other entities under certain circumstances and arrangements.

With ZINARA now also collecting all road tolls and vehicle licence fees throughout the country, with most of the toll gates already located near the major cities and towns, the proposition of any further toll gates becomes debatable. In order to put into perspective the debate on toll gates, it is proper to define the purpose and intention of toll gates, as well as to describe the types of toll gates.

PURPOSE

The fundamental purpose of a toll gate is to levy a fee for motor vehicles to be allowed to pass at a specific point along a road. The conventional purpose of the road toll is to generate revenue for the provision, management and maintenance of road infrastructure. This may be achieved through a private entity being mandated by government to finance the development of a road and being allowed to operate it while levying tolls to service the debt on the capital, operational and maintenance expenditure, and to realise a return on the investment, and then to transfer the road back to the relevant authority after a concession period, of typically 20 to 30 years. This is the classic build-operate-transfer (BOT), or a public private partnership (PPP), but there are variations of PPP's from a hybrid where both the public sector and a private entity may contribute to the capital expenditure, to a case of where the public sector may do everything alone, or through a special purpose vehicle.

The normal purpose of levying toll fees on motorists is to raise revenue for the provision, management and maintenance of roads, which funds are normally used on the road on which the toll gates are located. Moral social responsibility usually requires that there be an alternative route for motorists who do not wish or cannot afford to go through a toll gate, though this has largely been abandoned as a matter of expedience.

In Zimbabwe road tolls were first levied on motorists at the New Limpopo Bridge at Beitbridge in 1994. Whilst the old Beitbridge bridge could have continued to be used as an alternative, probably no motorist would have paid tolls to use the new bridge. Thus the old bridge was closed to motor vehicle traffic, forcing all motorists to use the new tolled bridge, with no alternative.

The Government, through ZINARA, has since gone on to install toll gates on most of the existing major roads throughout the country, even before doing any improvements to the roads, on the premise that it needed to collect the funds first to be able to do the works.

TYPES

A toll gate is a facility at which a fee is levied for motor vehicles to be permitted to pass at a specific location along a road. The toll gate may take a rudimentary

form of a single person, legally or otherwise, mounting a road block, with or without any barricades or signs, to charge a fee on all or selected motorists to pass at that point.

Modern toll gates can be quite sophisticated, like the ones causing much consternation and contention in Gauteng in South Africa, where high-speed cameras can read an electronic tag on a speeding vehicle to levy the toll without the vehicle having to stop. The e-tag may be pre-purchased and 'juiced' like a cell phone. The vehicle registration data-base system is then used to ensure that all vehicles that pass by the toll gate with, or without, the e-tag are duly charged the tolls due at the time of renewing the vehicle licence.

In Zimbabwe the toll gates currently have booths where persons manually levy and collect tolls based on the class and size of a vehicle. The toll gates are equipped with information communication technology (ICT) systems linked to a central control centre for monitoring and auditing. Toll gates are normally located to ensure maximum 'capturing' of traffic along the route, and minimising of 'leakage' or avoidance of tolls by motorists using alternative roads to circumvent the toll gates. Under normal circumstances, the distance between toll gates should be taken into account in the fee charged at each toll gate to ensure equity in the level of the toll levied on vehicles passing through different toll gates, with the toll computed as a unit charge per kilometre travelled, based on the class or category of each vehicle. However, in Zimbabwe the road toll is currently uniform at each toll gate throughout the country for each of the different classes of vehicles.

URBAN TOLL GATES

So, where and when may urban toll gates be justified? An obvious case is a toll gate to finance the outstanding works on the Harare Airport Road, being the direct link from the Dieppe Road roundabout to Enterprise Road at Mutare Road, including the road-over-rail flyover over the National Railways of Zimbabwe (NRZ) marshalling yard. At the time being most traffic is forced to go East to Chiremba Road or West to Seke Road at the Dieppe Road roundabout, or the traffic is made to weave its way through Cranborne. Another example is on the completion of the missing links of the Harare Drive ring road, where a toll gate would be justified if it was installed on the leg from Kirkman Road to Willowvale Road. The link starts at Kirkman Road in Warren Hills, crosses the Bulawayo Road at Heroes Acre with a flyover, flies over Coventry Road and Lytton Road in Workington, and over the railway lines at Southerton, to link into the existing Harare Drive at Willowvale Road. This will provide a direct link for traffic that currently has to use circuitous alternative routes via either Kambuzuma or Belvedere. Another case is for a toll gate on the missing link of Harare Drive ring road from Twentydales in Hatfield to the roundabout on Mutare Road in Msasa, which will offer a much shorter alternative than the current route going past Mukuvisi Woodlands. Completion of the Harare Drive ring road will go a long way in catering for traffic that does not need or wish to pass through the central business district (CBD) to get from one end of town to the other. For example, one can now come from Chinhoyi and get on the road to Mutoko or Mutare by using Harare Drive without going near the CBD. This will help to decongest the CBD. The 3 remaining missing links of Harare Drive from Warren Hills to the Mutare Road could be done as one BOT concession, with no toll gate in the middle portion through Mainway Meadows due to the impracticality of tolling the high volume of local traffic therein.

CONGESTION IN THE CITY

The proponents of urban toll gates have suggested that these gates will mitigate the congestion in the central business district (CBD), by discouraging motorists by penalising them from venturing near the CBD, while also collecting much-needed revenue for the maintenance of the City's roads network.

However, the reality is that the prevailing chronic congestion in the CBD is as a result of several causes. The congestion is primarily due to the absence of an efficient and reliable public transport system, making self-driving to and from town a necessity for most people, thus contributing to the congestion.

The relevant authorities must implement a bus rapid transit (BRT) system, or bring back the Harare United Omnibus Company (HUOC), or similar, that used to run from the Rezende Street, Fourth Street and Market Square bus termini, with a clean, efficient and regular service, to offer commuters an alternative to self-drive to and from town. The newly-implemented punitive parking charges are already forcing motorists to park their vehicles on the periphery of the CBD, but the congestion still remains throughout most of the day, and it gets horrendous in the morning and evening peak periods. Due to lack of space, there is little scope for increasing the capacity of most of the roads in the CBD by providing additional lanes. The City of Harare needs to reinstate the computer-controlled traffic lights system to enhance the coordinated smoother flow of traffic in the CBD.

To counter the incessant power cuts that also often disrupt the traffic lights, the City also needs to consider installation of solar-powered traffic lights like the pilot scheme installed several years ago on Rotten Row near Prince Edward School, and more recently at the intersection of Samora Machel Avenue with Enterprise Road. Ironically, the City has recently been installing solar street lights on a few selected roads. The use of low-capacity commuter kombi mini-buses also contributes to the congestion, especially in the Western parts of downtown. The plan to rank the mini-buses outside the CBD may help, but the congestion will still require more innovations.

A proposal for an elevated monorail train like the one in Sydney, Australia, may go a long way in facilitating the movement of commuters across town, from say Fourth Street to Market Square. The monorail trains could run on a regular schedule in a loop along Samora Machel Avenue, Fourth Street, Robert Mugabe Road and Rotten Row, with stops at strategic locations along to route to pick and drop commuters. The Gautrain in South Africa is a good example of an efficient and modern public transport system, albeit allegedly elitist due to the apparently high price of the tickets. The proposed Chitungwiza commuter rail project, which would cater for the commuters to and from Harare, the “freedom” trains to Ruwa and Mufakose, if run efficiently, would offer a viable alternative to road transport for a significant number of commuters. Otherwise, it is difficult to visualise how urban toll gates would help the motorist, who would expect in return to see and get tangible benefits for the service that he or she may be made to pay for. Electronic toll gates where vehicles do not need to stop are obviously the way of the future of tolling. But e-tolling comes with a huge price tag, both for the initial installation as well as the operation and maintenance of the toll gates. It is not uncommon for a toll gate to cost more to install and operate than the revenue it may ever generate, at reasonable toll levels.

So any proposal to install toll gates must be preceded by elaborate and detailed feasibility studies to establish a positive cost-benefit analysis thereof. In the meantime, it therefore may be more efficient and convenient to increase the fuel levy and vehicle licence fees, which road user charges ZINARA is already collecting from every motor vehicle that travels on the roads. Otherwise, there may be no justification, or benefits, for urban toll gates on the existing roads. It may be a simple case for ZiNaRA to ensure that the levels of road user charges that it collects are commensurate with the budgetary requirements for the maintenance of the national road networks, including those in urban and rural areas.

Engineer Musarurwa is a consulting road engineer. He is a former chairman of the inaugural ZINARA board. He writes in his personal capacity. bernardmusarurwa@gmail.com Facebook/Eng Bernard Musarurwa

ZIE October 2015 Freshers

Members listed below have their ZIE Membership Certificates ready for collection. They should get in touch with Alice on 04-746821 with regard to the requisite ZIE subscriptions. For ECZ registration the admitted 'member' has to attach a copy one's ZIE Membership Certificate and passport-size photo on the respective ECZ form. The duly completed form should be submitted to ZIE Offices together with the associated processing fee and annual licence fee of:

a) \$60.00 + \$75.00 = \$135.00 (Professional Engineer)

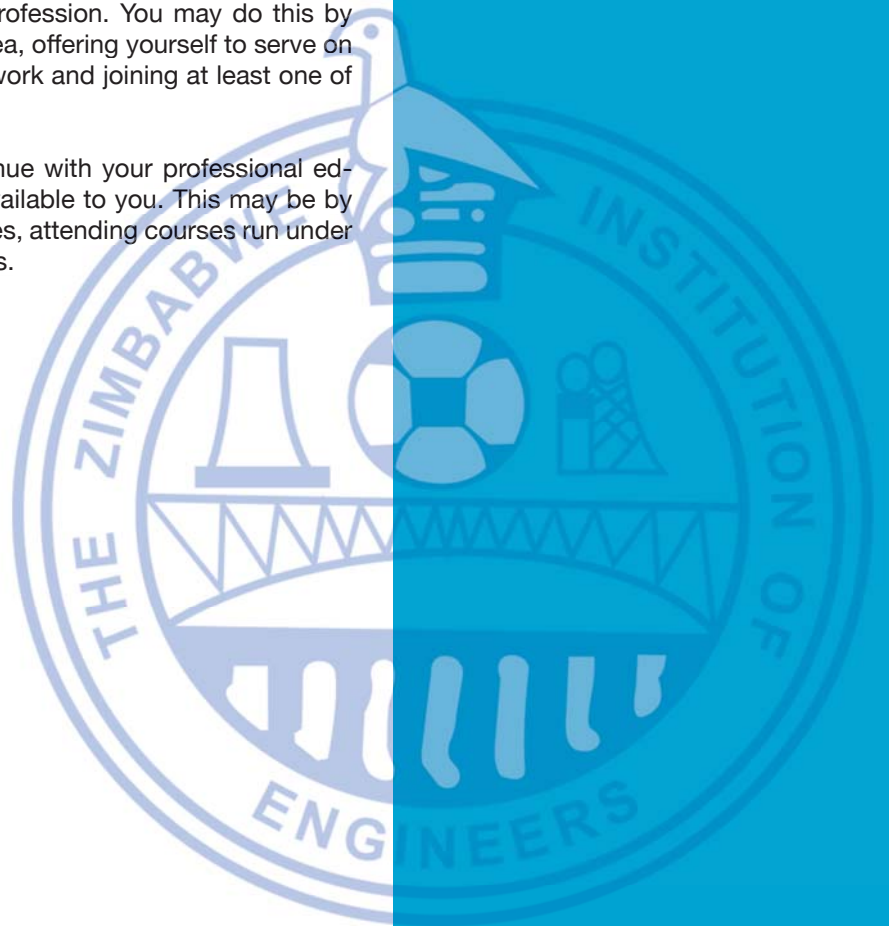
b) \$50.00 + \$35.00 = \$85.00 (Professional Engineering Technician)

To the members listed below, the ZIE Membership Committee welcomes your application for membership. The decision is that you be granted membership in the named grade. Congratulations and welcome to the Institution. Your membership number is as stated and you are advised to quote the number on any correspondence with the Institution.

The committee is most anxious that you should play an active role in the affairs of the ZIE in advancement of the engineering profession. You may do this by participating in events organized by your local area, offering yourself to serve on the various sub-committees or to assist in their work and joining at least one of the specialist divisions of the Institution.

The committee further encourages you to continue with your professional education and development by whatever means available to you. This may be by private studies, attending talks, presenting lectures, attending courses run under the banner of ZIE or other reputable organisations.

ALEXANDER E. NYONI Member ZIE911621
BEATRICE WATUNGWA Technician ZIE155372
BILLY MUKASA Member ZIE155483
CARL F. PARADZAI Member ZIE133297
CHARLES MUDZAMIRI Member ZIE155164
COUSINS MANASE Member ZIE155450
DARLINGTON ROPA Member ZIE155414
DOUGLAS GAPARA Member ZIE143948
ESROM T. NGOSHI Technician ZIE155196
FELANI MSIPA Member ZIE155003
GIFT MHLANGA Technician ZIE144339
HERBERT I. DZIKATIRI Technician ZIE155146
HUANG FUAN Technician Temp ZIE155484
INNOCENT CHINYANGA Member ZIE155246
KUDZAI NYABANGA Member ZIE073732
MARTIN MUDEKE Technician ZIE144378
MORDEN MANYOWA Technician ZIE 155452
NKOSANA H. NDLOVU Member ZIE111184
NYARARAI J. CHIPANDAMBIRA Member ZIE133298
REYNOLD M. MHLAHO Technician ZIE155363
TAFIREI MARINDIRE Technician ZIE155234
TAONA S. JAKACHIRA Member ZIE155448
TAVENGWA MANDIRA Technician ZIE155449
TENDAIVANHU Z. MADZIKANDA Member ZIE155392
THABANI CHINHARA Member ZIE154971
THINA MOYO Technician ZIE155256
TICHAONA JIMU Technician ZIE155117
WASHINGTON T. NYANGANI Technician ZIE155451
WELLINGTON KUTYA Member ZIE131725
WILSON CHAPENDAMA Technician ZIE155066
YVONNE N. CHIWOCHA Member ZIE155469



THE NATIONAL ENGINEERING STUDENTS AWARDS COMPETITION 2015.

The 2015 National Engineering Students Award Competition (NESAC) was bigger and better than the previous edition, attracting more than 500 delegates from industry and tertiary institutions countrywide. This year's NESAC was in partnership with TechnoMag, a leading ICT e-magazine, and was held in conjunction with the Ministry of Higher and Tertiary Education, Science and Technology Development and the Ministry of ICT, Postal and Courier Services. TechnoMag, were showcasing their innovative Tech@School brand, which is a career guidance platform for higher and tertiary education students.

The event started with an official opening speech read by the Permanent Secretary in the Ministry of Higher and Tertiary Education, Science and Technology Development (MHTESTD), Dr Mapuranga on behalf of the Minister, Professor Jonathan Moyo. The ministry applauded the NESAC and Tech@School initiatives as contributing fundamentally to the main clusters of the ZIMASSET. The current challenges the country is facing require home grown solutions; and Zimbabwe has a wide intellect base, which is not being exploited to the maximum due to lack of investment in research and development (R & D). The Minister highlighted that it was within the mandate of the MHTESTD to expose technological prowess in Zimbabwe, and the Ministry assured NESAC and Tech@School their full support in promoting innovation through enabling policies. Students and industry need to have a symbiotic relationship. While students require exposure of what is happening in industry through career guidance and internships; industry can benefit from commercialising the innovative projects from the students. This relationship can transform the economy significantly.

An official in the Ministry of ICT, Postal and Courier Services then read a speech on behalf of the deputy minister highlighting that since the world is now a global village, ICT has now become the backbone of industry. Dr Sanzan Diarra, ZIE CEO and Mr Toneo Rutsito CEO for TechnoMag then gave overviews of NESAC and TechnoMag respectively.

Renowned entrepreneurs and industry captains came and gave brief inspirational backgrounds and highlights of their careers to the students during the Tech@School career guidance session. The speakers included ZERA CEO, Eng. Gloria Magombo, hospitality guru Dr Shingi Munyeza, Econet Wireless CEO, Mr Douglas Mboweni and NetOne CEO, Eng. Reward Kangai. The question and answer session that followed was a free platform for students to direct questions and or concerns to the specific presenters; who responded to the questions adequately. One popular concern that got a lot of support from all delegates was that there was no transparency in the offering of opportunities by industry, especially to the students requiring attachment, citing that if one does not know anyone in a company, they were not likely to get attached. The students mentioned sad cases where certain students never got attached until they returned to school. Captains of industry noted the concern and assured the students that corrective measures would be put in place.

The eight university students who excelled in the preliminaries at CUT, HIT, NUST and UZ, presented their NESAC projects, which were deemed to be feasible for commercialisation. The projects are as follows:

POSITION	STUDENT	PROJECT
1	Chiwanga Auxiliah T	Design of a plant to produce virgin paper from the bagasse
2	Gondora Simbarashe R	An empirical regression model for crop drying kinetics for application in solar drying
3	Kanguru Kenneth	Design of a water powered pumping system for irrigation at Mwenje Dam in Mazowe catchment
4	Gongera Tinashe	Design of a portable bio-metric payroll and mobile payment system
5	Chisango Levious	Design of a solar powered automated greenhouse for extensive horticulture (flower) production in Zimbabwe
6	Mupazi Eddie	Design of a geo-polymer concentrate product using fly ash
7	Reza Ronald T	Remote GSM/WCDMA Base station security system
8	Mabasa Nativity	Design and automation of a combined furnace tap hole drilling machine and sealing mud gun

The first prize was retained by HIT, congratulations. Auxiliah T Chiwanga walked away with the mighty floating trophy and another take home trophy, both donated by the legendary Engineer Paul Mavhunga Kodzwa. NESAC appreciates this gesture by the Kodzwa family and appreciates Dr Gloria Kodzwa for all the support!

Though some captains of industry were present, NESAC believes there could be a wider representation and participation by industry in this event. During the NESAC projects presentation, the bulk of the audience was students who came to support their colleagues, with industry barely represented. The whole purpose of NESAC is students presenting their innovative ideas to industry for possible commercialisation. Industry stands to benefit by patenting newer concepts for cost effective production, but the uptake has been discouraging.

The edge of first world countries is hinged on their advancement in technology. Improved technology brings with it efficiencies in production which would make a country not only competitive, but self-sustaining as well. The richest countries in the world invest significantly in R & D to bring out innovation that make them excel. They consider R & D to be an integral strategy for success. USA topped the list of the big spenders on R & D with an annual investment of USD405.3b; followed by China with USD337.5b. Nearer to home, South Africa is ranked 30, with an investment of USD3.7b and Botswana with USD0.11b (2012 statistics). Zimbabwe spends so little that it is not even ranked. It is not by error that these countries are investing in R & D, they have come to understand the need and urgency for the same; for their success and survival!

Apart from countries, there are companies which have done very well and their success can be linked to their R & D expenditure. In 2013, Volkswagen ranked first on the list of big spenders on R & D; committing USD\$13.5 billion, which was 5.2% of their revenue; followed by Samsung, spending USD13.4b, being 6.4% of their revenue. The other companies are Intel with USD10.6b (20.1% of revenue) (to keep pace with Moore's Law a competing chip manufacturer in USA). Microsoft, Toyota, Johnson & Johnson and Google are also amongst the top spenders in R & D. A quick assessment of the aforesaid countries and companies has shown that their GDPs and revenues steadily continue on the increase and this can be attributed to R & D.

It is NESAC's hope that there will be a significant mind-set shift in Zimbabwe to embrace and appreciate the importance of R & D and invest in it. R & D can be the gateway to the end of the economic challenges bedeviling the country. R & D is the agenda, and not any other business.

