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SMART BUILDINGS

SAIEE THE OFFICIAL PUBLICATION OF THE SOUTH AFRICAN INSTITUTE OF ELECTRICAL ENGINEERS | MARCH 2021

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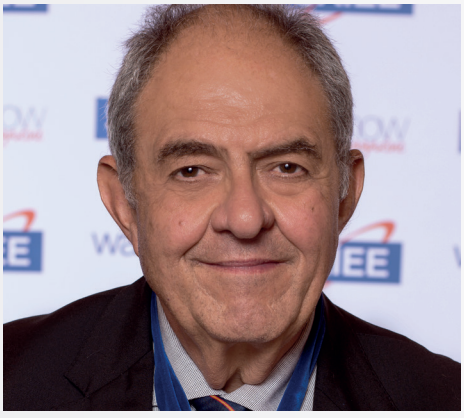

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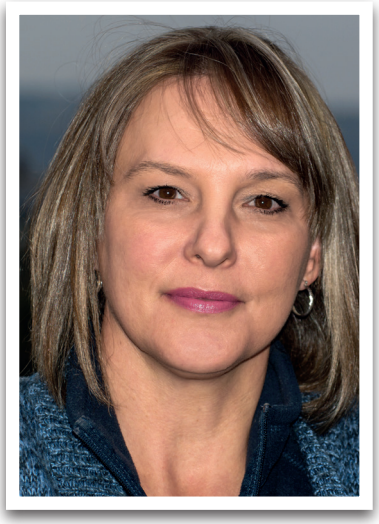

This issue of **watt**now features Smart Buildings.

Our first feature article, "New Criteria for a New, Smart Buildings Era", discusses the issue that Technology-enabling data capture and analysis, connectivity, monitoring, and control is becoming the new baseline for tomorrow's smart buildings. Understanding what it is and where it's headed is critical. Find it on page 30.

We look at building a smart home, which is no longer a technology of the future. Today, it is enabled by a wide variety of devices and services that consumers are embracing - and it is growing in numbers. Find the article on page 36.

As buildings become more connected, complex, and dynamic, there is a growing need for intelligent building technologies that provide data-driven insights to maximise operational efficiency, cut energy waste, and lower overall costs. This article, on page 40, "Smart Buildings and the Internet of Things (IoT)", explores how smart buildings leverage the IoT to create new opportunities for information gathering and sharing and its impact on buildings management and operations.

The April issue features Rotating Machines - and the deadline is the 5th of March. I encourage you to contribute to the **watt**now - which is for the members - by the members.

The SAIEE Annual General Meeting will be a virtual event, taking place on the 25th of March. Visit our website for more information.

Herewith the March issue - enjoy the read!

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SAIEE - latest developments

SY GOURRAH
2020 SAIEE PRESIDENT

Although the start of 2021 was not what we expected with the imposing of harsh lockdown just before New Year, we are glad to note that the infection rates have come down, and the lockdown regulations have recently been relaxed.

Worldwide, the number of new cases of Covid has dropped significantly, especially in the USA, India and South Africa.

However, we have experienced load shedding with the increased demand, urgent scheduled and unscheduled maintenance at the Power Stations. Cyclone Eloise has relentlessly caused storms and constant rainfall since 23 January, which has affected many municipalities, particularly their electrical networks, which has resulted in extended blackouts.

However, there is a lot we can learn when chaos is embraced and accepted. This has been proven as our staff continue to work from home, and we, as an institution, have been able to adapt and re-evaluate our current goals and strategies.

We will have to continue with our online meetings and webinars, and in-line with this, we will have our AGM online at the end of March. Given the circumstances, we have decided to cancel the annual banquet scheduled for the end of February to avoid any superspreader events.

We have appointed Leanetse Matutoane as Acting CEO until further notice.

The SAIEE Charge Reward Program has now been implemented. For example, the attendance of SAIEE events or meetings is now captured and recognised towards achieving an award of choice.

We are preparing the negotiations to implement a joint student competition between the IEEE and the SAIEE. Similarly, the formalities for implementing joint webinars between the AMEU and SAIEE are also close to being finalised.

In the meantime, please continue to practise safe social distancing, wear a mask in public, sanitise and keep safe.

S Gourrah | SAIEE President 2020
Pr. Eng | FSAIEE

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Dear Valuable SAIEE member,

SAIEE CHARGE REWARD PROGRAMME

Compliments of the new season to you and your family. 2021 is finally here, and we all look forward to a productive and healthy year ahead. As the second wave of Covid-19 continues to proceed unabated, 2021 is set to become another year of keeping safe and healthy by working from home. This, however, does not have to spell doom for your self-empowerment requirements as we are set to continue the trend of providing you with informative webinars to help with your professional development needs. As an added caveat to that, full attendance and participation in these technical engagements earn you as a member Charge Reward Programme points.

The Charge Reward Programme runs in cycles of 5 years. As a member, you have an opportunity period of 5 years (starting from December 2019) to earn these points, after which a new cycle begins, and all unused points are forfeited. Accumulated Charge points can be redeemed on various SAIEE activities like Training Academy courses and membership fees. To find out the amount of Charge point allocated to you, one needs to click on the unique link that was sent out to all members in good standing recently. That link is unique to each member and is not transferable. As a member, you are therefore encouraged to keep your membership in good standing by paying your membership fees for 2021.

Do not forget that now you can pay membership fees in instalments. If your fees are paid in full by the 31st of March 2021, the discounted membership fee is applicable.

As a parting shot, I encourage you to keep safe and earn those Charge Reward Points!
Please forward any comments/suggestions to improve to leanetse@saiee.org.za, and let's get the SAIEE working for you!

For more information, on how this programme works, click here.

Yours faithfully,

Leanetse Matutoane
Acting CEO

CHARGE REWARD PROGRAMME





MEMBER LOYALTY

We appreciate our Member's support for 110 years

REWARD

A unique reward programme exclusive to SAIEE Members

FEEDBACK

We received your feedback and we listened to added benefits

EARN POINTS

Earn Charge Rewards by attending events, courses or writing articles

SATISFACTION

We want you, our Valued Member to feel satisfied when working with us





LOYALTY PROGRAM

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QUALITY

We guarantee top quality events, courses, and services

SERVICE

We are here to serve you, our Valued Member better

RESPECT

We respect you and want to see value for your hard-earned money

SUPPORT

We are here to answer any queries you might have

For more information:

Visit your Membership Porthole on the SAIEE Website:
www.saiee.org.za

Alternatively, call Connie on 011 487 3003.

SAIEE
CHARGE
rewards programme

INDUSTRY AFFAIRS

SAIEE EDUCATION & TRAINING COMMITTEE REQUESTS YOUR SUPPORT

There is no doubt that our Electrical Engineering fraternity's future depends on the current Electrical Engineering students' consistency and growth. Sadly, there are several reasons why there is a decrease in graduates from various higher learning institutions. These include:

- Lack of financial assistance for students to embark and complete their studies; and
- Lack of availability for P1/P2 training for students to complete their studies.

For these reasons, SAIEE (through the Education and Training Committee) has been in the past, offering Electrical Engineering bursaries to qualifying SAIEE student members to improve the state of affairs.

Government supplements such initiatives, like that of the SAIEE. Its initiatives, such as the National Student Financial Aid Scheme (NSFAS), aim to help struggling students and close the financial gap. For the past 24 years, the Institution has allocated funds to help struggling students and offered various bursaries to assist with fees, and at times where possible, food and accommodation. This has also been made possible, through multiple partnerships and sponsorships the Institute has entered into. The Institute has also been working on a programme to assist students with P1 and P2 training opportunities.

To date, the Institute has assisted approximately 213 students, of which 206 have graduated. Last year, the Institute helped about ten students with bursaries to the value of R688 579. However, it is unfortunate that the Institute can only assist fewer students this coming year due to financial constraints and the current economic climate, making it clear that the struggle might continue in the upcoming years.

Therefore, we would like to approach you as SAIEE members for financial assistance, which could be donations, bursary or any form of sponsorship to assist our SAIEE Electrical Engineering students.

The SAIEE will highly appreciate your favourable consideration. If you can assist, please see below bank details for EFT payment and send proof of payment to reception@saiee.org.za

Name: SA Institute of Electrical
Bank: Standard Bank
Account number: 201547066
Reference: "Your surname + Student Fund."

Please do not hesitate to call Head Office at 011 487 3003 for more info.

Thank you. wn

Tshego Cornelius,
Chairperson
SAIEE Education & Training Committee

Hitachi ABB Power Grids partners with consortium in Angola on Africa's largest solar project

Hitachi ABB Power Grids to supply the main electrical infrastructure for one of the largest photovoltaic projects ever developed by MCA Group and Sun Africa consortium.

Hitachi ABB Power Grids has joined forces with Sun Africa LLC and M. Couto Alves S.A., part of the EPC conglomerate, on behalf of Angola's Ministry of Energy and Water, to supply the main electrical infrastructure to connect Sub-Saharan Africa's largest solar project to Angola's transmission.

Hitachi ABB Power Grids' scope of work will include the design, main power equipment supplies, testing and commissioning of the project. It is based on an in-depth grid impact study into the customer's unique requirements to determine in advance the best way to achieve the integration of the Government of Angola's renewable energy programme. The initial stage of the project will include the construction of a 188 MWp solar power plant and six other solar power plants to electrify homes in the southern African country.

"This is one of the largest and most significant photovoltaic projects delivered," says Niklas Persson, Managing Director of Hitachi ABB Power Grids' Grid Integration business unit. "We are contributing pioneering technology to enable MCA to integrate more renewables and electrify rural areas, while maintaining a stable network. Our role is to develop the project from idea to energisation – ultimately shaping a reliable and sustainable energy future for Angola."

"We are pleased to partner with Hitachi ABB Power Grids as we share its commitment to provide low-cost clean energy throughout the African continent," comments Nikola Krneta, CEO of Sun Africa. "This is an incredible accomplishment given the ongoing financing and other challenges due to the Covid-19 pandemic. It demonstrates the dedication, capabilities and the resilience of all our partners to overcome the unique challenges together."

"We appreciate our trusted partners, such as ING Bank, SEK, EKN, DBSA and KSURE, and the support we have received from the Swedish and US governments, in helping bring this project to fruition. We also thank the Government of Angola for its continued support throughout the development process," concludes Krneta.

President and CEO of the MCA Group, Manuel Couto Alves, says "the project will have a huge positive impact on Angola and specifically its economy, as more people are guaranteed access to affordable and clean energy. He added that the project will significantly increase the country's share of renewable energy."

Angola is Africa's seventh largest nation, with approximately 30 million inhabitants and a rapidly growing economy. The initiative is being financed under the Swedish Export Credit System (the Swedish Export Credit Corporation and Swedish Export Credit Agency), which aims to raise investment in Swedish sustainable technology globally.

The project supports the UN's Sustainable Development Goal 7 – ensuring that all people have access to affordable, reliable, sustainable and modern energy for all. The initiative will also help to increase the share of renewable energy in the global energy mix. wn

GLOBAL INNOVATION AWARD FOR SANDVIK

Simon Andrews, Managing Drector at Sandvik Mining and Rock Solutions.

Sandvik AutoMine® and OptiMine® have been recognised by the 2020 Global Autonomous Mining Solutions Product Leadership Award by Frost & Sullivan.

Simon Andrews, managing director at Sandvik Mining and Rock Solutions, is thrilled to announce that Sandvik AutoMine® and OptiMine® have been recognised by the 2020 Global Autonomous Mining Solutions Product Leadership Award by Frost & Sullivan.

Frost & Sullivan Best Practices Awards recognise companies in a variety of regional and global markets for demonstrating outstanding achievement and superior performance in areas such as leadership, technological innovation, customer service and strategic product development.

"Sandvik is the only mining equipment and solutions company that was awarded in our 2020 Class of Top 50 Digital Best-practitioners across the Industrial and Energy Space," says Rohit Karthikeyan, Industry Analyst at Frost & Sullivan.

The AutoMine® system is an innovative automation solution that comprises AutoMine® Underground and AutoMine® Surface Drilling, enabling customers to scale up the mining automation at their own pace.

The AutoMine® Underground product family includes the sub-products AutoMine® Tele-Remote, AutoMine® Lite, AutoMine® Multi-Lite, and AutoMine® Fleet. AutoMine® Surface Drilling is an automation solution available for a wide range of Sandvik's iSeries top hammer, down-the-hole and rotary drills.

"One of the biggest competitive differentiating factors is that Sandvik is a mining equipment/mining process and digital solutions provider," says Karthikeyan. "This expertise in technical, industrial and digital domains enables it to deliver compelling offerings that outperform peers' products to the market."

Riku Pulli, President, Rock Drills and Technologies Division, Sandvik Mining and Rock Solutions, says: "We are continuously developing innovative technologies that benefit our customers' operations and this award indicates the success that Sandvik has achieved with our automation offering over the years." wn

Electrical loggers help reduce facilities' energy costs

Fluke 1732 and 1734 3-Phase Electrical Energy Loggers find opportunities for critical energy savings.

Energy is significant cost at any industrial facility, and while managers view energy as an unavoidable expense, it's really a variable cost that can be monitored and managed, significantly improving the bottom line.

COMTEST's Fluke 1732/1734 Three-Phase Energy Loggers are powerful tools designed to easily identify sources of electrical energy waste. Easy set-up/use, capture key measurements — voltage, current, power, power factor, plus variables i.e. temperature. 1732/1734 enable managers to understand energy usage and correlate it to activities. They are also Fluke Connect® compatible. Data can be viewed from anywhere via the Fluke Connect mobile App, potentially reducing the number of times a technician must open a panel while wearing full protective equipment.
The 1732/1734 also include new Energy Analyze Plus App software, delivering more advanced analysis capabilities to better correlate data, making for better decisions.

Rated 600 V CAT IV/1000 V CAT III (highest in industry) — for safe use at the service entrance and downstream. Contact COMTEST on 010 595 1821 or sales@comtest.co.za for information on Fluke 1732 and 1734 3-Phase Electrical Energy Loggers, or for upcoming seminars, demos or to locate the nearest dealer. wn

The new Fluke 1732 and 1734 Three-Phase Energy Loggers

High-level pressure sensors for complete systems

KELLERs standard product catalog covers most applications for pressure measurement technology. However, there are often great benefits to optimising pressure sensors specifically for use and integration into higher-level complete systems.

KELLER's modular product design offers great flexibility and allows customer-specific adaptations to be made without causing soaring costs – even for small production runs.

SHARING EXPERTISE TO CREATE THE PERFECT SENSOR SOLUTIONS

KELLER has 50 years experience in countless challenging projects in the field of piezo-resistive pressure measurement technology. Applications that at first glance may seem trivial, can actually prove to be highly complex on closer analysis. By taking the actual usage conditions of the sensor into consideration right from the outset, Keller has achieved major improvements in effectiveness and durability.

Keller has found that a mutual exchange of expertise with customers has been central to their success, and sharing that knowledge is what has enabled Keller to find the best sensor solutions. wn

Contact INSTROTECH for more information on 010 595 1831 or sales@instrotech.co.za

Firm Local Base Sets Up Zest WEG For Africa Growth

Juliano Vargas, CEO at Zest WEG

Establishing a strong local manufacturing base in South Africa has been integral to Zest WEG's success over the past decade, building the economy and providing an important springboard into Africa.

This process has aligned closely with the strategic approach of Brazil-based parent organisation WEG, which prioritises its member companies' capability, efficiency and innovation on a local level, according to Juliano Vargas, CEO of Zest WEG.

"This has required considerable investment in our local production capacity and skills base," says Vargas. "The outcome to date has been very successful, with Zest WEG developing its local structure and supply chain , while working to world class standards and supported by WEG innovation."

As an example, he notes that Zest WEG today achieves almost 90% local content capability for its transformers and more than 70% local content capability for other products such as E-houses and panels. These products form part of the company's wide range of solutions, including electric motors, drives, switchgear, energy generation, electrical infrastructure, and generator sets, with different levels of localisation.

This locally developed supply chain delivers various benefits to customers, says Vargas. These include short lead times, as there is little reliance on Europe, China or the US for parts and components.

"The impacts to our market are considerable, and we have more predictability and control of our supply chain," he says. The company has embraced South Africa's commitment to transformation, achieving Level 1 B-BBEE status and investing heavily in training and enterprise development.

It helped that WEG is a member of the BRICS Business Council (representing Brazil), so it has over the years been able to engage with South African authorities about local content requirements and industry development opportunities.

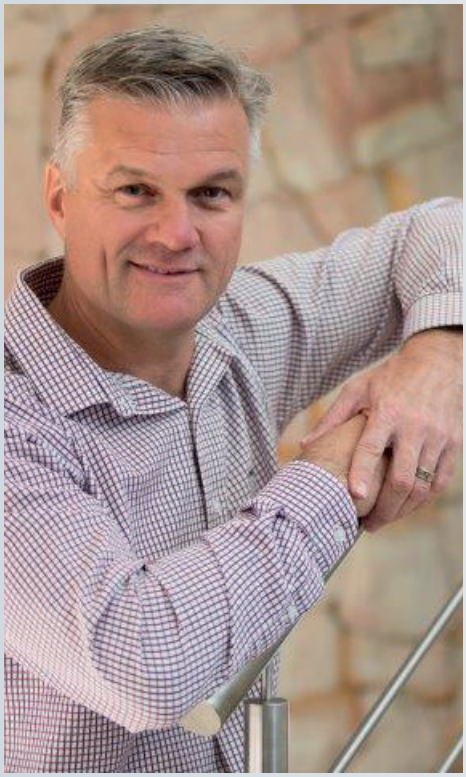
"Our business – both in Brazil and South Africa – has put our weight behind economic empowerment and transformation, focusing heavily on local suppliers and local skills," he says.

Zest WEG's investment in human capital exceeds the portion of payroll demanded by B-BBEE in local training. Among other initiatives is a bursary programme, and it will shortly employ its third electrical engineer from this scheme.

Vargas highlights the powerful launchpad that this groundwork has created for growing the company's footprint in Africa, where it also applies its local development philosophy by partnering with in-country Value Added Resellers (VARs). wn

The Zest WEG panel manufacturing facility in Robertsham.

Genset failure can cost companies dearly during load shedding



Michael van Niekerk
ASP Fire CEO

A back-up power supply such as gensets is critical to reduce overall electricity demand during load-shedding. However, it is vital that such important equipment is maintained properly and serviced regularly to be able to cope with such outages.

Genset failure due to a lack of proper maintenance poses a significant business risk. Here you are not only looking at protecting the value of your assets, but what this genset actually supports and protects, argues ASP Fire CEO Michael van Niekerk.

The first issue is fuel supply. This can range from an integral tank at the base of the genset to a 2 200 litre Bulk To Farm (BTF) tank or a 210 litre drum. Here the apparent danger is the presence of flammable liquids, especially in terms of refuelling and any spillages.

Another issue is vegetation or combustible material encroaching on a genset, which can often be tucked away somewhere as an afterthought. The genset itself is a potential source of fire ignition due to the high temperatures of the manifold. If the genset is indoors, these temperatures can be considerable, especially if the ventilation is inadequate.

Proper maintenance is therefore essential. If an oil filter has not been screwed on tightly enough, for example, it can result in an oil leak. If oil sprays onto a hot manifold as a result of this, a fire will ignite. Thereafter the temperature will build quickly to a point where entrance into such a room is well-nigh impossible.

Companies and individuals often lack the correct fire-fighting equipment to deal with genset fires. For example, a dry-chemical fire extinguisher will douse the flames, but not cool down any hot surfaces. A carbon-dioxide fire extinguisher, on the other hand, might cool down the overheated genset itself, but this can damage the equipment due to thermal shock.
Gensets do not only supply standby power, but are essential to the day-to-day operations of institutions such as financial services and medical care. Hospitals, for example, will often have back-up gensets, all in the same room. If a fire breaks out in one genset, the rest of the equipment is immediately at risk.

ASP Fire recommends an automatic fire-suppression system for such environments. It is unmonitored equipment, with a high fire hazard due to the presence of both flammable liquids and combustible products, as well as electricity. "The probability of something going wrong may be slim in the mind of the end user, but in the likelihood that it does, the consequences can be potentially disastrous and even fatal," warns van Niekerk.

In terms of fixed fire-suppression systems, a range of options is available. Sprinklers are an obvious choice, but this depends on whether or not such a system has been installed already. If not, the cost can be prohibitive, as sufficient hydraulic capacity has to be guaranteed, which means that cheaper and more effective alternatives need to be investigated.

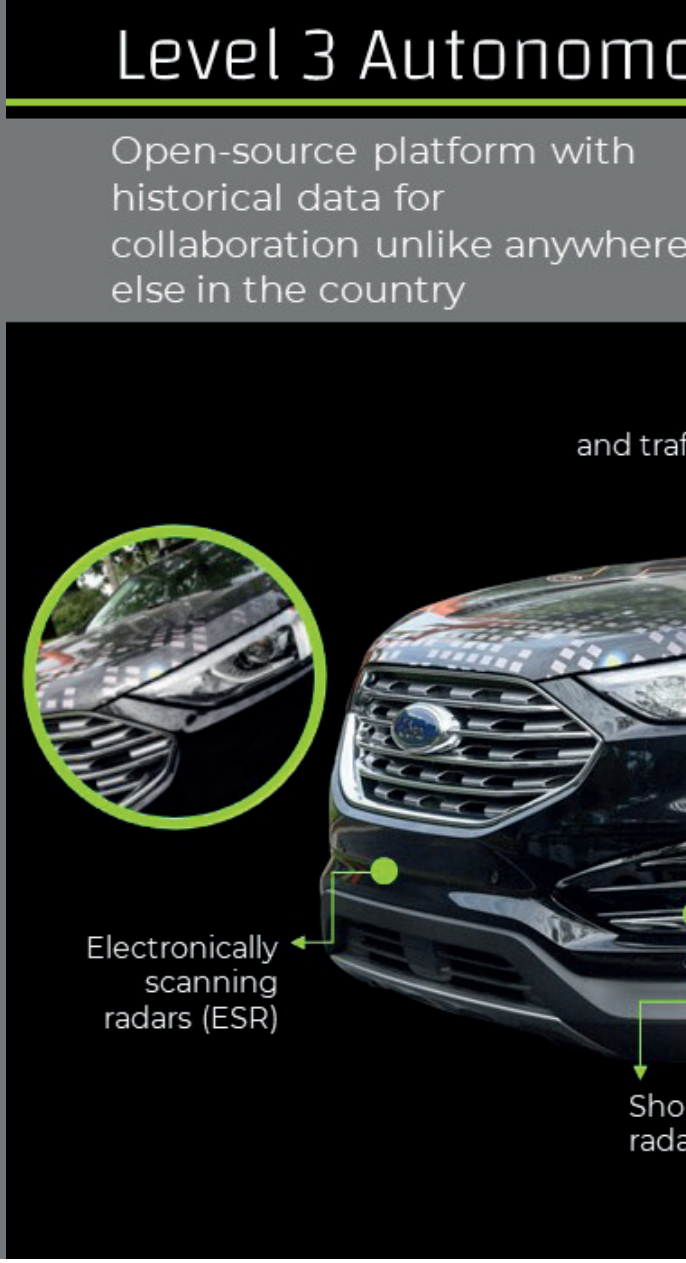
The next best option is a clean-gas fire-suppression system. "The problem with gensets and the heat they produce is that the rooms they are located in are normally ventilated, which compromises the integrity of the enclosure. If you discharge a gas system in this environment, it is therefore not possible to maintain the concentration of that gas for a sufficient period to suppress the fire. This means that clean-gas systems are not ideal in these scenarios," explains van Niekerk.

The third option is a water- or foam -mist fire-suppression system that only uses a minimal quantity of water. It is also far more cost-effective than the clean gases themselves necessary to recharge the system. This supresses a fire rapidly, cooling any remaining hot spots down to below the automatic ignition temperature.

A standalone water-mist fire-suppression system with mechanical activation should be inspected monthly. wn

Premier Smart City Launches Test Vehicle For Use by Public

Peachtree Corners – the nation's first smart city environment powered by real-world infrastructure and next-generation connectivity – today announced the addition of a mobility research and test vehicle designed to help companies and organizations develop and prove out new advanced mobility and autonomous technologies in a living laboratory environment.



The Ford Edge-based test vehicle is equipped with Level 3 autonomous capabilities on an open-source platform – differentiated from other test vehicles that either only test within closed courses or are limited to a host company's proprietary platform.

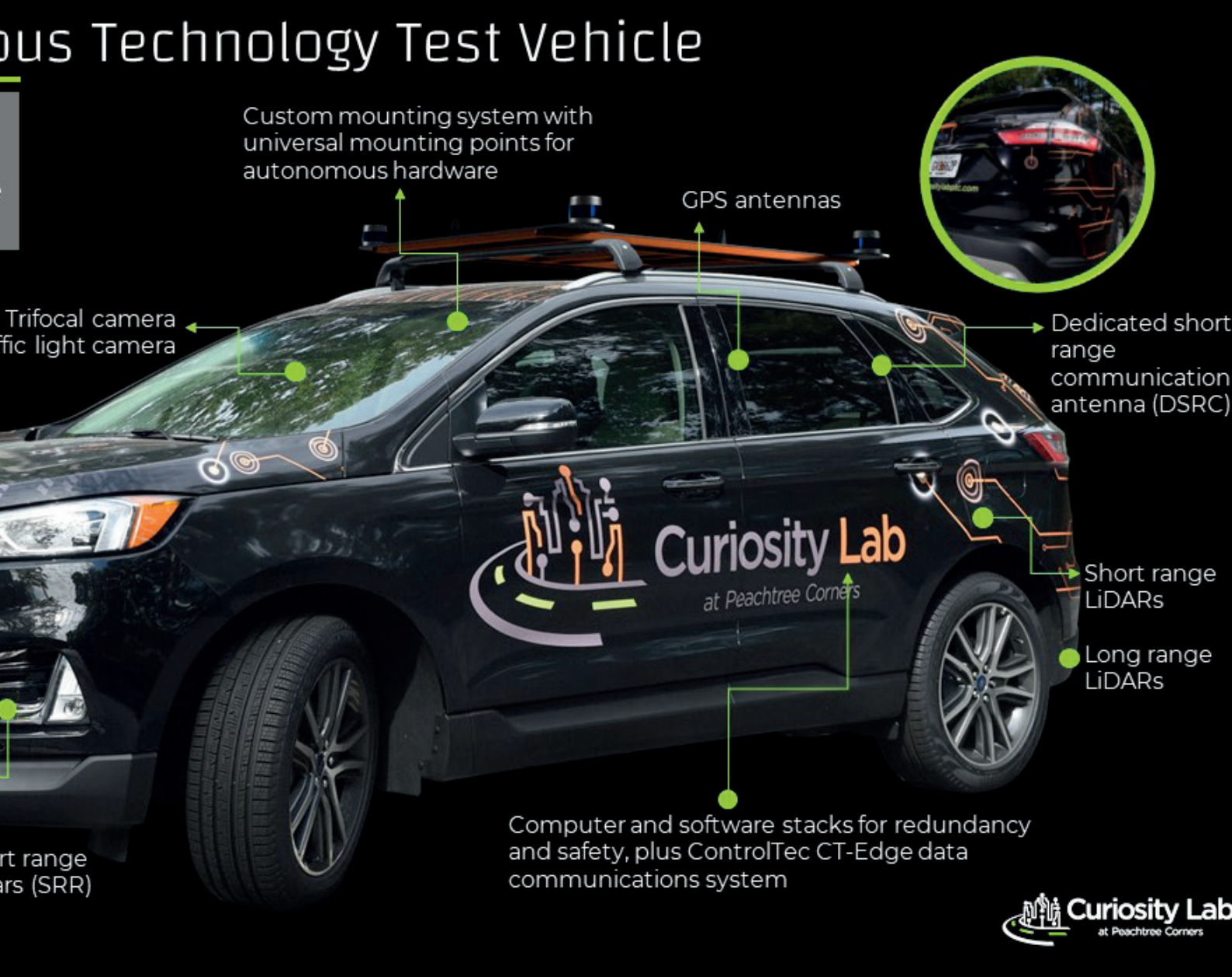
Companies working on full autonomous driving systems, mapping, light detection/ranging (LiDAR), cameras/computer vision, radar, V2X systems and/or data/simulation are invited to Curiosity Lab at Peachtree Corners to test.

The test vehicle will be interacting with city-owned smart infrastructure, allowing technologies to be developed with real-world scenarios, including thousands of local residents who live, work and drive alongside the vehicle.

The test vehicle is equipped with a large rooftop rack, giving companies the ability to attach their own LiDAR and other sensors for testing. Engineers may easily access historical AV data directly from Ford's autonomous vehicle dataset.

Invaluable data from the sensors and devices on the test vehicle, as well as across city infrastructure, is analyzed and made available to engineers through the city's central control room – giving developers a unique advantage as they work to mature new technologies.

"There have been many mobility test vehicles introduced these past several years, but at Curiosity Lab at Peachtree Corners, companies have the opportunity to develop new technologies on an open source mobility platform alongside other emerging solutions, while also leveraging actual smart infrastructure wholly owned by the city – not proprietary, closed platforms in closed track environments," said Brandon Branham, chief technology officer and



assistant city manager of Peachtree Corners. "The Ford Edge based test platform here operates in a living lab environment alongside residents that are walking and driving on the same public street. And we're the first city in the world to insure a public roadway for both driven and driverless vehicle activity – giving companies a true advantage as they look to learn and improve their technologies before they 'graduate' and scale."

"We're proud to have delivered multiple smart city firsts to date, and the introduction of an open-source platform for mobility research and testing is yet another milestone – giving companies the ability to develop new technologies in an actual city – complete with obstacles and everyday challenges that autonomous machines need to learn how to face," said Brian Johnson, city manager of Peachtree Corners.

"We've already had successful long-term tests of autonomous shuttles, Ollie, transporting residents – and we are excited to have the opportunity to have a platform that will help move the world even closer to fulfilling the vision of fully autonomous vehicles operating safely in a city." wn

Mr Ramaphosa delivers conciliatory speech at Mining Indaba

South African president Cyril Ramaphosa sounded many positive notes in his keynote address to Mining Indaba but did not indicate the direction of mining policy over the next 12 months, other than saying it would be investor friendly.

BY JONATHAN VEERAN
GARYN RAPSON
KATE COLLIER,
GILLIAN NIVEN
LIZLE LOUW
MERLITA KENNEDY
RITA SPALDING

Webber Wentzel's mining team welcomed President Cyril Ramaphosa's clear intention, expressed in his keynote address to the 27th Investing in African Mining Indaba, that government and the industry will work together to rebuild the country, post-Covid-19.

The president sounded a positive note, a welcome contrast to some of the keynote addresses from South Africa's mining ministers in the past, which were sometimes perceived as critical of the industry and investor unfriendly. However, the president delivered no details on government's expected policy path for the industry in 2021. While this was disappointing, it might be explained by the absence of minerals and energy minister Gwede Mantashe, who was unable to deliver his speech because of a recent bereavement.

The following are the key areas noted by Webber Wentzel's mining specialists.

ENVIRONMENT

The president's acknowledgment that sustainable mining is critical in unlocking innovation, competition and ensuring progressive societal impacts as well as the re-emphasis of the importance of ESG is welcomed messaging. It is, however, unfortunate that specifics on how government plans on reforming the existing regulatory framework was not provided.

It has now become increasingly important that government fulfils its undertaking to society and industry in relation to the facilitation of renewable and clean energy developments, in addition to its assertion of sustainable mining, by implementing holistically driven policy reform.

HEALTH AND SAFETY

The president's emphasis on the need for employers to continue prioritizing safety and health was encouraging. He also showed government's understanding of the interconnections between employees, their families, and communities and how education, and public health protocols, in the workplace have an influence on employees' wider networks.

The importance of preventing fatalities was also raised in the president's speech. It is to be hoped that this will be followed by more discussions about the issues this year and finding solutions, from a regulatory and legislative perspective, to prevent fatalities.

The president's comments about making South Africa's mining industry more innovative and modern were also relevant, not only for the private sector but also for the department of mineral resources and energy's processes and systems. Modernisation of the DMRE systems would support a more investor-friendly environment.

EMPLOYMENT

While the president encouraged the mining industry to create jobs, he also mentioned the importance of technological advancement – which

are not exclusive goals. However, what was lacking was a mention of the contribution that the government would make to encourage companies to modernize and create higher-skilled opportunities – for example, by offering tax breaks or other incentives.

The team was encouraged by the president's acknowledgement of co-operation with the mining industry on rolling out vaccines, given the industry's successful management of diseases such as TB and HIV. The industry is keen to move ahead with the rollout.

COMMUNITIES

The team was pleased to hear the president urge the industry to foster inclusion, especially of women, and say that Social and Labour Plans are critical to ensure everyone benefits and no-one is left behind. He also said mining companies' commitment to their SLPs should go beyond compliance, but unfortunately gave no further details. The team noted the President's comments that mining companies should foster an inclusive approach in all aspects of mining with specific emphasis on ownership, participation in management and procurement.

It will be interesting to see how this will be executed. The President also commented that in order to grow mining activity, the South African government is working with the industry to formalize small scale and artisanal mining. This remains a topical issue in South Africa.

ENERGY

The industry had hoped for more detail on the alternative energy that government intends to promote, which could be confined to renewables, or could extend to other sources like hydrogen and clean fuels. There was also no further information on streamlining legislation and how government was managing the just transition.

Companies that are trying to find innovative solutions to South Africa's green energy future are encountering regulatory challenges. These challenges have been raised with government over the past two years, but the president did not refer to any solutions. wn

"Rebuilding with Purpose"

CESA 2021 theme highlights importance of quality, integrity and accountability in South Africa's road to recovery

Consulting Engineers South Africa's (CESA) President, Sugen Pillay, presented his presidential message and theme for the year at a virtual event this morning attended by media, CESA members, and infrastructure stakeholders from around South Africa. Pillay revealed his 2021 theme as 'Rebuilding with Purpose'.

BY I BONOLO NKGODI

"When I delivered my presidential address this time last year, I had little idea of what was to come in 2020 – the unprecedented trials and tribulations that would face our industry, our country, and our global society," began Pillay. "However, the words I said then, 12 months ago, were more apt than I could have imagined. You might remember, I said: 'We are certainly in a period of great change. In times such as these, there is always uncertainty as to how events may unfold, and a certain amount of trepidation as to what the change may entail, and what the future may hold.' This was before COVID-19 reached our shores."

However, Pillay said that despite the uncertainly and trepidation, South Africa is facing these economic and social challenges with resilience and determination. He cited the South African Economic Reconstruction and Recovery Plan, which has created some much-needed optimism for the consulting engineering industry.

"Despite the hardships facing our country – hardships we cannot expect to dissipate soon – CESA remains committed to improving the business landscape and playing our part in creating a conducive procurement environment as well as shaping the requisite talent to see that our country's developmental goals are met. We aim to mould our industry of consulting engineers to ensure we continue to protect lives through quality and safe infrastructure, and protect livelihoods through the creation of economic opportunities for the wider construction value chain," he said.

Reflecting on the past year, Pillay said CESA had made progress in strengthening the relationship between government and the private sector, showcased by the association's involvement in the Sustainable Infrastructure Development Symposium South Africa in June last year.

"However, it has become clear that South Africa still faces many of the same challenges as in prior years, with an ongoing demise of public decision-making processes, a lack of checks and balances within procurement systems, and a loss of accountability of those tasked with leading change."

He mentioned President Ramaphosa's slow and laborious efforts to curb corruption, and the poor results from the 2020 Auditor-General's report as

From left: Mr Chris Campbell, CEO CESA and Mr Sugen Pillay, CESA President.

examples. "We also face continuously delayed infrastructure delivery, and those projects which do see progress are hampered by obstructions from the so-called construction mafia."

However, Pillay chose to highlight the good, and not dwell on the negative. He said that last year showed a greater focus on people rather than profit.

"As compassion and empathy gained momentum amid a public health crisis, we are now seeing an industry of people who act with more care for others, and we hope this spirit of ubuntu continues through 2021 as we stand together. Ultimately this spirit of ubuntu and caretaking is what CESA aims to promote to industry – to protect lives and livelihoods, and consider the tangible social and economic outcomes of our work."

REBUILDING

Unpacking the 2021 theme, Pillay highlighted the importance of democracy. "As we have seen recently in the US, democracies are precious and fragile, and need to be nurtured. Democracy will become less and less meaningful to those in our society that are stuck in poverty, with no access to basic services, and with no opportunities. Thus, as we embark on this massive rebuilding project, let us try to rebuild in a conscious and mindful manner, so that rebuilding doesn't just become about providing infrastructure, but that it is consciously engineered to address poverty, inequality, and unemployment."

Importantly, he said that as we rebuild, industry must be understanding of the immediate needs of society. "Without doubt, the most pressing requirement is the roll out of the COVID-19 vaccine. CESA encourages the industry to be patient and understanding as resources are diverted to funding the vaccine initiative. CESA and its members have the necessary skills and expertise to assist with the massive vaccine rollout undertaking, and offers it services to assist in this regard.

We need to be aware that municipal budgets set for infrastructure may be diverted. And we should stand ready to assist in infrastructure that might be prioritised, such as hospitals and clinics." He called on industry to contribute where they can, to go beyond the call of duty, and work together with the state to address issues around resources and governance.

Pillay presented various opportunities which could be leveraged in 2021 to

strengthen the industry and economy:

- Greater community involvement in the development of infrastructure, both new and maintained, for the benefit of end-users as well as the creation of jobs.
- A decentralised approach to spatial planning and development, spurred by the decreased emphasis on metros due to remote work and teleconferencing.
- Increased attention to agriculture and surrounding services, as the agriculture sector is performing well and surrounding areas are prime for development.
- Greater focus on maintenance, which is vital due to the poor performance of our infrastructure, as highlighted in the recent SAICE Infrastructure Report Card.

"For rebuilding to happen effectively, we need collaboration between all spheres of government. We need coordination between all role players, and we need to partner to build state capacity and ensure the necessary skills development takes place." He highlighted the recent emphasis on professionalisation of the public service and said that CESA stands ready to support this initiative.

PURPOSE

"In our efforts to rebuild, let us maintain our focus and purpose on doing so with quality and integrity. If we are to truly save lives and livelihoods, we must operate with an unwavering focus on value, reliability, and sustainability." CESA's emphasis on quality has been further highlighted by the new mandated management systems for CESA members based on international standards for quality, integrity, and sustainability. This demonstrates CESA's commitment to accountability, which Pillay says he hopes to see reflected in public sector spheres.

Pillay also mentioned the Draft Public Procurement Bill which has seen industry lobby for a more transparent procurement process with decentralised authority structures to ensure the necessary checks and balances are in place. "CESA calls on policymakers to listen to the voices of industry and ensure the bill promotes integrity, localisation, transparency, and accountability," he said.

Finally, Pillay suggested an "immune booster" in South Africa's recovery plan: "The identified SIPS will play a decisive role in economic recovery, if they can break ground. Getting a few selected projects off the ground early will be valuable in giving impetus to the programme, providing reassurance to the public, and encouraging investment confidence in South Africa."

Looking forward to industry developments, Pillay mentioned the upcoming CESA Annual Infrastructure Indaba, the FIDIC Africa Infrastructure Conference, as well as the newly formed Construction Alliance South Africa (CASA) as key in creating constructive engagements and industry coordination.

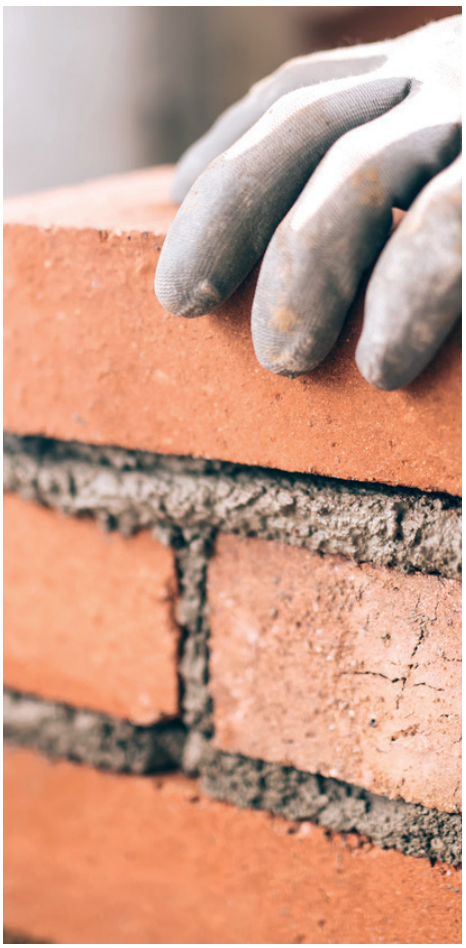
RECOVERY

In conclusion, Pillay said that CESA is committed to contributing to effective and sustainable solutions, and will continue to guide its members and the industry at large towards more transparent and prosperous infrastructure delivery processes.

"Every person in South Africa stands to benefit from this goal which would see improved use of taxpayers' money, an appropriately capacitated state, and the delivery of safe and reliable national infrastructure offering a strong foundation for further economic growth.

However, as Minister of Public Works and Infrastructure, Patricia de Lille said at our Infrastructure Indaba last year: 'We need to start implementing, the patience of our people is running out!' The preservation and deepening of our precious democracy will depend entirely on the success of our recovery."

"Our task is not easy, as the nuances at play make for a bumpy road to recovery. Regardless, CESA will continue to actively engage through the relevant platforms and to remain your 'Partner in enabling Consulting Engineering Excellence'," concluded Pillay. wn



Kenyan factory to develop local skills and manufacture WASH solution products.

From left: Ashwin Madhaparia, Superfit Steelcon Ltd; Jitendra Madhaparia, Superfit Steelcon Ltd; Simon Thomas, Megapipes Solutions Ltd; Alfred Kiilu, Megapipes Solutions Ltd; and Eric Muriithi, MIBP.

Construction of an HDPE pipe factory in Ruiru, Kiambu County started in February after the county and national government authorities gave the nod.

Megapipes Solutions Limited, the latest entrant into the Kenyan market is constructing a factory for manufacturing of large diameter plastic pipes, namely structured wall HDPE pipes (Weholite) for WASH Projects in Kenya and neighboring countries.

The construction of the company on a 5-acre plot in Ruiru, 25 kilometers from the capital Nairobi will take around 12 months to build according to the project consultants Mangat I.B. Patel (MIBP Ltd) and principal contractor Superfit Steelcon Ltd.

Simon Thomas, a director at Megapipes Solutions said they are looking forward to starting production in Kenya which he describes as a blue ocean of opportunities. "We are happy to announce that construction work has started at the site and we are looking forward to Weholite products that are made in Kenya, by Kenyans."

Thomas further said that it will become a Centre of Excellence for the whole of East Africa and shall train local employees in plastic pipe extrusion, fabrication of Weholite products (tanks, manholes, packaged treatment solutions) and jointing techniques for the installation of pipes and manholes. wn

Green award to Concor for Khobab wind farm concrete

A four-star Eco-Product Label has been awarded for the low cement concrete used by infrastructure contractor Concor to build wind turbine bases at Khobab Wind Farm in the Northern Cape.

The certificate was awarded by Eco Standard South Africa to the project manager Mainstream Renewable Power, the wind farm Khobab Wind (RF) and Concor, commending the concrete's low carbon footprint. According to Eco Standard South Africa, the replacement of cement by alternative material in the product saved over 1,9 tonnes of carbon dioxide from being emitted.

The concrete was used to construct 61 wind turbine bases, each measuring 19 metres in diameter and consuming 60 readymix truckloads of concrete. According to Stephan Venter, contracts manager at Concor, the company's commitment to Zero Harm includes high environmental standards as well as an acknowledgement that climate change is a major threat facing the planet.

"It is therefore important that we reduce our carbon footprint wherever we work, and our innovative approach to doing this often also reduces costs for our customers – as it did at Khobab," says Venter.

The remoteness of the site potentially meant trucking 80,000 tonnes of aggregate required for the concrete bases – some 3,600 truckloads – from the nearest existing source 300 km away. Instead, Concor was able to identify a deposit of more suitable dolerite close to site, and establish its own quarry and crushing facilities.

"This substantially reduced the carbon footprint of the material," Venter says. "It also resulted in greater economy for the project as a whole, as we could generate our own stone rather than relying on a commercial source."

The low carbon concrete mix design was achieved by substituting cement with ground granulated blast furnace slag (GGBFS) or fly ash. For the Khobab project, GGBFS was sourced as a waste product from the steel works at

Saldanha Bay in the Western Cape.

Cyril Attwell of ARC Innovations, who consulted to Concor for the concrete designs, says that the average carbon footprint on the bases at the Khobab Wind Farm was 90,7kg.CO2/m³. The average carbon footprint for a standard 30MPa readymix concrete base is from 290 to 340kg.CO2/m³.

"What is also significant is that with the demanding application in the turbine bases – completed in 2016 – there could not be any compromise in the strength and durability of the concrete," he says.

The blinding for each base was done with a 95% cement replacement, while the concrete for the bases themselves achieved a 90% cement replacement. Whereas 320 to 360 kg of cement is normally required for a cubic metre of concrete to reach 30 MPa in strength, the use of low carbon cementitious replacements allowed this proportion to be reduced to just 35 kg. The average strength achieved in the Khobab bases was 42,1 MPa, while in the blinding this was 22,3 MPa.

"Testing of the concrete mix options was conducted for six months before the project, to identify the optimal mix for the application," Attwell says.

"In the years since the contract was completed, we have continued to test at intervals and have confirmed that the strength and durability have increased year on year."

"The embodied carbon emissions in slag is just 10% of the level in cement," he says. "Fly ash is orders of magnitude lower, at just 0,1% compared to cement. Using these cement replacements, it is possible to significantly reduce a project's carbon footprint."

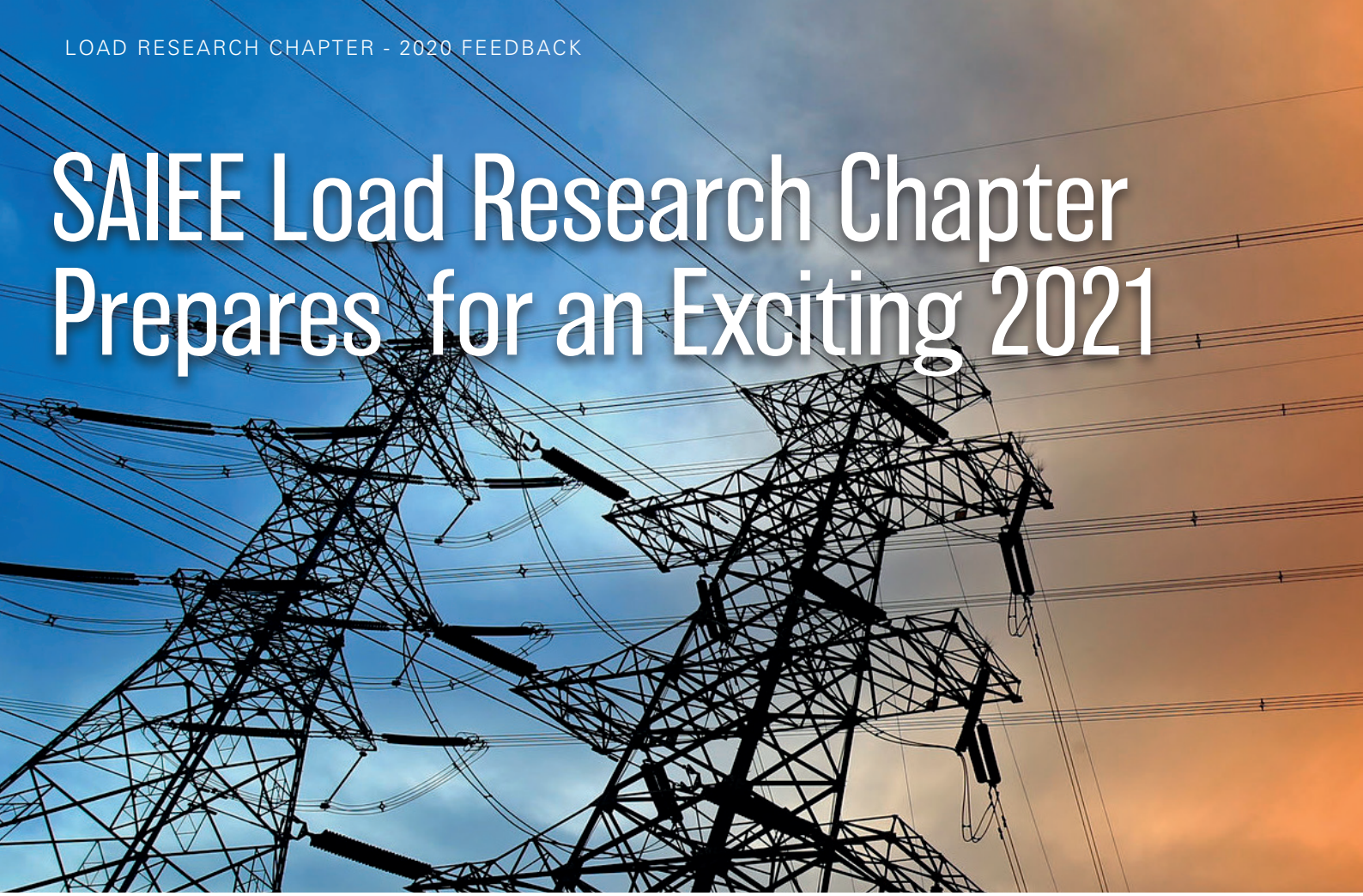
The low carbon concrete mixes were specially designed to ensure the same setting parameters as more conventional mixes. Attwell notes that a high slag or ash content in concrete tends to extend the setting time from the normal four to six hours to as long as 24, 48 or even 72 hours.

The specialised concrete mixes also allowed the project to deal with a severe shortage of suitable water, as the site was in an arid region which was also experiencing drought conditions.

"The only groundwater available contained sulphate levels six times higher than normal concrete required," he says. "This would have led to delayed ettringite formation (DEF) and a rapid deterioration of the concrete in the months after it had set."

Eco Standard South Africa also commended the concrete's use of recycled water, which was appropriate for this water scarce region and also reduced the requirement for the disposal of concrete wastewater. wn

SAIEE Load Research Chapter Prepares for an Exciting 2021



The SAIEE Load Research chapter (LRC) was formed to promote the art of load research, the broadcast of load research knowledge & information and the application of that information in the ESI.

The emerging context in South Africa and globally is such that the load behaviour is 'disrupted' from what it used to be and this is caused by a number of changes that redefine the customer's behaviour. These changes are as a result of initiatives such as energy efficiency, distributed energy resources and alternative energy sources.

Because of these pressures, it is quite possible that the ESI can fail to keep track of changes in basic customers' behaviours leading to poorly informed investment decisions.

The SAIEE Load Research Chapter provides an information-sharing platform for load researchers and applicators to share their knowledge and ultimately improve load modelling and application industry-wide. The scope of the LRC includes exposing the historical developments, the relevance of the current load models and the development of future load models that are mainly dictated by the technological developments on the customer's side and on the power system's side. In this article, the LRC outlines the developments that took place in 2020 and also shares the plan for 2021.

Since its inception on 4 April 2019, Load Research Chapter, through Executive Committee (EXCOM) comprising the Chairperson (Monde Soni); Deputy Chairperson (Marcus Dekenah) and Secretary (Lloyd Setlhogo), the Chapter grew from strength to strength. The membership is currently at 42 with 2 corresponding members. The membership includes of specialists from academia, municipalities, Eskom, government departments and consultants.

REVIEW OF 2020

The 2020 year started with the horror of Covid 19 unfolding and everyone learning to adapt. LRC cancelled all contact events and took activities online, with great support from SAIEE's head office staff.

This was great time of learning by all. On the way we sampled most of the online meetings platforms (MS Team, Skype, WebinarJam, Zoom meeting & Webinar). Much was learnt, and we subsequently shared and supported others at SAIEE in the same way.

With advent of Covid 19 and the lockdowns, much of SA "went home" (a human tidal change).

Office blocks and malls emptied to residential areas. The massive shifts in human behaviour led to speculation over the network impacts. LRC hosted discussions on the impact at domestic and non-domestic level, and saw a presentation on expected impact at Transmission level.

Network engineers are often confronted with questions over the expected impact of renewables. In LRC, we are concerned with how existing planning load models may change as renewables (SSEG, DER and IPP's) arrive in our power networks. What factors, standards and local policy influence the expected loads; what penetrations should be expected, and what approach should planners take?

We convened a "Planning for renewables", half-day seminar to shed light on this in August 2020. The seminar hosted speakers from Eskom, CSIR, Municipalities and Universities. With 10 speakers and over 300 attendees it was clear the event was well-publicised and attracted interest and appreciation.

2020 heralded more international participation. We started a programme of interaction with Electric Power Research Institute (EPRI), facilitated by EPRI's man in SA, Barry MacColl. Our objective was to unpack EPRI's research in all things required to cater for renewables and Distributed Energy Resources (DER) on the power grid. We hope that methodical exploration of such programmes will enable future SAIEE-EPRI collaborations.

This year we also saw presentation from MIT, detailing and discussing development of Machine-learning Based Demand Models for Electrification planning (with illustrations using SA data). We will continue to follow this development.

MONTH	FOCUS AREA
Feb	Energy efficiency
March	DSM
April	Data Science
May	Sample design
Jun	Data cadence
July	Network analysis
August	Academic advances
Sept	EPRI's programme
Oct	The future customer
Nov	Economics of load behaviour

Table 1: Calendar of Focus areas by month

There were also plenty of local deliveries at LRC in 2020, which saw content on Transmission forecasting methods, Load Research data collection systems, Building Energy systems Simulation, Network Resilience, the recently introduced POPI Act, SA's IEP, the use of load models in network analysis to name the few.

The LRC typically meets monthly and we usually include a relevant presentation from an expert at each meeting. In addition, we hold round table discussions and planned webinars (typically evening events) during the year.

In 2020 we held 14 such events, all online. We consider all materials presented to be "Useful IP with long shelf-life", and so we capture all presentations and video, for storage and review on LRC page of SAIEE's website here.

2021 EVENTS PLAN

Our plan for 2021 is to continue to deliver knowledge sharing on the syllabus we mapped out in consultation with our members during formation of the LRC, whilst leaving flexibility to include "topical topics" as they raise their head.

The challenges associated with "the future customer', The application of load research in emerging fields of interest such as energy storage, micro grids and smart grids will of course be explored.

In 2021, the LRC will also go through the election process to elect new executive committee that will serve for the next two years.

Two additional posts have been created on the executive committee to assist the Chapter improve its presence on the virtual space. The Chapter members have been informed to approach candidates that they think will help to take the industry forward.

We will keep on supporting the development and improvement of SANS 507-1 by working with the dedicated structures under SABS custodianship.

CONCLUSION

Given that 2020 was such difficult year due to Covid 19 lockdowns, the LRC has shown resilience and managed to operate successfully. The success was manifested by new members expressing interest and key-role players benefiting from the information shared.

We welcome new membership and contributions. Anyone wishing to join LRC should please contact the authors.

THANKS

The LRC committee would like to thank SAIEE's own support staff, in particular Douglas Millar (Web admin) and Minx Avrabos for their support in advertising, running and archiving our events on SAIEE's website.

In addition we appreciate the direct and indirect help at events, from Eskom, CSIR, Municipalities and Universities, also our international participants (EPRI and MIT).

Last not least, we would like to thank our members for their mentorship, enthusiasm and participation and for "spreading the word" of new and interesting LRC events to the engineering fraternity and SAIEE membership in particular. wn

THE LOAD RESEARCH EXECUTIVE COMMITTEE

MONDE SONI - CHAIRMAN
MSc Eng (Elec), Pr Eng, SMSAIEE

Monde received his BSc Eng (Electrical) from University of KwaZulu-Natal in 2007 and MSc Eng (Electrical) from the University of Cape Town in 2018.

He is currently doing PhD Eng in the field of power system analysis and planning. Monde started his career as a lecturer in 2007. He has worked as a power system planner and a manager within Eskom Distribution and is currently a senior engineer in power system planning specialising in load forecasting and analysis, bulk energy storage integration studies and renewable energy resource integration.

He is an elected member of the Council for SAIEE, a position he has held since 2017. He was awarded the Engineer of the Year 2019 by SAIEE, the achievement he holds close to his heart!

MARCUS DEKENAH - CO-CHAIR
NHD (Elec HC), M.Dip Tech (Elec HC) , BSc Eng (Elec), MBLII, AMSAIEE.

Marcus has been technical lead of the NRS 034 domestic load research project, and led non domestic load research in support of Eskom's Geo-based Load forecast tool for many years.

Marcus has conducted contract load research (domestic, and non-domestic) both inside and outside South Africa with multi-disciplinary teams of specialists from industry, private, and the academic sector, has authored and co-authored over 40 international and local journals, conference papers and articles.

Through his work, Marcus has contributed to several standards, won awards for project work and publications.

LLOYD SETLHOGO - SECRETARY
M Eng (Elec), Pr Tech Eng, MSAIEE

Lloyd Setlhogo holds a ND Elec Eng. HC (TUT), B. Tech Power Eng. (UNISA), M. Eng. Electrical Engineering (North-West University).

He started his career as a Senior Technician in 2000 at Eskom, and has progressed through the ranks over the last 20 years to Load Research Project Leader and onto Senior Advisor Engineering.

He has been involved in ALT testing, managed projects such as Standby Power Losses and is currently managing the Load Research Project and Critical Peak Day Pricing Project.

SAIEE
LOAD RESEARCH CHAPTER

New Criteria for a New, Smart Building Era

Technology enabling data capture and analysis, connectivity, monitoring, and control is becoming the new baseline for tomorrow's smart buildings. Understanding what it is and where it's headed is critical.

Progress in building science, making structures better for users and their physical environment, has long been defined by advancements in the hard and the tangible: architectural design, structural integrity, building materials, mechanical components and the like.

Those priorities remain as vital as ever, but now there's a new wrinkle when it comes to creating structures that will perform to modern standards and expectations. Today, the qualities of a building's digital infrastructure, the information and operational technology network embedded in everything that enables its routine functioning, easily rivals the physical infrastructure in importance.

Digital technology, it's safe to say, has been revolutionising buildings for some time, just as it has been upending so many aspects of the human experience over the last several decades. More controllable, better monitored and increasingly responsive, technology-aided and -enhanced buildings deliver

a better user experience and operate more efficiently.

But the future of buildings is still being written. Present now, but even very much in the process of refinement, is the smart building, one characterised by the presence of a digital infrastructure robust enough to collect and amass building operational data; provide the connectivity needed to analyse, learn from it, share it; and ultimately leverage it to benefit stakeholders' broad roster. All of those capabilities are being exploited in many new buildings designated as smart. But just as there's no ceiling on human intelligence, there's yet no evidence that smart buildings are nearing their full capacity in terms of functionality. While many technologies that make building intelligence possible are now robust and capable and delivering on their promise. More advancements are possible and bear watching, just as all stakeholders must closely follow new technologies currently in their embryonic stages. In various states of build-out, a few core technologies and technology applications should be on the radar of those interested in monitoring and evaluating smart building progress.

DATA CONNECTIVITY AND ANALYSIS

Building self-learning, which enables high- level automation and control, relies on effective data capture, sharing and crunching. Data captured from sensors in a building's complex web of systems that keep it running

must be accessible and capable of being interpreted and leveraged. In turn, networks are elemental to smart buildings, which are fast becoming an offshoot of the rapidly spreading and maturing Internet of Things (IoT). An environment in which individually addressable devices communicate via the Internet using a set of commonly understood communications standards and protocols, sharing data, responding to commands and even acting autonomously.

With the rise of smart buildings, the Building Internet of Things (BIoT) is now taking shape. It aggregates data from a building's connected systems, devices and assets, separate from or incorporated into a building automation system (BAS).

The BIoT comprises many basic building blocks: sensors to capture data; actuators that use data and analytics to respond; network standards that allow hardwired or wireless transmission of data; application platforms that provide the language for communication; and data storage and analytics that form the brains of the system and the functionality needed for automation.

Many elements of the BIoT are well in place, but progress is still needed in the area of meshing and merging different technologies and systems. Common standards and the availability of flexible, open architecture for data networks are vital to seamless communication.

DIGITAL TWIN

Planning is essential to the development of smart buildings that utilise technology effectively and work as intended and to the benefit of users. An essential emerging element of the planning process is the virtual fashioning of the structure using building information modelling (BIM). One product of the process is a "digital twin," a virtual computer model of the structure that permits simulating, testing and correcting design options before construction. The twin simplifies coordination with multiple designs and engineering disciplines, sidestepping possible design conflicts that can be costly to restore during or after construction.

"There has been the expectation that a digital twin model will improve the operational efficiency of a building.
But in order to do so, the digital twin will need to contain both static data from the construction phase of the building and the dynamic data of the technical systems and the occupants during the operational phase.
I think the industry is only at the beginning of learning how to connect the static and dynamic
data into the digital twin."
Philip Chan, Strategy Manager, Smart Infrastructure

In the context of designing a smart building's features, the twin would enable an analysis of a structure's response to changes based on such variables as occupancy levels or different energy supply sources. The effect of, say, adding a door or window could be analysed in the twin in the context of different building evacuation scenarios and the impact on heating and cooling costs. Post-construction, a digital twin can incorporate live data from the building and allow constant comparisons with the original design. Serving as a central repository for all information associated with the building, the twin becomes a platform for testing and optimising building control scenarios as needed.

CYBER-SECURITY

Connected devices are the foundation of smart buildings, and little could be accomplished without them. But their presence also poses a security risk that technology must be capable of addressing.

An Internet of Things configuration offers multiple points of entry for potential hacking. That exposes both building information and operational technology systems. With critical building systems networked to allow remote management and monitoring, and both IT and OT communicating with each other, a cross-contamination risk is real.

To limit the security threat potential, smart building technologies must address both physical and cyber-security risk. On one- layer, physical building access must be monitored with occupancy monitoring and control systems for anomalies that could indicate a cyber-attack. On another, digital networks must be safeguarded with firewalls and data encryption. Thirdly, system integrity must be ensured with individual systems and terminals protected from access by an unauthorised individual as well as unauthorised changes.

In short, the trend to extensive building digitalisation, and increased reliance on it, can be a double-edged sword when it comes to security. Utilising the full range of safety features a smart building system offers can limit the potential for a cyber-attack that could put building operations and users at risk.

SPACE MANAGEMENT

Gaining a better understanding of exactly how occupants use a building is a central component of the smart building approach. Data captured through sensors is the foundation for programming a building's operational system, aligning with usage patterns and responding appropriately to needs. Tracking and logging user movements, monitoring building area occupancy levels and trends, and providing real-time information to occupants, smart building technology helps improve space utilisation to benefit both users and the building's energy requirements.

Space under-utilisation is one of the most significant inefficiency problems buildings present. Some research suggests that traditional assigned-desk configurations in office buildings leave those desks unused up to half the day and that meeting rooms and other shared areas are often empty as well. That means significant building areas are likely being lit and heated/cooled when no one is present for substantial periods.

Activity-based working (ABW) approaches have consequently begun to blossom. They move workers away from a single desk and toward a setup where workers can congregate in more defined but less restrictive workspaces. The approach offers more flexibility and potentially reduces the need to extend the power and a working environment across large building areas.

The smart building configuration could go a long way to making that more feasible for more employers. With real-time monitoring of desk and room occupancy via sensors embedded in desk or lighting systems,

"The Corporate Real Estate industry will increasingly engage with occupiers to understand space needs better and clever optimised use of space will be a major future factor.
Space will become more activity-based with overall reduced area and higher utilisation. Ongoing monitoring of space use will allow these learnings to constantly improve."
Ruairi Revell, Sustainability Advisor Real Estate, Standard Life Investments

workers alone or in groups could quickly locate available work areas tailored to their needs. The information would be accessible via mobile phones, or live CCTV video feeds analysed by facial recognition software.
Occupancy detection is destined to become a central feature of smart buildings to improve space utilisation in advance. By extension, building users stand to benefit through enhanced productivity and better overall interaction with the building environment.

Predictive operation and maintenance
Providing an integrated platform for all building management elements, digitisation can transform the approach to operation and maintenance. Typically, the current method involves reliance on a mix of control and management systems. That's long been achieved with an expert operations staff capable of managing troubleshooting, inspection, repair and replacement as needed. But even top-notch building operations and maintenance staff often must make guesses about the source of system problems and the timing of service cycles and replacement; actual performance data has played a limited role in decision-making.

In a smart building configuration, sophisticated sensoring technology enables in-depth monitoring of building physical plant operations to supplement knowledge and expertise held in human hands. With digitalisation, system performance can be monitored and tracked; servicing and maintenance needs can be predicted and planned, and costs can be better compared and estimated based on multiple variables. They can include the age and service record of plant and equipment, its usage level, how critical it is to building functions, and the investment needed to repair or replace.

The result is a more efficient and cost-effective system maintenance and movement toward a predictive or "just-in-time" approach to maintenance. That means less unplanned downtime or outages, with necessary replacement

or repair optimally scheduled. Additionally, money is saved by reducing unneeded or premature parts replacements and minimising building operations.

The energy needed to run building systems also can be better managed with smart building technology. In some buildings, energy management has become wholly digitalised, with facilities managers able to review and optimise the building's energy performance using a mix of real-time and historical data to adjust or upgrade equipment such as the HVAC system. Facilities managers can thus adopt a more strategic stance informed by data provided by new technologies aimed at improving facility performance.

MONITORING AND CONTROL

Reduced energy consumption in smart buildings is a savings opportunity not only concerning money but the environment. Reduction of a building's energy footprint translates to decreased energy production, much of which is still dependent on burning carbon dioxide-emitting fossil fuels. The smart building, equipped with technology that closely monitors and controls energy consumption based on needs and resources, is well-situated to become another type of structure increasingly sought after: the green building.

The smart technology that enables improved operational efficiency and energy savings positions allows the smart building to be more environmentally friendly and sustainable. Buildings increasingly designed to have on-site renewable energy to supplement or even replace grid-supplied energy are edging toward "zero energy building" status, which is likely to become the next meaningful marker for a new generation of buildings.

The sustainable building model has long revolved around a building materials and equipment approach that ties energy reduction to better physical infrastructure design. That remains important, but the other emerging dimension relates to better building systems management. A more proactive and ongoing effort to discover energy waste areas in operations using smart technology may prove equally consequential. Improvements acquired through digitalisation could translate into a new target for building energy savings and reducing the environmental footprint.

PARTNERING FOR A SMARTER FUTURE

Experts are emerging to help to build stakeholders move ahead more confidently toward a smart building future. That's certain to become more critical as demand for smart buildings grows, and the range and depth of enabling technology expands. Stakeholders dizzied by the options – as well as the stakes themselves – will increasingly look to capable partners to guide them through the maze and grasp the full promise of next-generation buildings.

The challenge of delivering on that is sure to grow in complexity. Buildings of tomorrow will be called to account on numerous fronts, from enhancing the user experience to reducing energy usage and the environmental footprint to control operating costs.

Today, we have smart buildings and green buildings, zero-energy buildings, and people-friendly WELL buildings, all reflecting a range of demands that buildings become better and growing confidence that they indeed can. But it won't happen by throwing technology at buildings, chasing bells, and whistling down blind alleys, hoping that more equals better.

Instead, it will demand to take a step back, assess needs first, and then move ahead, deploying the digital tools that will genuinely transform buildings and their role in the built environment.

CONCLUSION

Mass digitalisation is a game-changer for buildings – from how they're initially conceived and designed to how they're built and ultimately utilised. The possibilities for using digital technology to create a broadly defined, overall better building stakeholder experience are only beginning to be understood and appreciated, more so with the help of those with proven expertise in configuring smart buildings that perform.

On paper, both new and modernised buildings will likely have far more native intelligence than their analogue predecessors. The trick for these smart buildings, though, just as it is for the book-smart human, will come in translating that capability to the real world. Indeed, the challenge that confronts all would-be smart building developers is mistaking the presence of raw capabilities for the ability to achieve precise, meaningful results. But those are attainable when human intelligence and know-how intersects with smart digital technologies. In the end, that's what will produce buildings that genuinely work – for people – in the demanding 21st century. wn

THE SAIEE ENTREPRENEURSHIP & INNOVATION CHAPTER

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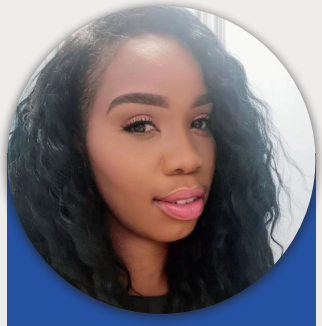

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OUR VISION

Providing the best knowledge-driven innovation and entrepreneurial support for sustainable rapid economic growth for all, with due cognisance of previously disadvantaged groups and youth.

OUR MISSION

Entrepreneurial & Innovation Chapter (EIC) provides competitive advantage to its members and assurance to its stakeholders through the provision of timely knowledge-driven advice and exchange of information as well as wide-ranging and in-depth training. With a diverse pool of experienced mentors, and symbiotic partnerships, IEC will provide support at all levels of innovation, entrepreneurship, and successful running of businesses that will last for generations.

We call on any interested parties, who are members of the SAIEE, to join our chapter. Send a photo and your CV to entrepreneurchapter@saiee.org.za

SAIEE
ENTREPRENEURSHIP & INNOVATION CHAPTER

Building a successful smart home strategy

Smart homes are no longer a technology of the future. They're here today, enabled by a wide variety of devices and services that consumers are embracing in growing numbers.

And that's bringing big changes - and challenges - for Communications Service Providers (CSPs) that have long offered standard, subscription-based bundles of voice, video, and data services to their customers.

Smart home technologies depend on access to fast, ubiquitous, and reliable connectivity. If CSPs can deliver this and build on that foundation with new digital and cloud-based services for the next generation of smart homes, they can transform their current businesses, defend their market position in the face of new competition, and remain vital into the future.

Over the past few years, many smart home technologies have gone from cutting-edge to mainstream.

Consider digital voice assistants, for example. Juniper Research[1] predicts we'll see 8.4 billion digital voice assistants - including smart TVs, wearables, and smart speakers such as Amazon Alexa and Google Home - in use around the world by 2024. That's an increase of 113% compared to the 4.2 billion devices in use at the end of 2020.

A new study from global tech market advisory firm, ABI Research[2], forecasts that by 2026, the global smart home market will reach $317 billion, up from $85 billion in 2020 and up 5% over pre-COVID-19 forecasts.

People with such technology in their homes won't have just one or two

devices, either - they'll average 21 in use. Our data indicate that the number will climb and exceed 38 by 2024. These devices will include smart appliances, remote-enabled entertainment systems, control and monitoring systems for home security, smart thermostats, smart light bulbs, smart doorbells, and more.

More smart home devices are entering the market every day, with many more on the horizon. Among them: faster and smarter WiFi routers, health and sleep monitors, energy management systems, apps for monitoring emotional health, monitoring systems for the elderly, even smart toilets and smart paints. These next-generation devices will become mainstays of the smart home ecosystem (what some call Smart Home 2.0).

The demand for connected home applications and devices is expected to dominate the Internet of Things market over the next few years, Cisco[3] reports. By 2023, it predicts the consumer segment will be nearly three times as big as the business segment. And the number of connected devices will be three times bigger than the number of people worldwide.

WHY THIS MATTERS FOR CSPS

All of these developments point to an inescapable conclusion for established CSPs: their customers' expectations are changing and dramatically, accelerated by the pandemic-related lockdowns that began in 2020. Customers are discovering new ways

THINK STRATEGICALLY

- Recognize that trust and familiarity make CSPs natural partners for customers who want to add smart services to their homes.

- Think beyond B2C and look for B2B opportunities as well. Digital disruptors like Amazon and Google have already tapped into such markets and are growing B2B revenues by as much as 30–50% annually, according to Accenture research5.

- Beyond looking for new potential growth areas, also seek out ways to better monetize existing offerings.

- Focus on providing digital, customer-centric experiences driven by data that allows for hyper-personalization.

to use networking and mobile services to monitor and safeguard their homes. They're using new kinds of devices to access voice, video, and data services. And they're rapidly adopting new technologies that will challenge the traditional business offerings of CSPs.

This creates new and heightened pressures for CSPs that have long operated in an environment where traditional barriers to entry and market boundaries have helped keep would-be competitors at bay. That environment has enabled them to build sizable and relatively stable customer bases with reliable revenue streams.

However, in this emerging smart home landscape, as Accenture noted in a 2019 report, "incumbency is no longer an advantage[4]."

CSPs' infrastructure has built their service offerings on can't compete with cloud-delivered disruption, and cloud-delivered service is what big technology companies like Amazon, Apple, and Google do best. These companies are entering the smart home era with favourable tailwinds, while legacy CSPs face increasing headwinds.

So CSPs are at a critical moment. Rather than merely looking for ways to save costs and optimize existing services to maintain their market position today, they need to invest in strategies to ensure their future growth and stability. This will require transforming their current business model to offer new digital products and cloud-delivered services ready for the smart home era.

Fortunately, they have a strong foundation on which to build this new approach. Their customers, their networks, their local brands and existing expertise - all these can help support a transition to new ways of doing business.

CHALLENGES FOR CSPS

While building a smart home strategy is vital, it poses several significant challenges for CSPs, especially independent ones with limited resources.

LEGACY SYSTEMS

Traditional CSPs have built their businesses on hardware and infrastructure, with the bulk of their workforce focused on installing, maintaining, and repairing those physical systems. Smart home technologies, by contrast, rely on software and engineering. CSPs' physical systems can't scale as software-defined platforms can, and they're not as flexible or agile either. The traditional CSP workforce also tends to lack the digital skills needed to compete with the likes of Google or Amazon.

Meanwhile, customers are less interested in using legacy offerings such as landlines. In 2018, the National Health Interview Survey[6] found nearly 55% of homes in the US no longer had landline telephones. Those numbers were even higher among renters and 25- to 34-year-olds: 74.4% and 77.3%, respectively. The clear message is that CSPs must look for new services as a value add.

BUSINESS MODELS

Another core CSP service - video or cable TV - is also seeing declining adoption rates as more and more consumers "cut the cord" in favour of digital streaming services. Trends like this mean declining profitability for traditional service providers, who now

find themselves struggling to offset lower revenues through cost-cutting measures.

At the same time, regulatory changes mean many CSPs no longer enjoy the protections that kept their service areas free of competitors. This makes it harder for them to maintain the physical presence that was once their strength. Instead, today's business advantage goes to companies that excel at digital engagement.

The infrastructure that CSPs have built their service offerings on can't compete with cloud-delivered disruption. Simultaneously, cloud-delivered service is what big technology companies like Amazon, Apple, and Google do best.

DISRUPTOR COMPANIES

The digital engagement race is being led by big technology companies focused on software first.

By building their services on software, these giants can scale quickly to meet the demands of thousands to millions of new customers. Their digital delivery model also makes it easier to quickly roll out new services on top of existing ones, enabling them to stay fresh and relevant for the modern consumer.

The tech giants have excelled at serving not just consumers but businesses too. Their combination of B2B and B2C customers has helped strengthen their market position even further compared to traditional CSPs. And that has opened up new opportunities that they've been eager to exploit: streaming video services, voice-over-IP phone services, and a host of other new services that put them squarely in competition with legacy CSPs.

IMPACTS ON CSPS

For CSPs, all of these challenges have brought shrinking customer numbers, declining earnings, lower returns on investment, and a continual battle to control costs and optimize existing business systems rather than to upgrade for the digital business age. The result, as Accenture has noted, is a "race to the bottom[7]."

LOOKING FOR SOLUTIONS

A real solution to these business challenges requires new models and strategies built on digital, smart home thinking. Such an approach demands putting a priority on technologies that can achieve the following:

- Improved business efficiency and innovation.
- Transformation with a new focus on software-defined services.
- Flexible, network-agnostic technologies for smarter and more reliable connectivity.
- Data-driven insights into networks, devices, and customer usage.
- Personalization of products, services, and customer experiences.
- Open-source software that can scale rapidly across both deployed and new hardware.
- Achieving these goals offers obvious and dramatic benefits for CSPs:
- Better efficiency means more resources for building the business, rather than merely maintaining existing market position.
- Digital business brings flexibility, agility, and scalability.
- Smarter connectivity makes services easier for customers to deploy and use.
- Data-driven insights allow CSP workforces to identify and resolve technical issues more quickly.
- More data on user behaviour and usage patterns also allows companies to target customers with more tailor-made, personalized offerings.

All of this enables CSPs to do more with less and to ease demands on customer service. At the same time, they can also improve customer satisfaction, reduce churn, and begin to grow revenues through new products, new services, and new customers.

Achieving these goals might have once been out of reach for companies without access to the newest digital technologies and the related in-house skill sets required for these.

However, thanks to the cloud and its many "as-a-service" possibilities, CSPs today have the potential to transform their businesses for the smart home age and be ready to compete with new models and disruptors.

CONCLUSION

For CSPs, the time to digitally transform and become providers of Smart Home Services is now.

Consumers embrace diverse smart technologies and increasingly move away from the traditional voice, video, and data offerings that once dominated the market. They're also increasingly willing to change who they do business with to obtain the services they want if their current providers don't deliver. wn

GET CONNECTED:
Smart Buildings & the Internet of Things

As buildings become more connected, complex, and dynamic, there is a growing need for intelligent building technologies that provide data-driven insights to maximise operational efficiency, cut energy waste, and lower overall costs. This paper explores how smart buildings leverage the Internet of Things (IoT) to create new opportunities for information gathering and sharing and its impact on buildings management and operations.

Over the years, buildings have become more complex and dynamic, with multiple disparate systems and devices supporting a range of standards. Such complexity can lead to inefficiencies. When systems do not "talk" to one another, they operate in silos, and facility staff cannot get a holistic view of building performance.

This is one reason why building energy management systems (BEMS) emerged to integrate a multitude of disparate systems and functions. However, while

presenting a holistic view of operations helps organisations cut utility costs by making better strategic decisions around energy use, many of these early systems were not predictive. Instead, these systems ran diagnostics and sent alerts after finding a problem.

The rate of change in building management technology over the past decade has been swift and diverse. That's good news for ageing buildings and infrastructure. As depicted in figure 1, approximately 75 per cent of a building's lifetime cost is spent on operations and maintenance, according to the U.S. Department of Energy and buildings are designed to last for decades.

Consider, for instance, that more than half of all commercial buildings in operation in mature economies today were built before 1970, so it's vital to consider technologies and scalable solutions that can optimise assets and limit operational costs over extended periods.

Keeping current with the latest building technology is difficult due to a large number of advances every year. To ensure success, building owners

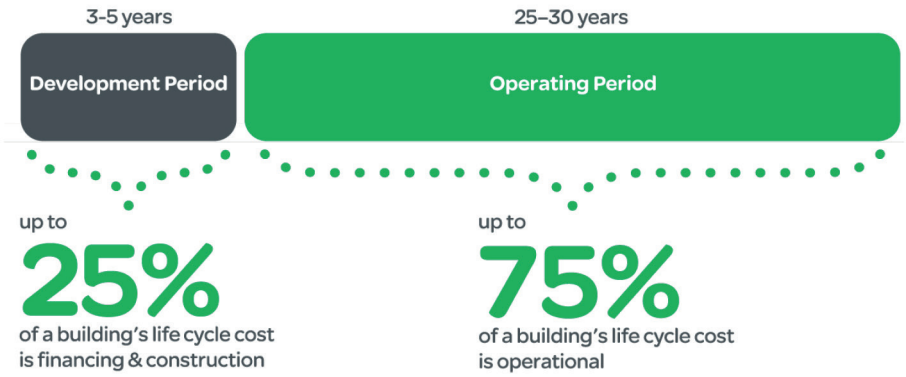

Figure 1:

and operators unequivocally need to be aware of both the benefits and limitations of the newest technologies. Failure to do this may result in missed opportunities to reduce operational and energy costs and improve occupant comfort and staff productivity.

According to Navigant Research, the BEMS market is evolving along with the ecosystem of intelligent building technologies such as control systems and wireless technologies. While energy management was the initial focus of BEMS, organisations now want these solutions to optimise sustainability, space utilisation, operational efficiency, and employee productivity.

As a result, today's smart buildings are starting to leverage the Internet of Things (IoT) and building information modelling (BIM) to connect various systems and devices to a centralised technology backbone. By integrating real-time performance data and analysis to the BEMS, smart buildings help facility managers proactively identify problems before they occur to drive efficiency.

These new technologies are increasingly important as the power and efficiency demands of buildings evolve. According to the U.S. Energy Information Administration, energy consumption worldwide will increase by 56 per cent by 2040.

The global population is expected to increase by 38 per cent, from 6.9 billion in 2010 to 9.6 billion in 2050, and our electricity needs are projected to skyrocket in this "always-on" digital economy. Buildings currently consume about 53 per cent of the world's available electricity. By 2040, that consumption will increase to 80 per cent of our electricity.

Consequently, organisations need a more analytical, data-driven approach to building operations and management to maximise operational efficiency, cut energy waste, and lower overall cost. There is also an increasing need for smart buildings that provide more comfortable, modern environments that enable people to work more effectively. In a study by the Continental Automated Buildings Association (CABA), facilities that include comfort and productivity measures (e.g., improved ventilation, enhanced lighting conditions, etc.) provide proven benefits beyond energy savings.

Buildings of all sizes can benefit from this more technological and analytical approach: research shows that the small and medium-size commercial building market is poised to grow by more than 60 per cent – to $38 billion – by the year 2025. These small and medium-sized buildings can save 20 per cent on their energy bills through more effective monitoring. Additionally, large commercial buildings using a collaborative IoT platform can improve building operations and cut energy use by 29 per cent per year.

WHAT, EXACTLY, IS THE IOT? AND HOW DOES IT RELATE TO BUILDING ENERGY MANAGEMENT?

IoT is the concept of connecting any device with an on/off switch to the Internet and each other. IoT uses one standard Internet Protocol (I.P.) to connect devices, including everything from smartphones, tablets and digital assistants to various types of sensors and systems such as HVAC, lighting, and security.

In other words, the IoT is a fast-expanding digital ecosystem of connected devices. In 2015, there were about 10 billion connected devices; by 2020, that number will more than triple to 34 billion. This growth is not surprising given the current environment where broadband Internet is widely available, technology costs are decreasing, smartphone use is becoming ubiquitous, and more and more devices are designed with built-in sensors and Wi-Fi capabilities.

SO, HOW DOES THE IOT ENABLE SMARTER BUILDINGS?

The IoT helps create dynamic and intelligent cloud-based interoperable networks by connecting electrical, mechanical, and electro-mechanical

systems and platforms. By communicating with each other, these systems can help monitor themselves and act when necessary (e.g. turn down air-conditioning or heating needs in a little-used area) to provide the data and analytics needed to optimise performance and create smarter buildings intelligently.

The technology to enable this competitive edge is already at hand. The Internet and significant price reductions on I.T. components such as wireless sensors have made smart building technologies much more affordable, creating a strong business case for owners and investors to invest in more intelligent technologies to increase building performance.

For example, advanced smart-energy sensors – a market whose revenue will almost triple between 2016 and 2025, from $1.2 million to $3.2 million, according to Navigant Research – can play a critical role in BEMS.

These devices contain "sensing" technology that captures and sends digital data to a BEMS to enable analysis and support actionable insight.

Sensors that measure and provide continuous feedback on temperature, carbon dioxide level, humidity, and air pressure, for example, can deliver valuable information. Controllers, gateways, and sensors can also increase energy efficiency and help cut costs.

All at once, these devices, systems, and platforms connect to a central, open I.P. backbone to provide a holistic view of building performance.

This backbone integrates all the data generated by the devices. It presents it via a friendly user interface displays (desktop, tablet and mobile) that use powerful graphics, data-rich reports, and trend visualisations.

Most importantly, this central backbone helps facility managers make strategic decisions through data analysis and actionable insights to ensure buildings are working smarter and running at maximum efficiency.

Data analysis can also include artificial intelligence and machine learning algorithms that help buildings self-diagnose and optimise. In turn, this creates more comfortable environments that drive productivity by increasing employee engagement and satisfaction. With the right IoT platform in place, buildings are ripe for improved energy management by integrating technology. An open, secure, and scalable platform that delivers in-depth and actionable insights can significantly increase buildings' operational efficiency. Additionally, correlation and analysis of data across historically disconnected systems can yield unexpected insights.

In short, IoT is creating enormous opportunities for information gathering and sharing that will have a tremendous impact on the way buildings are managed and operated. Using a collaborative smart building IoT platform, devices are connected with software and services to realise these opportunities.

REAL-WORLD EXAMPLE HIGHLIGHTS FUTURE OF BUILDINGS

"The Edge" is a 40,000-ft building in the Zuidas business district of Amsterdam. It exemplifies how a smart building can leverage the IoT to improve all aspects of a company's workspace – from building management and energy to lighting and security.

Designed according to the "New World of Work" principles, the building challenges traditional corporate organisational structures. The edge features a glass exterior, large open floor plans for flexible workspaces, and a dramatic 15-story atrium filled with natural light and surrounded by balconies.

"The Edge"

As one of the most sustainable buildings globally with a BREEAM-NL rating of 98.36 per cent, the edge features a broad range of integrated facility management and energy solutions: an electrical distribution system, I.T. infrastructure, control devices, and power-monitoring software.

Sensors, valves, actuators, and other BEMS-compatible and connected field devices were installed in ceilings and in technical rooms to create a smarter building that makes the IoT a reality.

The building, constructed for the professional-services firm Deloitte, contains 28,000 IoT sensors that monitor LED lights, temperature, humidity, infrared and motion, among many other internal building aspects.

Sensors can alert the cleaning staff of the day's most heavily used work areas, for example, and provide security information via an automated security robot that patrols the grounds at night.

These sensors and other systems also help employees as they go about their workday. Using a proprietary Deloitte app, employees can find a desk (there are no pre-assigned offices or cubicles), get access to car and bicycle parking and the company gym, adjust the heating in a workspace, and find colleagues, among other tasks.

The edge is a net-zero energy building, producing 102 per cent of its energy via solar panels that line the building's roof and southern wall. Other eco-friendly features include aquifer thermal energy storage, motion sensor- activated ventilation, and rainwater harvesting.

All sensors and systems connect to a single I.P. backbone that gives real-time access to critical building data. The building leverages EcoStruxure Building (formerly SmartStruxure), an open, collaborative smart building IoT platform that connects BEMS with diverse building systems, devices and services. This enables facility managers to monitor, measure and control proactively – both on-site and remotely – all the data from building and I.T. systems.

By linking devices, sensors, and systems, EcoStruxure Building helps manage building management, power supply and process functions to provide comprehensive building-

system interconnectivity. This solution also leverages Microsoft's Azure cloud platform to improve analytics, software, and global services.

The world of smart building technology is uniquely positioned to benefit from IoT, but how can organisations – whether they're large multi-national entities or small to medium-sized businesses – best integrate IoT to deliver significant transformation over time?

SMART BUILDING IOT BEST PRACTICES

The following smart building IoT best practices should be taken into consideration:

- **It's OK to test the use of IoT:** Organisations that want to take more measured steps before revamping their building systems should start small. For instance, they could employ a pilot project that focuses on lighting or another aspect of building needs. Keep in mind that this and other systems need to have end-to-end configurability.
- **Build a concrete plan from the beginning.** What are the specific, measurable goals that your organisation wants to accomplish? Careful planning from the start is vital. Developing a thoughtful, solid plan will define the critical requirements for hardware, software, security, and infrastructure, among other factors.
- **Include all key stakeholders.** This plan should involve all facility's stakeholders, including but not limited to operations, finance, I.T. and security. The stakeholders should establish operational, productivity and sustainability goals and objectives that align with the values and mission of the organisation and evaluate ROI before broadening scope. Then, they can present a unified plan and collaborate with key contractors and vendors to produce a more effective strategy.

Thoughtful planning early in the project will help diminish last-minute, costly changes by avoiding redundancies such as multiple software systems and parallel networks. For instance, stakeholders can determine their "must-haves" and reach a consensus on applying IoT and other intelligent-building technologies effectively.

As organisations go through the process to make buildings smarter and more efficient, they should consider the following three critical planning aspects:

1. **Technology integration and interoperability:** Aim for a holistic – not siloed – approach to adding systems that comprise the network backbone. The various devices and systems must also be scalable, adaptable, and integrated with the BEMS. Organisations should be prepared to expand systems in the future as new technologies emerge, and additional features and capabilities are needed.
2. **Smart building data analysis:** While advanced BEMS can aggregate, filter, and translate large amounts of data to provide actionable insights, facilities managers and other employees should also analyse the relevant data to make smarter decisions.
3. **Cybersecurity and data privacy.** Increased connectivity and data capture mean more opportunity for data leaks and breaches. With that in mind, organisations should employ a smart building platform that incorporates cybersecurity. Also, instituting data collection, storage and use governance, among other cybersecurity policies, will help secure company data.

In conclusion, while IoT is still a new concept – only a small percentage of organisations currently leverage IoT for building management – more and more buildings are leveraging technology to create smarter buildings that increase efficiency, productivity, and overall satisfaction. wn

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MARCH 2021

2	**Training Academy - Online CPD Course** Technical Report Writing - Day 1
3	**Training Academy - Online CPD Course** Technical Report Writing - Day 2
	Training Academy - Online CPD Course Design Thinking & Innovation for Engineering Professionals - Day 1
4	**Training Academy - Online CPD Course** Design Thinking & Innovation for Engineering Professionals - Day 2
8	**WiE: Celebrating International Women's Day** Webinar
9	**Training Academy - Online CPD Course:** Fundamentals of Lightning Design - Day 1
10	**Training Academy - Online CPD Course:** Fundamentals of Lightning Design - Day 2
	Training Academy - Online CPD Course: New Engineering Contract (NEC) - Day 1
	Eastern Cape Centre AGM - Webinar
11	**Training Academy - Online CPD Course:** New Engineering Contract (NEC) - Day 2
17	**SAIEE Training Academy - Online CPD Course:** SDN/NFV Standards & Applications - Day 1
18	**SAIEE Training Academy - Online CPD Course:** SDN/NFV Standards & Applications - Day 2
	SAIEE Training Academy - Online CPD Course: HV Measurement & Testing - Day 1
19	**SAIEE Training Academy - Online CPD Course:** HV Measurement & Testing - Day 2
23	**Training Academy - Online CPD Course:** Incident Investigation & Root Cause Analysis - Day 1

To organize a webinar on the SAIEE Platform, please complete the **Webinar Booking form**.

MARCH 2021 (CONT)

24	**SAIEE Training Academy - Online CPD Course:** Incident Investigation & Root Cause Analysis - Day 2
	SAIEE Training Academy - Online CPD Course: SANS 10142 - Part 1 & OHS ACT - Day 1
25	**SAIEE Annual General Meeting** Virtual Event
	SAIEE Training Academy - Online CPD Course: SANS 10142 - Part 1 & OHS ACT - Day 2
	SAIEE Training Academy - Online CPD Course: ARC Flash - Day 1
26	**SAIEE Training Academy - Online CPD Course:** ARC Flash - Day 2
29	**SAIEE Training Academy - Online CPD Course:** Cables Course:L CIGRE/ESKOM - Day 1
30	**SAIEE Training Academy - Online CPD Course:** Cables Course:L CIGRE/ESKOM - Day 2
	SAIEE Training Academy - Online CPD Course: Legal Liability Mine Health & Safety Act - day 1
	SAIEE Training Academy - Online CPD Course: PV Solar Systems - day 1
31	**SAIEE Training Academy - Online CPD Course:** Cables Course: CIGRE/ESKOM - Day 3
	SAIEE Training Academy - Online CPD Course: Legal Liability Mine Health & Safety Act - day 2
	SAIEE Training Academy - Online CPD Course: PV Solar Systems - day 2

Section & Chapter, Centre Webinars

SAIEE Academy Online Training

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