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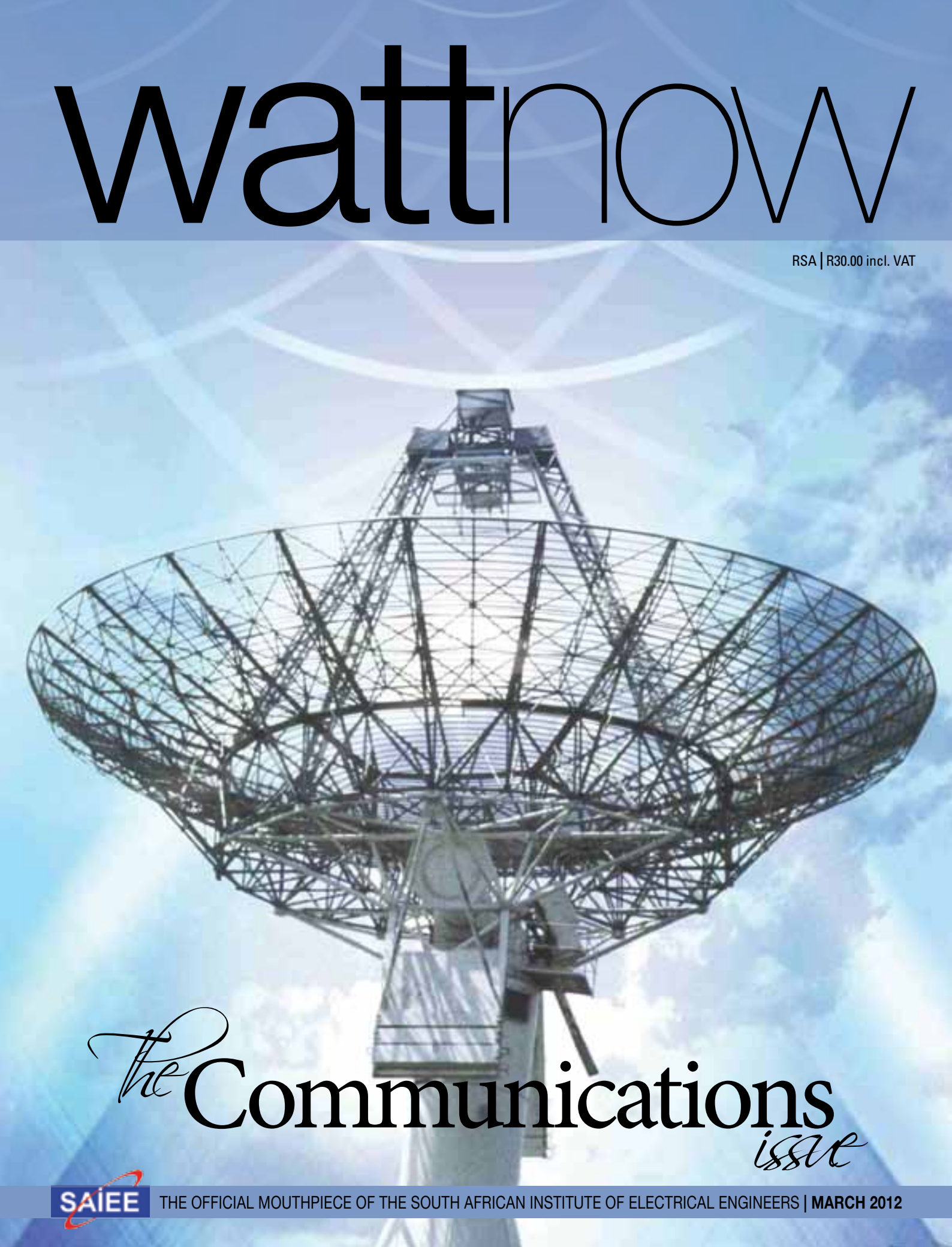

The Communications issue

SAIEE THE OFFICIAL MOUTHPIECE OF THE SOUTH AFRICAN INSTITUTE OF ELECTRICAL ENGINEERS | **MARCH 2012**

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- MV PILC Jointing and Terminating
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- AMPACT Connector Installation
- ORHVS Responsible Person & Authorised Persons
- Cable Diagnostics & Fault Location
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contents

wattnow magazine

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ISSN: 1991-0452

OMMUNICATION - the Oxford dictionary describes it as "the imparting or exchanging of information or news" - and I am communicating with you through this magazine – Cool!

If you sit back and just think about how many ways we have to communicate today, it makes you ask yourself, how did they communicate 100 years ago? I'm sure there was more privacy then.

In this issue of **watt**now, we showcase the various means of communication and its technology.

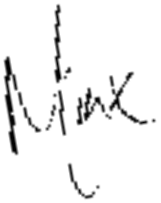
On page 26, we find out more on those "Orange Ducts" and the culprit causing all the interference on our national roads.

Page 32 explains the Square Kilometre Array and what it will mean for South Africa if we win the bid. This information will only be released to the media on the 4th of April 2012.

On page 40, we inform you about the Radial Feeder Protection Training Module which tells you more about the theoretical and practical application of the IDMT overcurrent protection system.

I've introduced a 'memories' section whereby I invite you, our valuable reader, to send me your anecdotal memories that you have encountered throughout your career - I would love to publish these. On page 48, Edwin Grobler reflects on his comical experiences.

Herewith, your Communications issue - enjoy the read!



Visit www.wattnow.co.za to answer the questions related to these articles to earn your CPD points.

The only good watt is a negawatt

Due to intrinsic inefficiencies, 33 units of energy consumed at the point of use require 100 units of primary energy

What's a negawatt? The one you didn't use.

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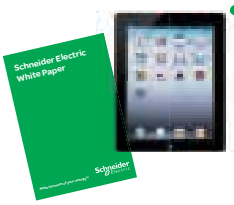
EcoStruxure solutions cut energy costs today

As energy prices continue to climb, every unit of energy you save matters. One unit saved at the point of use means three units of primary energy not consumed. Today, only EcoStruxure Active Energy Management Architecture can deliver up to 30% energy savings across your buildings, industrial plants, and data centres. You deserve an Efficient Enterprise™!



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Dear valued member and advertiser,

By the time you receive the March 2012 edition of the **watt**now magazine, the SAIEE will have held its annual General Meeting (AGM), scheduled for the 29th March 2012. In accordance with our constitution my Presidential term will have come to an end. Mr. Mike Cary will have been inaugurated as the SAIEE President for 2012. Please allow me to express my hearty appreciation of the support I received from every member of our esteemed learned society and all our stakeholders. I have no doubt that Mr. Cary will receive similar support from you all. I wish Mr. Cary a successful Presidential tenure.

The past year, 2011, was characterized by a high level of activity for the SAIEE. The President Invitation lecture, delivered by Dr Azar Jammine of Econometrix was well attended. He updated us on world macro-economics and how the domestic economy is influenced by what happens globally. We are part of the global village.

I also managed to visit five centres of the Institute, viz., KwaZulu-Natal, Western Cape, Southern Cape, Eastern Cape and Mpumalanga. I was humbled by the dedication shown by the Centre Chairmen and their Committee members in serving our members. I believe that the Centres are the service delivery agents of our Institute at these regions, far removed from SAIEE House. They deserve full support from SAIEE House. I thank them heartily for the hospitality shown to me during these visits.

The 60th Bernard Price Memorial Lecture, delivered by Philippe Paelinck of Alstom France was well attended at the centres as well as at Wits. The lecture was entitled: Carbon Capture and Storage,

Ready to deliver. We thank Philippe and Alstom France for a most informative lecture on the subject. Indeed, the lecture was most appropriate and relevant in view of the fact that in November/ December 2011, South Africa hosted COP17 in Durban.

The Annual SAIEE Annual Banquet was successfully staged at the prestigious Wanderers Club at Illovo, with record attendance. The guest speaker was Mr Hanief Ebrahim from the National Planning Commission (NPC). His speech covered the NPC diagnostic report published in June 2011.

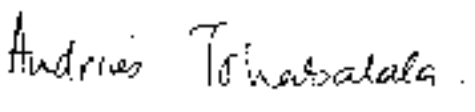
We also saw the official opening of SAIEE House in October 2011. The occasion was graced by the Minister of Science and Technology, Mrs Naledi Pandor. Council requested Past President, Mr Michael Crouch, to seek sponsorship from our industry partners for contributions towards the new building. Donor company names and logos will be featured on a roll of honour in the building in recognition of their support. I am most humbled by the generous response shown by various companies and individuals. I am most pleased to mention that by the beginning of March 2012, the total sum of the donations amounted to approximately R400 000. I thank Mr Michael Crouch very much for agreeing to do this work. Office Bearers have agreed to use the money to equip the committee rooms in SAIEE House.

In November 2011, I managed to attend the SAIEE National Student Competition held at the North West University, Potchefstroom Campus. This competition is co-sponsored by EE Publishers and the SAIEE. We thank EE Publishers for their ongoing insightful support and I am most pleased to report that agreement has been reached to continue the relationship going forward with this competition. I also thank the judges for a job well done, Stan and Gerda for a well organised competition. I was totally blown away by the student talent showcased by 7 universities and 4 universities of technology and hereby congratulate the winners. The standard of the projects was very high! In my view, all the entrants were winners.

The theme for my presidential tenure was: Engineering the future: The relevance of the SAIEE in our contemporary times. I am sure that you will agree with me that we continue to be relevant, indeed.

Enjoy reading this edition of **watt**now, whose theme is Communication.

In conclusion, I would like to thank all who made my tenure so enjoyable. In particular, every Council member, every Office Bearer, the Business Director and every staff member at the Institute. I would also like to thank my employer, ACTOM, especially the Chairman and CEO Mark Wilson for the material as well as moral support I received during my tenure. I also thank my family, especially my beautiful wife, Fikile who endured a lot of inconvenience during the year.
Ngiyabonga MaMjadu!!



Andries Tshabalala | *SAIEE President 2011*

WATTSHOT

GADGETS FOR 2012

INTRODUCING XPERIA™ S – THE FIRST SONY SMARTPHONE

Xperia™ S, the first smartphone from the new Xperia™ NXT series is an Android smartphone that delivers a stunning viewing experience with a high resolution screen, Sony HD experiences and a 12MP camera that takes pictures in just 1.5 seconds from standby. Xperia™ S also comes with a powerful 1.5GHz dual-core processor for faster performance.

The new Xperia™ S enables easy connectivity with multiple screens for consumers looking to share and enjoy content on whichever screen best suits their situation, whether it's TV, smartphone, laptop or tablet. Consumers can watch their favourite content from the Sony Entertainment Network by connecting their Xperia™ S through HMDI to TV or share photos wirelessly with just one touch. Xperia™ S is also NFC (near field communication) enabled to allow consumers to share content with each other as well as enjoying an increasing number of NFC applications and services. Xperia™ S will be able to access the richest entertainment experiences from Sony Entertainment Network. Music Unlimited offers a global catalogue of 12 million unique songs while Video Unlimited has the latest Hollywood blockbusters and TV shows from all major studios. Xperia™ S is also PlayStation™ Certified, guaranteeing a high quality smartphone gaming experience and access to the PlayStation® Store. Xperia S will be available to consumers globally from the first quarter 2012. Launching on Android platform 2.3 (Gingerbread) Xperia™ S will be upgraded to Android platform 4.0 (Ice Cream Sandwich) during the second quarter 2012.

CRUZER® FITTM USB FLASH DRIVE

With its low-profile design, the Cruzer® FitTM USB flash drive easily fits USB ports and blends in with your notebooks, tablets, TVs and car audio systems. Whether it's your favorite music, pictures, music collection, video collection or your work documents, the Cruzer® FitTM USB flash drive gives you the ever-present storage you need in a compact and portable device. Protect access to your private data with the included SanDisk® SecureAccessTM software, and get the added protection of secure online backup (up to 2 GB* optionally available) offered by YuuWaa™.

OOPS

It was brought to my attention that the Conclusion of the THE DUHVA POWER STATION TURBINE FAILURE article (pg36) was omitted in the February issue of* wattnow. *Herewith...

The author has drawn the following conclusions:

- The damage to Duhva occurred at a time when Eskom was experiencing difficulties in maintaining capacity and the loss of some 1.7% of capacity has had an impact.
- To the credit of Eskom the power supply to South Africa was maintained.
- The very serious incident at Duhva has had remarkably little coverage in the professional press in South Africa.
- No technical analysis by a Professional Engineer appears to have been published by the SAIEE and this is both surprising and troubling.
- It would be of great interest and teaching value for the SAIEE or **watt**now to publish some tutorial papers on turbo alternator protection schemes.

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- Built-in clip for easy carrying

PARROT MINIKIT+ PORTABLE BLUETOOTH HANDS-FREE KIT

The Parrot MINIKIT+ is a very easy-to-use hands-free Bluetooth kit that integrates advanced telephony functions: you can make and receive calls while driving, and still keep your eyes on the road and your hands on the wheel. Its refined shape and monochrome design – ranging from matte to glossy black – make it a truly modern device which will find its place in the interior of any car.

The Parrot MINIKIT+ includes the Parrot Dual Mode multipoint technology. You may simultaneously connect two Bluetooth telephones and receive incoming calls on either one easily. The kit signals incoming calls using different ring tones, thereby letting you know which telephone is receiving the call.

All products are available from Incredible Connection, or visit www.snac.co.za

WATTSUP

Value Added Joint Ventures will bring jobs to the Electrical Industry

Skills transfer, mega project management, prosperity, growth in the Electrical Construction Industry would happen if ECA(SA) members were to establish commercially useful establishments via partnerships and genuine value adding Joint Ventures. This is the view of ECA(SA) President, Mark Mfikoe, speaking at the organisation's annual press breakfast on Thursday 15 March 2012.

Chris Greager, National Director: Operations with Mark Mfikoe, President ECA.

The Electrical Contractors' Association South Africa, ECA(SA), has over 3 000 members, and represents almost 60% of all employers in the Industry who are registered with the National Bargaining Council for the Electrical Industry of South Africa. Members range in size from those with only one or two employees to the larger businesses which have several hundred. Members' employ some 75% of all employees registered with the Bargaining Council.

The Association also protects the interests of members, and keeps them informed about all matters affecting the Industry through regular general meetings and general communication. The services include free advice and assistance on any issue concerning members' businesses; assisting in obtaining outstanding payments from difficult clients; providing a complete labour relations advisory service, which includes representing members at the Bargaining Council and at the Commission for Conciliation, Mediation and Arbitration (CCMA); and extensive contractual, technical and business advice. It also has a guarantee of works scheme whereby members' customers are covered against defective workmanship for up to R15,000.

Many challenges face the electrical industry today, not the least of which is the state of the training and apprenticeship programmes for emerging contractors. Says Mfikoe, "In my view the biggest scandal of this country is the compromising of our capacity to develop scarce skills for this Industry and others as a result of the shocking manner in which our mandated training authorities continue to fail the country. All of us had hope when the Sector Education and Training Authorities (SETAs) were introduced." The Energy Seta was placed under administration and the electrical contracting industry was then transferred to the Construction Seta and in no time at all it too was placed under administration and still is. Education and training is a way to create a better life for all and raise the country's ability to respond to skill challenges.

The SETA process is negligent and has compromised the training of youngsters as well. The Construction Seta has failed to renew the training accreditation licence of the ECA(SA) Training Centres in Germiston and Cape Town, and the one in Durban had to close down when the country is dying to have qualified Electricians. The millions of Rands that have been raised by the Skills Development Levy are going to waste.

The ECA(SA) is committed to the upliftment of the electrical industry and to this end welcomes the potential introduction of punitive measures for dishonest disclosures with regards to BBBEE procedures. Says Mfikoe, "We have both black and white dominated electrical contractors as our members. As the ECA(SA) we see a huge potential to get our members commercially established." The ECA(SA) are appreciative of President Zuma's highlighting infrastructure development as a priority, and believe they can make a value contribution.

WiST™ Launched a massive step change in inteligence and control

Gert Botha, CEO WiST™ SA addressing the attendees at the launch.

From solving the problem of rhino poaching to improving effective asset utilization in a manufacturing environment, an advanced wireless intelligent sensing technology is set to take the market by storm. "Knowledge is power and the customized applications which WiST™ is capable of delivering will bring a step change to the world of intelligence and control," says Gert Botha, CEO of WIST South Africa.

Botha and his partner Gundo Mawela (COO of WiST™ High Tech Solutions) launched WiST™ to 300 CEO's at The Forum in Bryanston in March. Despite the fact that attendees were running late or had to turn around due to the rain they had a really good turnout. They had an overwhelming response to the technology and people stayed on after the event to ask questions and explore possibilities. Thirty seven companies left their details to attend the WiST™ high security launch which will take place later in March.

(L-R) Hayley Kobrin (KDVP), Evan Kobrin (WiST™ SA), Bradley Cabral (ANV Holdings)

(L-R) Terry Ahwin (WiST™ SA), Rieel Schonfeldt (Omnigo)

(L-R) David Neaves (ANV Holdings) with Mike Austin (Powertronics)

CPD Courses

Over the last month, the SAIEE was excited to introduce two new courses to its CPD course programme.

The new *Photovoltaic Solar Systems* course was held to a full house of delegates in Johannesburg. Photovoltaics (PV) is a method of generating electrical power by converting solar radiation into direct current electricity using semi-conductors that exhibit the PV effect. PV power generation employs solar panels comprising a number of cells containing a PV material. The course was presented by Attilio Dalvit, an MSc in Information Technology Management. The course was run over 2 days with 1 ½ days being devoted to theory and the afternoon of the 2nd day being devoted to practical demonstration. Everyone enjoyed the course and it will be presented in East London and Bloemfontein later this year.

On 14-15 March another new course was held, *Understanding The Application, Risks & Safety Of Switchgears*. This course was presented by our seasoned lecturer, Viv Cohen, who is an expert in his field and a long standing member of Council and Fellow of the Institute. The course included discussion on LV & MV voltage circuit breakers, internal arcing, electricity safety, LV co-ordination, MV & HV co-ordination systems and maintenance.

WATTSUP

POWER-GEN Africa Advisory Board meet to discuss Conference topics

The POWER-GEN Africa and Renewable Energy World Africa Advisory Boards met in Johannesburg, South Africa on 28-29 February 2012 to discuss the 2012 Conference Programme.

After receiving an encouraging response to the POWER-GEN Africa and Renewable Energy World Africa Call for Papers, which closed in early February, the Advisory Boards, consisting of representatives from Eskom, Wartsila, Ansaldo Energia, Andritz Hydro, Suzlon, Siemens, Alstom, Black & Veatch, Dewey & LeBoeuf, Hitachi Power, SAIEE, SAWEA, NERSA and including a Presidential Representative and a former Ministry of Energy, met and outlined the 2012 Conference Topics and overall Programme, which will be announced shortly.

POWER-GEN Africa, along with Renewable Energy World Africa is set to become the region's premier conference and exhibition dedicated to the power industry. It will also provide the perfect setting for industry leaders and decision-makers to network and keep abreast of the latest developments in the sub-Saharan region in the field of power and energy.

The inaugural POWER-GEN Africa will provide comprehensive coverage of the power needs, resources, and issues facing the electricity generation industries across sub-Saharan Africa, by way of a twin track conference, featuring strategic and technical tracks plus a track dedicated to renewable power generation, which forms part of the co-located Renewable Energy World Africa Conference & Exhibition. This important new industry forum will feature leading power industry professionals from around the world who will share their expertise and experiences to help define Africa's energy sector of the future.

POWER-GEN Africa and Renewable Energy World Africa Conference Director, Nigel Blackaby stated, "We are delighted in the way the industry has responded to our call for papers, which has included many high-quality abstracts for us to consider and has allowed our Advisory Board to put together a strong and far-reaching conference programme dedicated to the most pressing power industry issues facing sub-Saharan Africa .

We are very pleased with the variety of abstracts were submitted covering the strategic, technical and renewable tracks, and look forward to announcing the programme to the industry ".

Based on the reputation of the global POWER-GEN events, POWER-GEN Africa's exhibition has attracted the world's leading power equipment and service suppliers, who will line-up alongside local electricity industry and power engineering firms all demonstrating their latest services and technologies.

Global attention is being paid to Africa's power requirements as the continent continues to experience rapid growth and development, driving the need for more widespread and reliable electricity.

POWER-GEN Africa and Renewable Energy World Africa is designed for those who work in the utility and private power sectors, engineering and commercial personnel from the equipment manufacturing and consulting fields. POWER-GEN Africa addresses professionals from energy intensive industries with responsibility for ensuring power supply, and officials and ministers from the national and regional political spheres who are tasked with the design and implementation of energy policy.

For further details, please visit www.powergenafrica.com.

Eskom drives energy-efficiency at Matimba power station

Driving energy-efficiency has taken on a renewed sense of urgency in South Africa. Apart from encouraging business, industry and consumers to save electricity, utility giant Eskom remains committed to driving efficiency within its own operations. This includes working closely with its own suppliers in order to find new ways to generate energy savings. This innovative approach – recently taken with the team from Shell Lubricants – has already seen a number of gearboxes at Matimba power station reduce their power consumption by almost 3%, translating into a cost saving of almost R1 million per annum for the power station. The saving promises to make a significant impact on both the power station's bottom line and its contribution to the national grid.

Matimba Power Station

(L-R) Martin Baptiste, Senior Consultant - NIL Africa and Mark Camp, Regional Director, NIL Africa

(L-R) Richard Vester, Executive Head Vodacom Business with NIL CEO, Klemen Stular

NIL launches Technology Led Training (TLT) - the first hi-tech learning platform for advanced ICT skills development in SA and Africa

The 29th of February saw the launch of what is a first for the industry - Technology-Led-Training (TLT) - which is expected to give ICT skills in SA a considerable boost as well as across Africa.

Regional Director for NIL Africa, Martin Camp, says the first classroom experience of TLT, which is designed around Cisco technology but delivered on NIL's TLT platform, allows students across the world to participate in the same live class simultaneously.

While cost is not where the "big win" is, says Camp, the expected future bolstering of bandwidth in SA means student savings are on the cards. "The main upside of TLT is the flexibility," he says. NIL says the technology based learning platform will bring a new dimension to ICT training both within SA as well as across Africa. "It is making maximum use of the current advances in collaboration technology, offering clients the opportunity to participate in a live session without compromising the quality of skills transfer," says learning services manager at NIL, Karen Sharpe.

Camp says the launch (which saw over 165 industry related professionals and press attend the event) and classroom demonstration was the start of an extensive and far-reaching African project. The Bryanston classroom, he says, will be duplicated and TLT deployed throughout Africa "in the near future, this year still".

The challenges of obtaining high-end advanced ICT skills programmes in South Africa have been significantly reduced, as NIL announces Technology-Led-Training (TLT) in Johannesburg this week. The engineering team at NIL has integrated a number of Cisco collaboration technologies to produce a technologically advanced learning platform, which allows students across different countries to participate in the same live instructor-led class simultaneously.

When approached for comment on his TLT experience, a recent Cisco UCS student, Luyanda Mnyandu of MTN Business, had this to say: "The instructor was on the other side of the globe, yet it was like he was really in the classroom. It was my first, and was quite an awesome experience, that I'll recommend it to anyone who is looking to enhance their IT careers."

WATTSUP

Electric Machinery's facility in Minneapolis, United States.

WEG acquires Electric Machinery

Brazilian motor and control manufacturer WEG has signed an agreement to acquire the United States based organisation Electric Machinery. Gary Daines, sales and marketing director of Zest WEG Group in South Africa said the acquisition is an exciting development since Electric Machinery has 100 years of history in large machines, a strong reputation for high quality products and excellent brand recognition in key market segments.

"From a global perspective, this acquisition complements WEG's offering, with state of art products and technology," he said.

Electric Machinery, founded in 1891 and based in Minneapolis in the United States, custom designs and manufactures motors, generators and brushless exciters that serve thousands of customers worldwide primarily in the oil and gas and power generation industries. The business also provides a complete range of aftermarket services including installation, field support, parts, repairs, upgrades, stator rewinds, high-speed balancing and technical support.

Mr. Harry Schmelzer Jr., WEG's ceo says the production platform in North America now combines the plant in Minneapolis with our plants in Mexico, allowing us unsurpassed flexibility on providing integrated solutions in the region.

Electric Machinery has an installed base of more than 5,500 units in operation and is a technological leader in the development of high value added products, such as 2-pole turbo generators and slow speed synchronous motors. Revenues in 2011 are estimated to reach US$ 56 million.

WEG acquired the Zest Group in 2010. ZEST distributes, markets and supports a wide range of electric motors, variable speed drives, transformers and switchgear in sub–Saharan Africa. In addition, the company owns a number of subsidiary companies serving key areas of South Africa's mining, manufacturing and municipal sectors.

Female entrepreneurs bring down communications costs - Xuma Technologies

The laying of fibre-optic cable for network operators and municipalities is set to reduce the cost of broadband and communications services in South Africa. Sisters Bongiwe and Boitumelo Mkonza, the founders of telecommunications infrastructure company Xuma Technology, have made this their business. Based in Northcliff, Johannesburg, the company is a 100% black women-owned and managed business that offers a number of telecommunication infrastructure services, including civil works.

The dynamic twosome managed to get IDC funding of R11 million to achieve the business expansion needed to land a major contract for Dark Fibre Africa, which plans to roll out 15 000kms of fibre cables over three years. They qualified for the funding through the Women Entrepreneurial Fund offered by the Industrial Development Corporation (IDC).

Xuma contracts to network operators and owners to lay terrestrial fibre cable, conducting both the civil portion of the duct rollout, as well as the blowing and splicing of the fibre cables into the ducts. This capability means major construction contracts, with the necessary capital requirements. "While we had concluded several long-term contracts with credit worthy companies, payment is generally made on the successful completion of work performed. For this reason, we needed an injection of working capital to be able to fulfil the contracts," says Boitumelo Mkonza. "We had our eye on the IDC as a potential development funding source for some time, and when we realised we qualified for the Women Entrepreneurial Fund, it made absolute sense."

The fund, which falls within the R1 billion IDC Transformation and Entrepreneurship Scheme (TES), has dedicated R400 million to supporting women-owned businesses that have the potential to break into the mainstream economy.

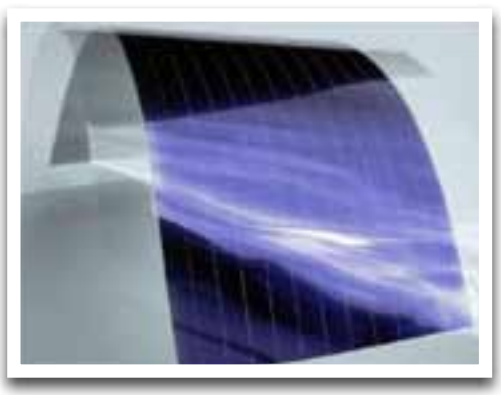
Funding for start up businesses, expansions or expansionary projects under the Women Entrepreneurial Fund (WEF) must include businesses with women in its operations and management. Shareholding by women must be at least 50 percent plus one share or if less, at a minimum of 25 percent plus one share, with the business presenting a plan to achieve this over two years.

The financing instruments applied are through equity, quasi-equity or loans with a maximum asset base of R80million and funding to a maximum of R30million per transaction is provided. Shareholders should have a collective total net asset base of less than R15million.

Along with funding, additional business support is offered in the form of a grant, helping with business planning, training and mentorship. To date the scheme has committed over R2.6million in grant funding towards business support. "The IDC didn't just provide capital, but have guided us through the process of putting it to good use through the business support consultants that were provided. We've been in good hands," says Mkonza.

296 jobs were created as a result of new contracts facilitated by the funding.

"The Information, Communications and Technology sector is one of our 14 key focus sectors for development funding. We further need to increase the extent to which women own and manage existing and new enterprises through WEF," says Meryl Mamathuba, head of Development Funds Department at the development financier. "This project fitted neatly into these criteria and we're pleased to see it go from strength to strength."



Thin-Film Solar Industry Leaders Launch PVthin

Leading representatives of the thin-film solar photovoltaic (PV) industry value chain today announced the establishment of a new industry coalition, PVthin.

An international non-profit organization under Belgian law, PVthin was created to strengthen global energy security and help create sustainable energy infrastructures by promoting the social, economic and environmental benefits of thin-film solar photovoltaic technologies. PVthin represents companies committed to the development of thin-film solar PV products based on chalcogenide compounds. The founding members are Abound Solar, Arendi, Calyxo, First Solar, GE Energy and 5N Plus.

As the name suggests, thin-film photovoltaic solar modules employ a very thin layer of semiconductor-usually just a couple of millionths of a meter (microns) thick - in place of a traditional wafer. Simpler to manufacture, thin-film PV makes more efficient use of raw materials and energy and results in both lower costs and smaller carbon footprints. Thin-film PV now accounts for around 18% of global PV sales, from almost nothing a decade ago, and is leading the way to affordable solar electricity.

Thin-film PV also lends itself to relatively simple mechanical and chemical recycling, ensuring the recovery of valuable raw materials when the need to replace the modules arises-often at no additional cost. PVthin aims to strongly promote efficient and energy-saving production, raw material use and state-of-the-art PV recycling and recovery programs and technologies in cooperation with other organizations supporting this objective.

WATTSUP

PneuDrive Challenge 2012 Aims to Use Engineering to Address Socio-Economic Challenges

PneuDrive Banner
Tshwane University of Technology

The PneuDrive Challenge 2012 Engineering Design Competition, sponsored by SEW Eurodrive and FESTO, has presented South African engineering students with an opportunity to use their academic aptitude to design solutions that could improve the lives of South African disadvantaged communities.

The PneuDrive Challenge, an engineering student design competition that has entered its fifth year, has started the year with renewed enthusiasm from the sponsors as well as an eagerness from students to design engineering solutions that are relevant to the broader population of South Africa. A series of road-shows to Gauteng universities have been concluded and visits to universities of the Western and Eastern Cape will be concluded by the end of March 2012.

Each year the sponsors of the competition suggest a theme for the competition with the intention of exposing students to the industries and technologies that they may engage with when they enter the job market. These themes have proven to be fundamental in focussing the analytical and design skills of students. This year's theme, "Engineering a better life for South African Communities", is one of the most open-ended themes to date and is expected to generate the most creative and life-changing designs in the history of the competition.

Russell Schwulst, Business Development Manager from FESTO, the newest member of the PneuDrive Challenge team, supported the importance of the 2012 theme by commenting that "with South Africa's success rate at solving all its challenges over the last 16 years, it is becoming increasingly evident that each South African has a role to play. We can't leave all our problems for government to solve and businesses and individuals just have to get involved". The sponsors and organisers of this competition feel confident that South African students "have what it takes" to take on the challenge of "engineering a better life for communities in South Africa". During the course of the last four years South African engineering students have proven their creative skills and enthusiasm by constantly presenting thought-provoking designs to businesses that solve real-life business problems.

The 2012 competition encourages students to think about the socio-economic problems faced by less fortunate communities in South Africa, and to design an application using SEW Eurodrive and FESTO products as a means to start addressing some of these issues.

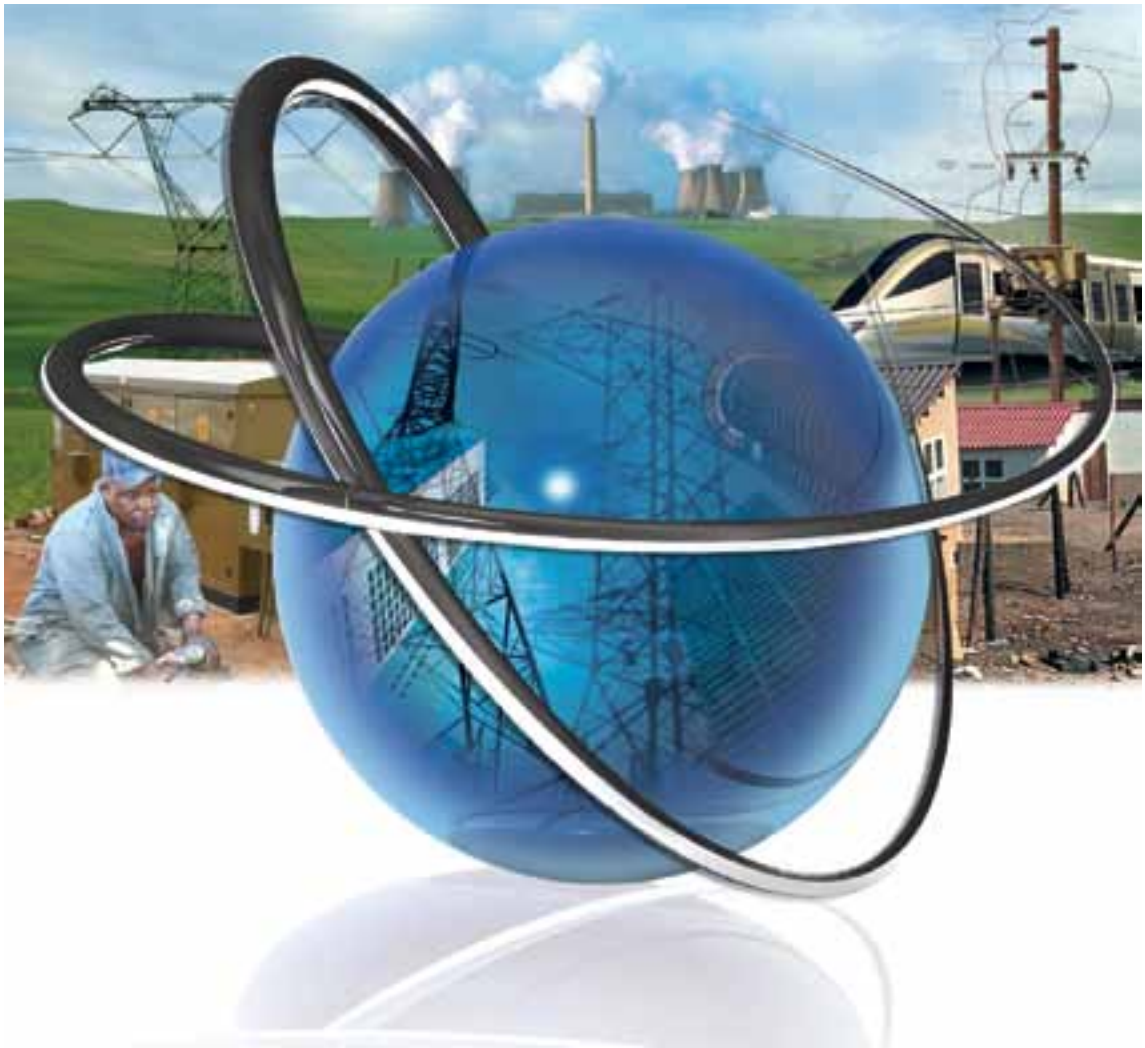
Rene Rose, General Manager of Communications at SEW Eurodrive highlights that "the competition has a proud and interesting history that was generated by the need to provide a platform for engineers of the future to bring together academic theory, business reality and the latest technology". An approach that many, if not everybody, engaged in South African business would support. Rene Rose adds that "the engineering student competition was an idea born five years ago when we were needing to bring together the importance of finding synergy between business growth and social responsibility. We have managed to build on the significance of the competition year upon year, to the point where six of the eight participating universities have included the competition as part of their curriculum".

The PneuDrive Challenge is open to third and fourth year mechatronic, mechanical and electronic engineering students from South African universities. The winning team receives an all-expenses paid trip to Germany where they will present their design at the head offices of SEW Eurodrive and FESTO, as well as afford their university an opportunity to claim R 100,000 worth of SEW Eurodrive and FESTO products.

Students at the Wits University Road-Show

Students at TUT Road Show

PNEUDRIVE CHALLENGE 2012



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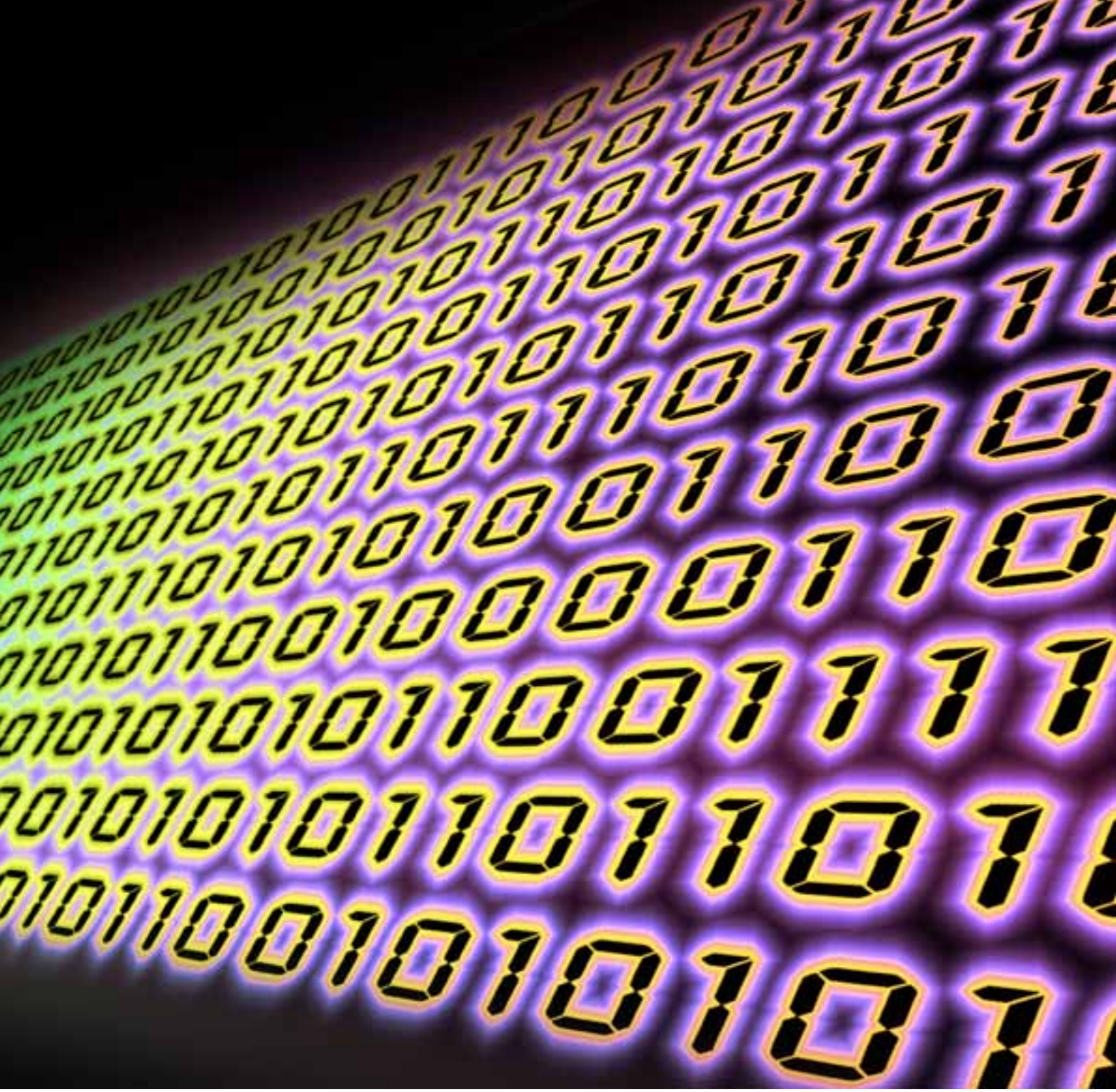
Emerging Developments in Enterprise Information Management

BY I DR DAVID H JACOBSON **I** PAST PRESIDENT **I** SAIEE
DIRECTOR I PRICEWATERHOUSECOOPERS LLP I TORONTO

In this thought leadership paper, we introduce and explain several emerging developments in enterprise information management that will likely pave the way for dramatic advances in the next two to five years. Big data mining, discovery, unwritten knowledge, security, social machines, cloud and mobile enhancements, and the emergence of "The Participative Web" are some of the developing areas which will have significant impact. Enterprise C-suites, their boards, cloud computing providers, mobile network operators, customers and clients will likely find these insights thought-provoking and relevant to improving or enhancing their business.

Enterprises in the digital economy strive to grow their revenues and earnings in increasingly competitive markets. Effective IM is key to achieving this.

Worldwide, C-suite executives, employees, customers and clients have all become highly technology savvy. Skilled at using communications and computing, they're quick adopters of new electronic systems, devices and services to



enhance their working and leisure lives So much so, that PricewaterhouseCoopers coined a new word to describe today's users: "Selfsumers". The Selfsumer is highly discerning; wants to see useful results and acquire knowledge quickly; keen to engage and make an impact; and eager to develop business and personal skills and learn new ways of working productively and enjoying their leisure time. Driving and being driven by technology, they engage easily with the internet, search engines, multimedia, social networking and collaboration, mobile communications and cloud computing - all of which increase their ability to participate ubiquitously. Indeed, "Ubiquitous Participation" has become a way of life in contemporary society for people leading demanding, high-speed lives, and working across geographical and time boundaries.

While today's users have advanced, grand-scale developments in computer memory and its management have led to gigantic Enterprise Data Warehouses (EDW). High-speed communications, cloud computing, encryption and colour display systems bring enterprise performance figures and trends direct to CEOs, CFOs and their boards at their desks - or while on the move. "Big Data" EDW methodologies

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drive "Agile and Predictive Analytics" by enabling most-recent business performance figures and trends to be updated quickly and comprehensively and be presented in easy-to-absorb graphical form. What's the end result? Enterprises are now able to make better financial predictions.

At the same time, "Customer-base Analytics" extend quantitative analytics beyond the borders of the enterprise by predicting which customers will likely be the most valuable targets, when and why. This dynamic Customer Relationship Management enhancement depends on mining EDW contents and integrating the results with real-time data flows. Realistic financial models of business performance are deduced by combining this with macro- and micro- economic and market-activity estimates.

Monitoring big, diverse sets of data generated by RFID tags and associated systems used for identifying and tracking containers and pallets of goods and even single-product items generates enormous amounts of data. Inventory control and valuation using these big data sets requires advanced IM to categorize and mine useful commercial information and display it in digestible form to decision makers.

Cloud computing now has implications beyond its origins of consolidating, replacing or complementing in-house enterprise IT. For example, small (even tiny) temperature, humidity, pressure, wind, fire and water, energy-consumption and intrusion detection sensors now enable vast networks of these data-gatherers to be distributed throughout office and residential buildings, warehouses and factories. Collecting data in this way and processing it is leading to "Smart and Green Buildings" and "Smart Grids". Whether grids are electrical, mechanical, chemical, retail or communications, they're becoming increasingly important in managing business enterprises and entire regional economies to the fullest.

A growing symbiosis is emerging between cloud computing and mobile systems. Smartphones, tablets and sub-laptops provide Selfsumers with powerful mobile communications and computing experiences. The cloud can store large databases and advanced applications for enterprise and customer use. What's especially important to make the most of smartphones is that information linked to location and directional orientation is immediately available from the cloud.

With this symbiosis, there's been an increase in enterprise mobile workers, as mobile systems and devices have become much more effective. Electronic collaboration, video conferencing and location-based access to EDWs from mobile devices make it possible to enhance the use of office space and also give employees improved work-life balance by enabling work-from-home. Employees can also access information quickly, whether on the go or working remotely, creating higher productivity levels and customer engagement. As a result, the sales process is quickened, creating a higher volume of transactions.
Despite these advantages, there's been a concern, especially amongst early adopters, about the security of data and knowledge stored in "the cloud". Appropriate computing architectures, planning, procedures and encryption for configuring cloud applications are paramount to making sure enterprise users have an acceptable level of security. Secure Sockets Layer (SSL) encryption between user and cloud, adopted widely for online banking, is likely to become more commonly used, as faster encryption chips with multiple processor cores become available in the next two years.

As powerful computers and "cyber criminality" skills continue to evolve, so do security risks for local and multinational enterprises on a vast geo-spatial scale. Simple Phishing fraud has become Whaling, where a company's C-suite members may be targeted by fraudulent emails specifically focused on their business dealings with senior executives in other companies and their social networking and email directory contacts. Man-in-the-middle, machine-to-machine (M2M) cyber attacks on mobile devices connected into unprotected public and private WiFi networks and "lightly protected" conference-meeting WiFi networks are increasing as tablets and smartphones often contain or link to more valuable personal and enterprise data than simpler devices. While effective counter measures are available to mitigate these risks, more needs to be done to ensure safety in the years ahead.

When it comes to the Web, it's entering a new phase - predicted by Tim Berners-Lee some 10 years ago - of "contextual" or "semantic" linkages and explorations. This includes M2M social networking and collaboration, search evolving into discovery, computing with encrypted data, in the cloud, unstructured reference information and knowledge, and advanced mobile computing. Contextual intelligence is closer to the way humans retain and recall informational experiences; so, a contextual web holds the promise of being a friendly,

When it comes to the Web, it's entering a new phase - predicted by Tim Berners-Lee some 10 years ago - of "contextual" or "semantic" linkages and explorations.

collegial and insightful 24/7 partner for enterprises. These concepts and trends are explored below.

SEARCH EVOLVES TO DISCOVERY

Long the stalwart foundation of "search": even before the advent of the Internet, key word profiles found articles, files and reports containing words that related—as close as possible - to a specific enquiry.

If you know more or less what you're looking for, then searching on keywords and numbers will likely lead you to articles relevant to what you have in mind. But what about discovering knowledge valuable to you and your enterprise concealed in vast EDWs?

Discovery goes beyond search. In 2001 Berners-Lee described what he had in mind for "The Semantic Web", a term that he coined for machines exploring web-based data for meaning. Building on those ideas, discovery involves machines (computers) exploring EDWs to unlock and estimate the value of information in files/documents by obtaining answers to non-key word contextual questions of the following types:

- Who is the author?
- Is the author "highly regarded" in the subjects covered?
- Is the author in the enterprise's social collaboration systems and social networking accounts (e.g. LinkedIn, Facebook and Twitter)?
- Are the author's "friends" highly regarded by the enterprise?
- Who has accessed the information and how frequently and where was it used?
- How current is the information and when was it last updated?

The advances made in computers and communications capacities, speeds and availability during the past 10 years are now enabling these types of M2M questions and answers (M2M Q&A) to discover deeply buried information in EDWs, going well beyond conventional search. Mobile business devices have a natural ability to automatically communicate information through their inbuilt GPS, accelerometer and other sensors, which determine their position and orientation in space and time. Other user information, including email content and browser information, can similarly be seen automatically by enterprise servers. As a result, workers automatically receive information that's relevant to mobile enterprise-user surroundings, time of day and current activities, without having to ask for it. This is a powerful rendering of the concept we call "Anticipatory Discovery" (AD).

The recent Microsoft announcement that "Bing Maps Malls" is an early example of AD. The map search engine now provides not only street address and route information, but also the names and locations of stores within malls and mall parking entrances.

This is based on the anticipation that mobile shoppers will want to have access to this information without asking. In the next two to five years, AD by machines will likely be an important part of IM in the enterprise, providing materials automatically to workers based on their business activities and locations during their working day.

For "road warriors" and "airways warriors" this will be a welcome productivity-enhancing, convenient enterprise service. We've already seen the beginnings of this "Participative Web", a friend and colleague partnering with Selfsumers at work in the office, remotely and mobile, and also at leisure and play. Information, knowledge and know-how discovery is becoming increasingly practical and will likely grow dramatically as context-based techniques develop further in the next two to five years.

M2M social networking and collaboration

When people think of social networking and social collaboration services and platforms, sites such as LinkedIn, Twitter and Facebook, come to mind. But, there's nothing that limits "social" only to humans. Machines can link EDWs having related interests and sufficiently trustworthy security measures in place.

As mentioned, there are aspects of M2M social networking inherent in M2M Q&A, such as map search engines. But M2M Social Networking and Collaboration can go much further. For example, the smartphone application named Waze automatically estimates your stop, start and speed of highway driving and shares this through M2M communication with the smartphones of others geographically

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nearby, advising them whether to use a particular highway or alternative route. The U.S.–based BlackBerry Traffic application is similar. We anticipate that further development and deployment of M2M social collaboration will increase efficiencies in goods-transportation enterprises by rerouting to avoid congestion on the ground, in seaports and airports. Following the GroupOn application, automatic multi-enterprise collaborative buying to reduce staple supplies costs will likely also be a powerful use of M2M social collaboration in the next few years. This can be thought of as an extension of multi-enterprise commerce, which is currently receiving attention in the marketplace.

Productivity may also improve through M2M collaboration with workers. Automatic recognition by M2M intelligence that several workers are engaged in closely-related activities will immediately provide relevant information and knowledge to all, thereby avoiding costly, time-consuming, duplicative individual searches. M2M collaboration is likely to emerge strongly as competition in business intensifies. It will also take place in medical services as populations increase in age and more seniors require quicker, effective interventions. Doctors can be presented with treatment, medication and rehabilitation options and their effectiveness by coordinating presentation of blood test and scan results through M2M collaboration, without having to search or request the information. As a result, doctor diagnosis, treatment decision and follow-up will be greatly enhanced.

Multi-disciplinary design teams are common in engineering and manufacturing. Collaboration amongst team members, and reliably linking appropriate design rule and patent data bases with component supply chain and prototype manufacture services, is becoming essential to meeting project milestones and product release dates. Collaboration between project team members has advanced significantly during the past 10 years crossing geographical and time zones. It's expected that during the next two to five years, scheduling, component procurement, prototyping, manufacture and distribution will be improved significantly using M2M collaborative systems.

MULTIMEDIA REFERENCES

For generations of time, reference materials have been in the form of written or text documents incorporating numbers, figures and charts, where necessary. As multimedia content on the internet has increased, the question has arisen of whether such conventional reference materials could be enhanced or even replaced by multimedia reference materials, such as audio or audio-visual interviews, demonstrations and training. On TV, the advantages of filmed demonstrations in food preparation and DIY machine maintenance programs have been known for many years. In education, training and advertising, the use of video has increased sharply in recent years - and continues - as portable and mobile display devices have become ubiquitous.

It seems likely that non-textual case studies of the disastrous earthquake, tsunami and Fukushima nuclear meltdown and contamination in 2011 in Japan will play a very important role in "documenting" the sequence of events and missed opportunities in emergency management, rescue, evacuations, and rehabilitation of the affected population.

Wikipedia, only recently regarded as a "modern invention", is already being viewed as outdated because it insists on including conventional references. Even professional content, such as the legal opinion, is being enhanced in court presentations by the use of audio-video "Demonstrative Evidence".

Today, people are giving greater credit to entrepreneurship, business skills and successes, and entertainment in emerging countries and economies, several of which do not have extensive written and textual histories. Indeed, it seems clear that textual reference works constitute only a small part of the universe of human knowledge.

In medicine, on-the-job augmented guidance of surgeons on complex procedures is likely to improve substantially by providing in-theatre high-resolution displays of how to deal with awkward situations. Multimedia recordings of prior real-life surgery using "Surgical Robots" for later in-theatre guidance is already feasible. The success of robotic surgery, where the surgeon sits at a computer console and guides the arms and fingers of a surgical robot, is already well-established in North America and internationally. The ease of recording each and every surgical movement provides invaluable reference material for surgeon training.

We expect multimedia reference materials to gain standing and become much more widely used during the next two to five years.

SECURITY IN THE CLOUD

Whether or not an enterprise cloud is public, private or a combination of both, there are always concerns about risk, safety and security. This isn't surprising

New types of memory, which were being investigated in laboratories only a few years ago, have emerged into mobile devices.

as compliance to personal and enterprise security legislation and best practices is uppermost in the minds of enterprise leaders. Secure transactions are admirably handled by SSL encryption in which a fresh code is selected for each new transaction, thwarting even today's most powerful computer cipher crackers. But (big) data stored on enterprise premises or somewhere in the cloud can be vulnerable to determined hackers using powerful computing machinery. Numerous recent experiences of banks, retail and other online sales and service companies who've lost control of clients' personal, enterprise and banking information attest to this.

The main security problem with processing data is that it generally has to be decrypted so calculations and analytics can be performed and interpretations extracted. In this form, it's vulnerable to cyber crime. Now, however, a new form of encryption, known as "Homomorphic Encryption" (HE), is emerging toward practicality. HE is a type of encryption that enables operations to be performed on encrypted data without decrypting it. The still encrypted result is then obtained by the user who decrypts it--when and where necessary.

It was in 1978 that some of the RSA encryption inventors and others posed the problem of constructing a fully HE scheme. The first such scheme was demonstrated by Craig Gentry in his remarkably innovative 2009 Stanford PhD thesis. To obtain acceptable security from the scheme would have required excessive computing power. More recent advances by Gentry and others show that computing requirements can be reduced significantly making HE feasible as an emerging practical technology. It's expected that within the next two to five years HE will lead to greatly increased security in the cloud by allowing operations in EDWs to be performed on encrypted data.

Embedded hardware and software in electronic devices have been focused mainly on optimizing performance and making features more versatile. As cyber crime has evolved greatly in the past five years, attention has been turning to building security into embedded subsystems. No longer is it good enough to "add on" some type of security software to counter present-day and future security attacks. During the next two to five years, M2M techniques embedded in devices and their sub-assemblies and components will add a new dimension of watchfulness and action at all levels of devices and systems. Context-aware embedded security clearly has an important role to play. These trends are changing the form, expertise profiles and partnering patterns of software and hardware security companies.

COMMUNICATIONS AND COMPUTING DEVICES EVOLUTION

Wireless devices used in IM are becoming smarter every day. Inventive applications and cloud services continue to emerge at a high rate and hardware and embedded software enable entirely new features.

New types of memory, which were being investigated in laboratories only a few years ago, have emerged into mobile devices. One is "Phase Change Memory". Here, a special material is used that has the property to change from crystalline to polycrystalline form when its temperature is altered, thereby storing a zero (0) or a 1. This memory can be manufactured as a tiny component. New results released by IBM indicate its high speed and low power will provide future mobile devices with exceptionally high storage capacity thereby enhancing their capabilities significantly.

The famous Moore's Law of semiconductors has predicted, quite accurately for some

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40 years, that the number of silicon-based transistors on integrated circuits would approximately double every two years. INTEL's recent development of a 3D silicon chip will likely enable this trend to continue well into the future as well as provide lower power consumption and greater computing capabilities.

Nanotechnologies, thought by some to be esoteric curiosities only a few years ago, have emerged in several fields during the past year, ranging from materials of exceptional strength to entirely new electronic components. High-resolution colour displays are already available, and battery capacity and length of life are being enhanced by growing nano-structures on electrodes.

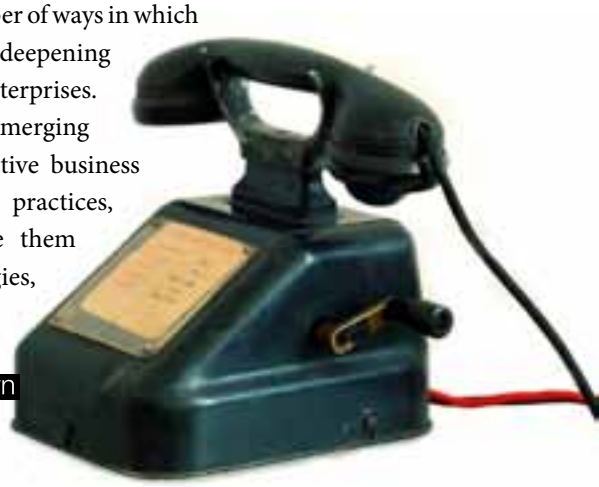
Battery cells constructed with nano-tubes as basic elements are performing impressively in laboratory experiments. Tiny and fast nano-transistors are also emerging. These and other nanotechnology products will play an increasingly important role in mobile devices in the next few years. This is certain to occur because "Long Term Evolution" (LTE) very-high-speed mobile networks will become widely available in both urban and rural areas. What will be the impact? Demands on future mobile devices to store, process, display and participate with other mobile and fixed devices, systems and services will increase greatly.

The emergence of "Cognitive Wireless" silicon chips is providing mobile devices with agility to seek and find unused frequencies in real time, when they become available at the mobile's location. This is optimizing wireless spectrum use. But, there is still more on the near horizon for enterprise mobility: tiny silicon-based TV tuners now emerging into production will enable direct TV reception on hand-held mobile devices, including video on demand. This will complement WiFi and Cellular high data rate downloads, such as video. The end result: less congestion in these limited spectral bands and service providers can make the most use of their fourth generation (4G) cellular network and spectrum investments.

During the next two to five years, we can expect exceptionally powerful mobile devices to be available for use by enterprise workers – rivalling the capabilities of present day desktop and laptop computers. But laptops and enterprise servers will continue to evolve, becoming increasingly more powerful and versatile, as many core microprocessors are integrated into hardware and software to exploit their parallel computing capability matures. We expect the full range of computing machinery and applications to be available to the enterprise worker, networked seamlessly, so that in-office work moves easily to mobile work and back again, as and when required.

CONCLUSION

This paper reveals a number of ways in which IM is expanding and deepening to the advantage of enterprises. As these newly emerging trends mature into effective business disciplines and best practices, specialists will integrate them with current methodologies, working with clients to achieve even stronger business performance. wn



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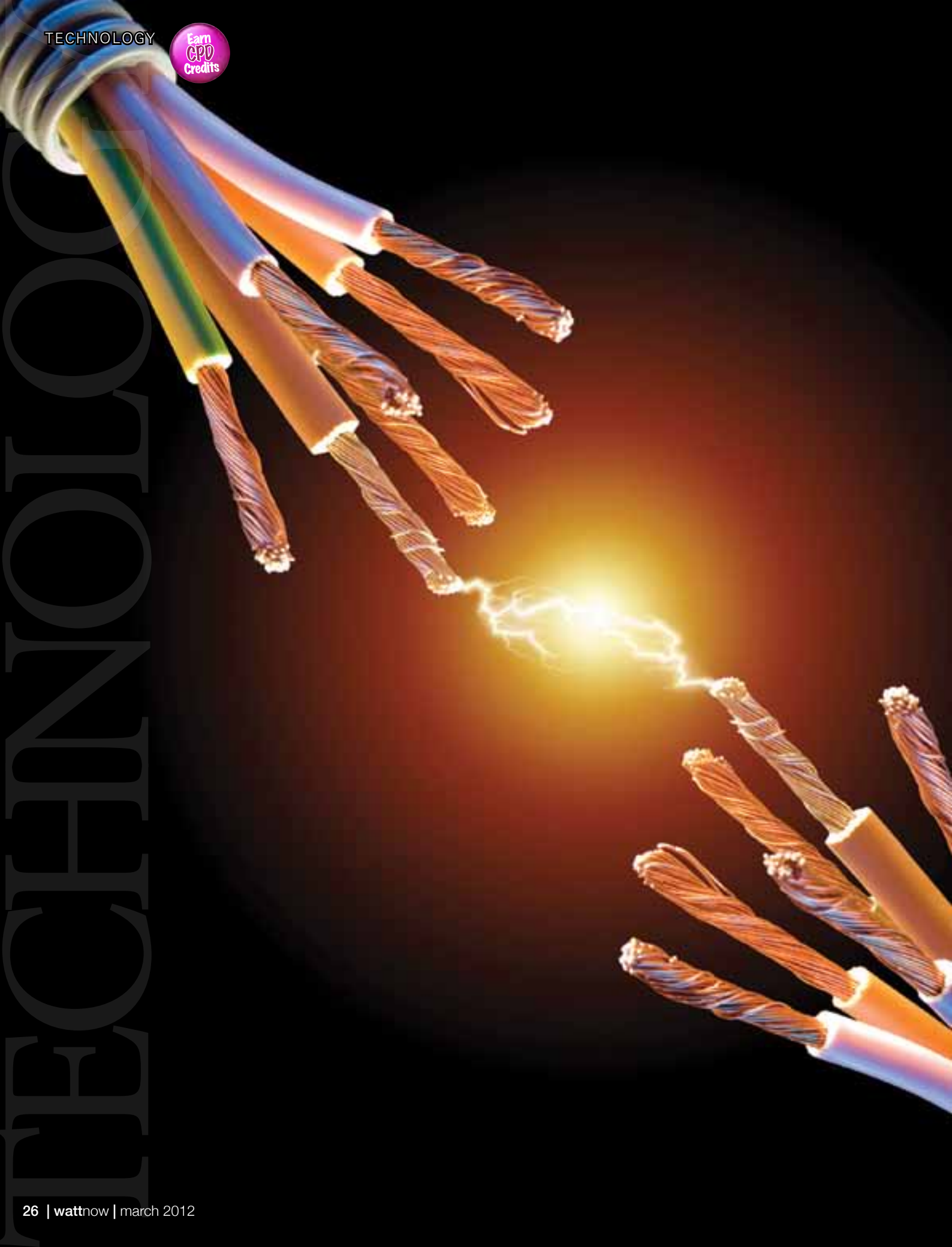

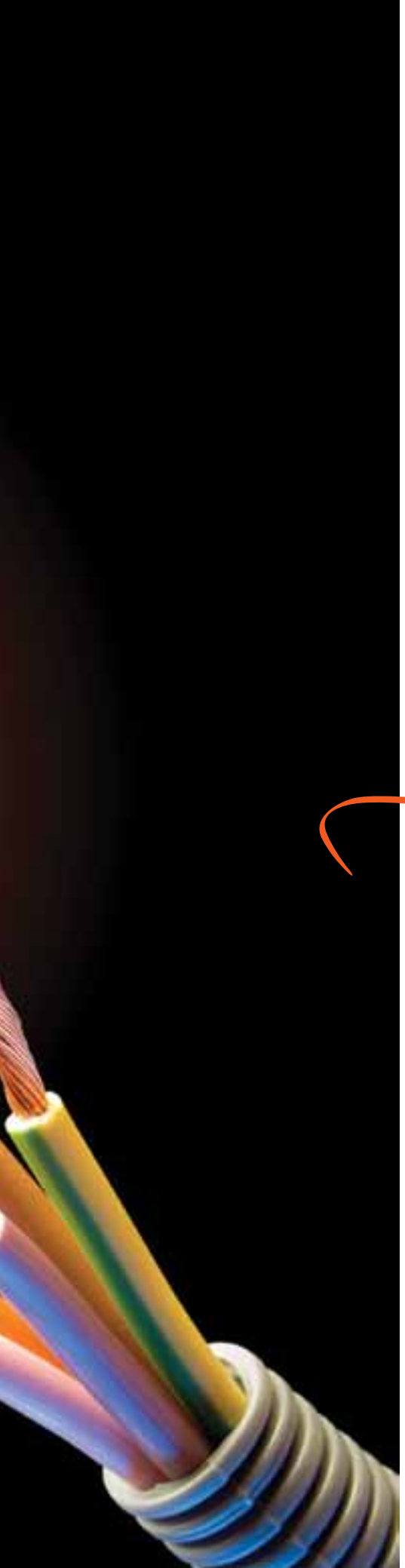

What are those orange ducts?

Anyone travelling along the N3, N1 or N12 national roads recently would have noticed a bundle of coloured ducts being laid in a newly dug trench alongside the road. This is the latest in a series of major telecommunications infrastructure projects in South Africa over the past few years.

BY I GREGORY NEFDT **AND** REBECCA BROWNLEY
NETWORK IMPLEMENTATION I NEOTEL

There have been similar projects throughout the major metropolitan areas, with many people having seen their roads and pavements being dug up to lay coloured – often orange – ducts. For the man in the street, these ducts have been the first sign of new competitive telecommunications infrastructure being constructed in South Africa. But just what are these ducts, and what's in them?

NATIONAL LONG DISTANCE NETWORK

The National Long Distance (NLD) Fibre Network – the coloured ducts along the national roads – is a co-build project between MTN, Neotel and Vodacom. The works encompass the laying of telecommunications ducts, the construction of chambers and manholes, and the deployment of fibre optic cables in these ducts for the co-build partners. The network will cover a total distance of 5 000 km, connecting the major centres of South Africa, once all the phases have been completed. Construction is far advanced on the first four legs of the project, which cover the routes from Johannesburg to Durban, and Johannesburg to Cape Town via Kimberley and Bloemfontein.

In a project of this nature, one of the biggest challenges prior to commencement of the construction phase of the works is obtaining all the necessary permits: Rights of Way, General Authorisations, and Environmental Authorisations, particularly in environmentally sensitive areas and wetlands, from the various local and national government departments. In addition to the need for an Environmental Impact

What are those orange ducts?

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Metro networks need more cables, with higher fibre counts, than long distance networks.

Assessment (EIA), as for any project on this scale, water use is of particular concern. The crossing of any watercourse, and the use of water during the project are subject to specific water use licensing.

In addition to the permitting issues above, there are multiple other engineering challenges to be overcome, including avoiding existing services like water and electricity, and simple issues such as gaining access to the works when there is maintenance or road sealing in progress.

The construction of the routes begins with a civil portion of the works, which involves trenching by either mechanical or hand trenching methods, and the installation of manholes and eight 32mm PVC ducts, colour coded for the different partners. At regular intervals, the ducts lead into concrete chambers, accessed via lockable manholes.

The works take place mainly along the existing national road reserve and along wayleaves in the metro areas of the specific towns where termination sites have been constructed. At the termination sites, the ducts extend into telecommunications facilities where the fibre optic cables are connected to optical distribution frames and thence to the electronic equipment.

Optical fibre cables, which consist of multiple pairs of hair-thin glass fibres, surrounded by various materials to strengthen and protect the cable, are not tolerant of tight bends, which places constraints on the physical construction of the ducts and chambers.

Once the civil portion is completed, the fibre optic cable is installed along distances of up to eight kilometres using fibre-blowing technology to "float" the cable into the duct. Once the cable is installed, the fibre is spliced to create end-to-end optical paths through each fibre pair, which will be lit by Dense Wave Division Multiplexing (DWDM) optical transmission equipment.

Once fully installed, an optical fibre network such as this can deliver hundreds of gigabits per second over thousands of kilometres, providing vastly more bandwidth, and using much less power than older, copper-based transmission networks. The capacity is maximised by placing electronic repeaters spaced around 80 km apart along each route, balancing the attenuation and dispersion of the light in the optical fibre against the cost of repeater equipment.

METRO AND ACCESS NETWORKS

Within urban areas, the deployment of fibre optic networks in somewhat different. Current generation Metropolitan Area Networks (MANs) are laid out in multiple rings or meshes, providing the necessary redundancy of routes between telecommunications sites. As a result, the networks of ducts that have been laid in South Africa over the past few years criss-cross entire cities, running along the sides of roads or pavements.

A number of different methods of trenching and construction are employed in urban areas, where there are tighter limitations on both space and time, and other restrictions imposed by the permitting process of local authorities. In pavements, conventional trenching and reinstatement is common. In sealed tarred roads, mechanical cutting of narrow trenches in the road surfaces has been employed in various cities in South Africa.

One can view the metro network as consisting of two parts – metro core, and access. The metro core (backbone) routes link major telecommunications network nodes (typically referred to as Points of Presence or POPs), with two or more diverse routes meeting at a single node, to minimise the likelihood of failure if a single route is cut. The access network consists of smaller rings that pass customers' premises. This ring feed makes it possible to provide two independent, diverse fibre

routes into premises, to provide a guarantee of high availability, often under a service level agreement. "Dual-homing" – connecting the two fibre routes to different POPs – can increase availability even further. To ensures a fully diverse connection to the network, feeds from the access ring enter the customer's premises through ducts separated by at least 6m, subject to the building entry points available.

Metro networks need more cables, with higher fibre counts, than long distance networks. A typical construction consists of large ducts (110mm), through which multiple micro-ducts (typically 12mm) are passed, across the entire footprint of the access network area. Another common type used is the seven-way duct, which consists of seven permanent micro-ducts within a 32mm duct.

The micro-duct system along streets and pavements passes in front of the business premises or homes within the footprint. Micro-cables are blown through the micro-ducts using compressed air, to complete the installation.

Fibre Access Closures (FACs) are strategically placed along the access fibre rings, resulting in an approach known as Fibre to the Kerb (FTTC, using the America spelling, Curb). These closures have "Single Circuit Management" (SCM). SCM provide access for connection to a specific pair of fibres, with virtually no risk of disturbing services to other customers.
In legacy networks, FTTC can refer to a model where the last link from the kerb (or Cabinet) into the customer's premises remains copper. In a modern, pure fibre network, a new branch is typically constructed to feed fibre into the customer's premises as and when required. For fibre diversity, a customer feed can be connected into the ring in both directions at an FAC; for full physical diversity, two separate feeds from a customer can be connected at two adjacent FACs.

The purpose of deploying Fibre to the Kerb is to have access fibre within easy reach of all customers within a geographic area (footprint), such as a business district. Once the Fibre to the Kerb is in place, customer connections via fibre can be installed rapidly, on demand.

Typically, metro fibre rings make use of 72-fibre cables. However, where the potential customer density is lower, smaller cables may be used. All access cables contain only Standard Single Mode fibre (exceeding the minimum requirements specified in ITU-T recommendation G.652.D). These fibres have low Polarization Mode Dispersion (PMD) as well as a low attenuation at the water peak (1383nm). These characteristics make the cables usable for high speeds (up to 40Gbps per wavelength of light) and also suitable for Dense Wave Division Multiplexing (DWDM) as well as Coarse Wave Division Multiplexing (CWDM). Using DWDM, which transmit multiple wavelengths of light, the total speed possible on a single fibre pair can reach speeds above 1 Tbps.

FTTB (Fibre to the Building) refers to an approach where the ducting, and often fibre, is preinstalled all the way

What are those orange ducts?

continues from pg 29

Armoured optical fibre cable can be directly buried by ploughing it into the ground ...

into the building, shortening delivery times, and potentially connecting many more customers. Taking the same approach in residential areas is referred to as FTTH (Fibre to the Home).

ALTERNATIVE APPROACHES

The pipe and chamber construction described above is only one of several methods used in the deployment of optical fibre networks.

Armoured optical fibre cable can be directly buried by ploughing it into the ground where conditions permit, although this is obviously less convenient when later access or expansion is required.

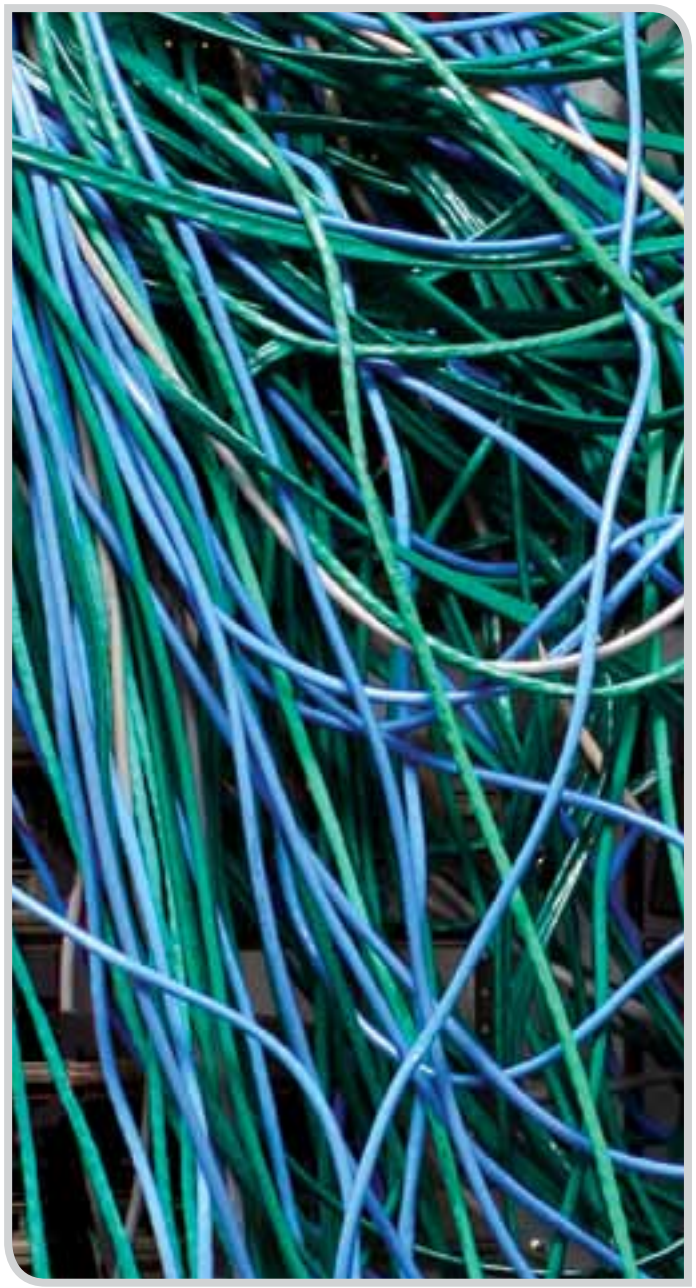
Reinforced and weather-resistant outdoor optical fibre cables (typically metal-free All-Dielectric Self-Supporting or ADSS fibre) can be suspended from poles, street lights, railway mast poles, or power pylons, or even wrapped around power line conductors. Examples of these construction methods can be found in major cities and along major routes between cities in South Africa.

Many new power lines incorporate Optical Ground Wire (OPGW) conductors, which have optical fibre in the centre, adding reliable telecommunications transmission to a power transmission system.

In contrast to terrestrial optical fibre cables, submarine optical fibre cables are simply laid on the seabed, or ploughed in shallow waters, and have a more complex construction, to provide for the protection, strength, and power feeding required under the sea. wn

OPTICAL FIBRE facts

Optical fibre is the miracle medium that modern telecommunications networks are built upon. Single-mode fibre is silica glass, almost as thin as a human hair, that acts as a waveguide for light (typically infra-red, wavelength 1200-1700 nm), modulated by a laser light-emitting diode. The bandwidth of a single fibre pair (one for each direction) is almost infinite for most practical purposes. Using Dense Wave Division Multiplexing (DWDM), which transmits multiple wavelengths (colours) through a fibre, the record throughput recorded is more than 100Tbps (100,000,000,000,000 bits per second), with each wavelength carrying more than 100 Gbps. Using modern signal processing techniques, these speeds continue to rise.



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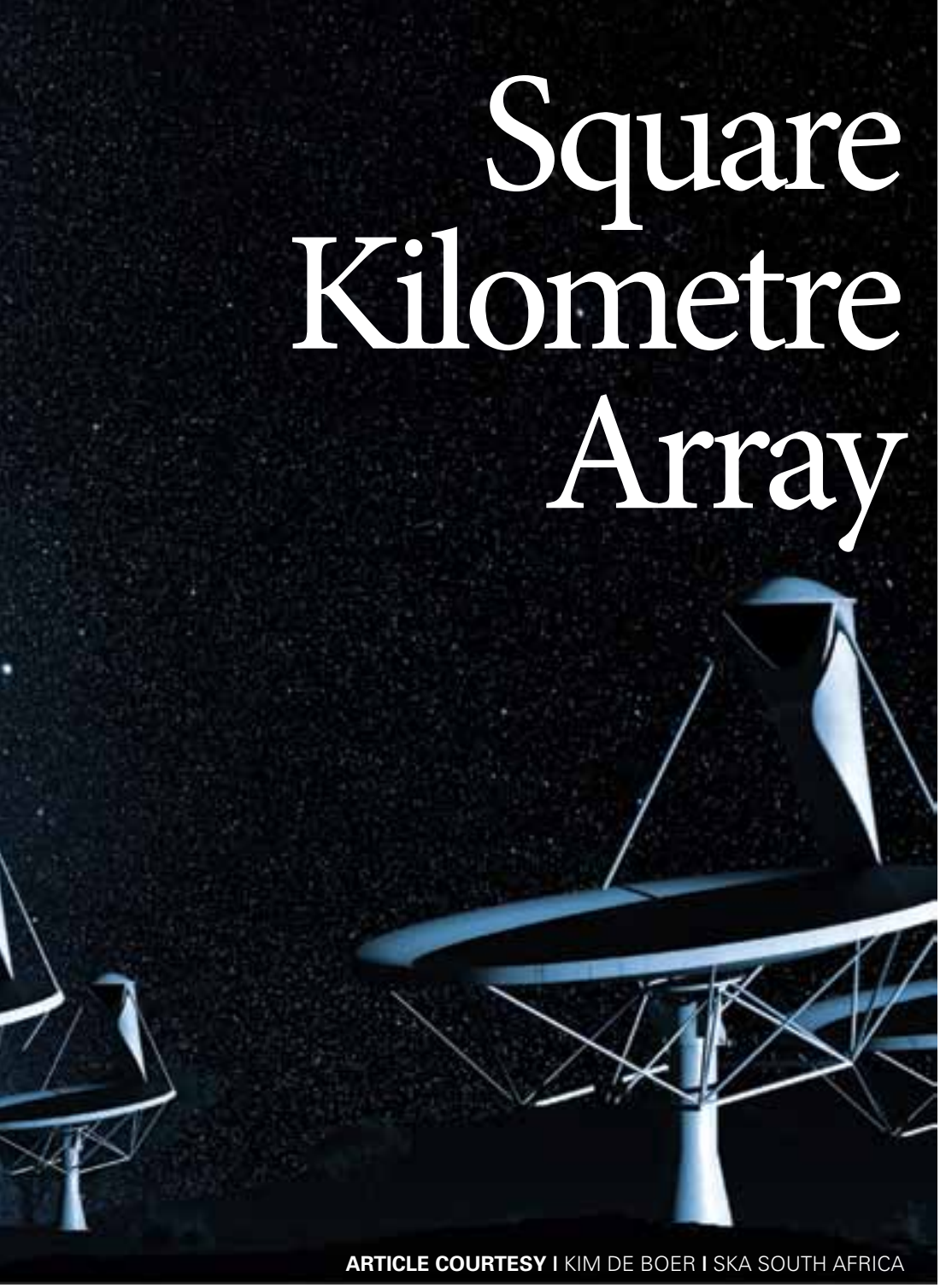
Two candidate locations are under consideration: Australia – New Zealand and Southern Africa. In the first case, the core region would be in Western Australia with remote stations stretching across Australia to New Zealand.

In Southern Africa, the core would be in the Northern Cape Province in South Africa with remote stations scattered throughout the rest of South Africa and several countries in the region including the Indian Ocean islands. The core region in either location will have to accommodate up to three sub-cores, each approximately 5 km in diameter - one for the dishes, one for sparse aperture array dipoles and one for dense aperture array tiles*.

Major site selection criteria include the current and future radio quietness of the sites, and the infrastructure capital and operations costs. Ongoing site characterisation includes measurement of the radio-quietness of the core regions and representative remote stations, as well as measurement of tropospheric and ionospheric stability.

**Each tile consists of a collection of simple, all-sky element antennas coupled such that beams are formed and steered electronically on the sky.*

Square Kilometre Array



ARTICLE COURTESY | KIM DE BOER | SKA SOUTH AFRICA

The SKA will be a revolutionary radio telescope with about one square kilometre of collecting area, giving 50 times the sensitivity and 10,000 times the survey speed of the best current day telescopes.
It will give astronomers insight into the formation of the first stars and galaxies after the Big Bang, how galaxies have evolved since then, the role of magnetism in the cosmos, the nature of gravity, and studies in astro-biology. And, if history is any guide, the SKA will raise more questions about the Universe than answer old ones.
The SKA is a global project in which astronomers and engineers from more than 70 institutes in 20 countries, together with industry partners, are participating in the scientific and technical design of the telescope through development programs, design studies, and pathfinder telescopes.

WHAT WILL IT LOOK LIKE?

The SKA will employ antenna systems to cover, initially, the frequency range from 70 MHz to 10 GHz (4 m to 3 cm wavelength), with potential for a future extension to 25 GHz or more. Fifty percent of the total antenna collecting area will be concentrated in the core region, 15-20 km across, with the remainder in outlier stations at distances of up to at least 3000 km to provide very detailed images of the cosmos.

In the higher part of the frequency band, the antennas will comprise up to 3000 dishes each of about 15 m diameter and carry low noise innovative feed and receiving systems. In the lower part of the band, the antennas will be fields of aperture array tiles and dipole arrays, with no moving parts, able to observe a number of large areas of the sky simultaneously.

Square Kilometre Array

continues from pg 33

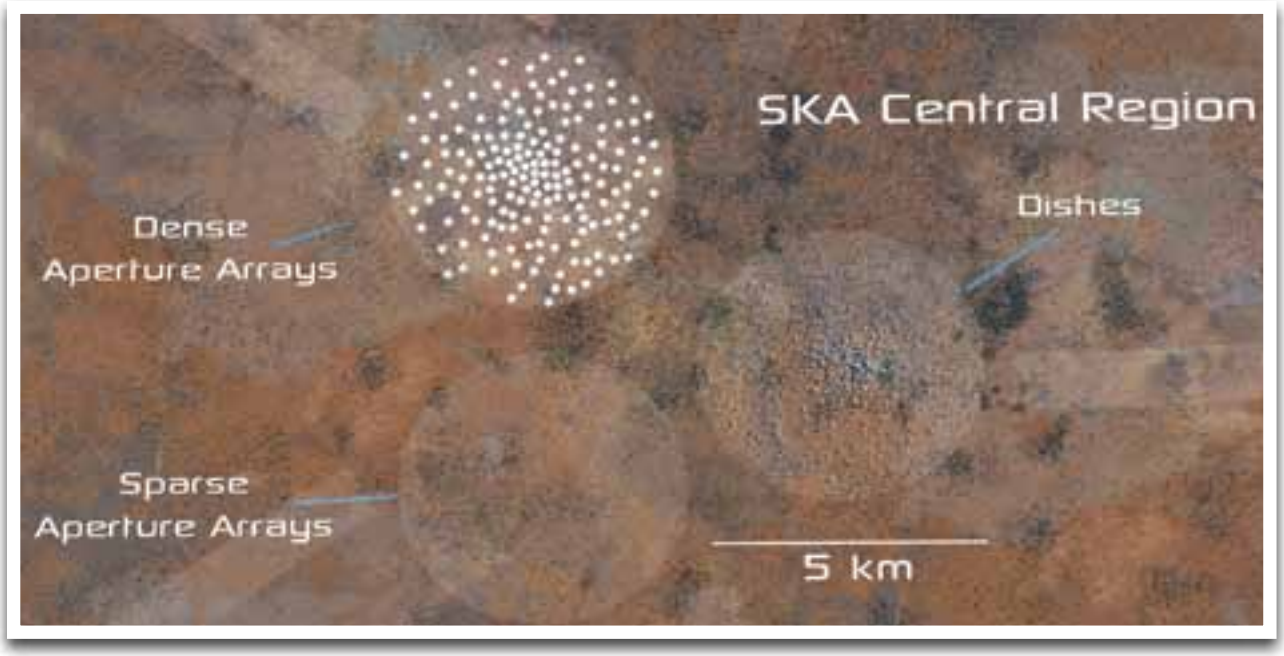
Signals received by the antennas will be transferred to a central signal processing system and high performance computer by optical fibre links carrying up to 420 Gbits/sec per dish and 16 Tbits/sec per aperture array. The special purpose central processing system will process as much as 1 petabyte of astronomical data every 20 seconds, so that exascale computing and exabyte data storage will be required.

A sophisticated data archive and distribution system will provide access to the data by astronomers and physicists anywhere in the world.

TIMELINE AND COST

2008-2012	Preparatory phase in which the system design and cost are determined, and the site decision and initial construction funds are ratified by the participating governments.
2013-2015	Pre-construction phase - detailed design.
2016-2019	Initial construction of Phase 1, commissioning, integration and first science. Ratification by governments of funds for the full SKA.
2020-2023	Completion of construction, commissioning, acceptance, integration, and shared-risk science.
2024	Science operations.

The target cost for the SKA construction is €1,500 million.



The sparse aperture arrays, for the lowest frequencies of observation, are shown as arrays of 'droopy dipoles', one for each polarisation. The sparse aperture arrays are arranged into stations.

At mid-frequencies the dense aperture arrays are closely packed antennas arranged in tiles within stations. The size of the dense aperture array stations is likely to be about 60 m diameter.Parabolic dishes are used for high frequencies. These are arranged into stations at distances beyond about 180 km from the core regions.

Each dish is approximately 15 m in diameter. wn

Article courtesy of Kim de Boer, SKA South Africa | www.ska.ac.za





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Extra-galactic milestone for South Africa's KAT-7 telescope

FIRST ATOMIC HYDROGEN SPECTRAL LINE IMAGES OF A NEARBY GALAXY

South Africa's KAT-7 telescope, a seven-dish array which is a precursor to the much larger MeerKAT telescope in the Karoo and to the Square Kilometre Array, has reached another major milestone by observing the radio emission from the neutral hydrogen gas (HI) in a nearby galaxy. Hydrogen gas emits radio emission in a spectral line at a very specific frequency of 1420 MHz.

ARTICLE COURTESY | KIM DE BOER | SKA SOUTH AFRICA

The astronomers pointed the telescope towards a galaxy called NGC 3109 - a small spiral galaxy, about 4.3 million light-years away from Earth, located in the constellation of Hydra. The observation allowed them to see the HI radio emission of this galaxy, as well as to see how this galaxy is moving. Where the gas is moving towards us, the frequency of the spectral line is Doppler-shifted upwards; where the gas is moving away, the frequency is shifted down. In this way, astronomers can map the way in which all of the gas in the galaxy is moving.

"These exciting results achieved by KAT-7 have given us confidence that we know how to build a cutting-edge radio telescope in Africa to answer some of the fundamental questions in radio astronomy", says Dr Bernie Fanaroff, director of SKA South Africa. "Our team in the SKA South Africa Project and universities has again shown that they can deliver cutting-edge technology and do excellent science on a very tight schedule."

"A large proportion of the science planned for the SKA - and MeerKAT - involves mapping of the universe using neutral hydrogen. Because of the ongoing expansion of the universe, distant galaxies are moving away from us. Measuring the frequency of

the spectral line from neutral hydrogen in those galaxies allows us to work out how far away they are. By finding billions of distant galaxies, astronomers will be able to map the structure of the universe and how it has changed over time. This cosmic census of the neutral hydrogen in galaxies - far and near - is essential in understanding the deeper physics of the universe, by answering fundamental questions such as the nature of dark matter and dark energy."

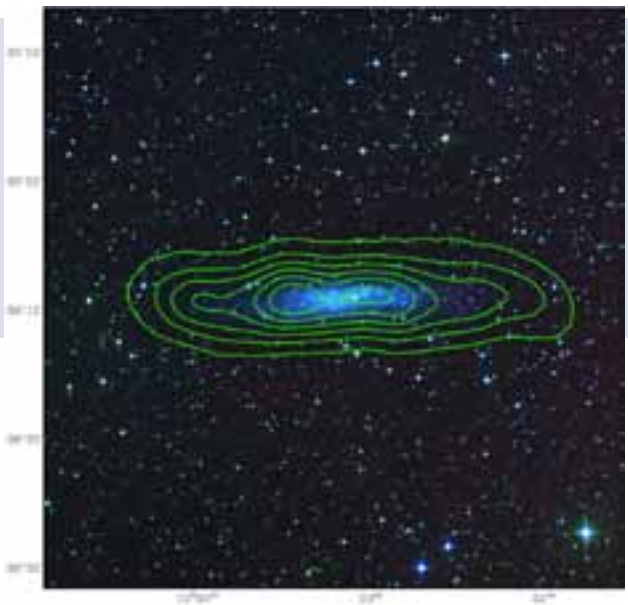
"Observations of the neutral hydrogen content of galaxies also help to form a picture of how galaxies have evolved over cosmic time and show how our own galaxy, the spiral galaxy called the Milky Way, has developed," Fanaroff adds.

The radio waves which KAT-7 picks up from the galaxy were processed in the correlator, the first stage of computing. The correlator currently allows measurement of the gas velocity to an accuracy of 10 km/s. Further upgrades during 2012 will enable astronomers to study this galaxy with a velocity resolution of 1 km/s.

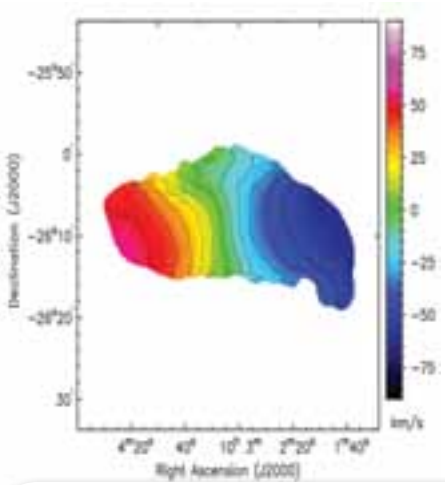
"Such a high velocity resolution will allow us to distinguish between the conventional models which suppose the presence of an important quantity of dark matter (matter that cannot be seen but that is detected by its gravitational influence) and the Modified Newtonian Dynamics (MOND) models which suppose that no dark matter is present but that it is instead the laws of gravity that change on galaxy scales," explains Prof Claude Carignan, South African SKA Research Chair in Multi-Wavelength Astronomy at the University of Cape Town (UCT).

"We also speculate that an unusual warp in the disk of this galaxy could be caused by a tidal interaction with its dwarf companion galaxy known as Antlia," Carignan adds. "Future KAT-7 observations should reveal more information on this possible interaction."

"It is particularly exciting that we will soon be able to derive new scientific results with a relatively small precursor array," says Bradley Frank, PhD student at UCT and lead researcher for the HI imaging of nearby galaxies with KAT-7. wn



The green contours in this image show the distribution of the atomic hydrogen gas overlaid on an optical image of the same galaxy - showing clearly that the emissions from the hydrogen gas come from a much larger region than that seen by the optical image. (The Digital Sky Survey was produced at the Space Telescope Science Institute under US Government grant NAG W-2166. The images of these surveys are based on photographic data obtained using the Oschin Schmidt Telescope on Palomar Mountain and the UK Schmidt Telescope.)



This image shows that the galaxy is rotating with the blue towards the viewer and the red away. The rotation is not uniform and the structure can be used by astronomers to model the distribution of matter in the galaxy. Current thinking is that most of the matter is actually dark matter, which can't be seen but whose presence can be confirmed by these kinds of observations.

Article courtesy of Kim de Boer, SKA South Africa | www.ska.ac.za

LATEST NEWS FROM SKA

The Board of Directors of the SKA Organisation held a meeting in Manchester, UK on Monday 19 March 2012. The Board formally noted the admission of Canada, represented by the National Research Council, Canada (NRC), as the 8th member of the SKA Organisation. The main item of business at this meeting was to consider the site report and recommendation. Board members had the opportunity to question the chairs of the SKA Site Advisory Committee (SSAC) and the SKA Siting Group (SSG), and to clarify a number of the SSAC's conclusions.

The Board agreed to pass on the site recommendation to the members of the SKA Organisation, together with a commentary that captured the Board discussion and noted certain issues.

The members will meet in Amsterdam on 3 April 2012, but it is not likely that this meeting will make a final decision on the site; rather it will be the start of a process of discussion and negotiation between the members.

The Board will next meet in Amsterdam on 4 April 2012 for one of its quarterly meetings to oversee the activities of the SKA Organisation.

Earn CPD Credits

Power Factor Correction

FAST ELECTRONIC SWITCHING VS CONTACTOR BASED SWITCHING

FAST AND ACCURATE COMPENSATION

The ACTIVAR achieves full compensation in 1 second typical (3-4 seconds maximum). The compensation is based on averaging the FFT analysis of each cycle, resulting in more accurate compensation, even with the presence of harmonics.

SIMULTANEOUS GROUP CONNECTION

When load changes require connection or disconnection of more than one step, the ACTIVAR controls the switching of as many steps as required at precisely the same time. Simultaneous connection or disconnection provides the following benefits:

- Faster full compensation
- For example, a 1:2:2 system configuration and groups 1 and 2 are connected. When 1 more step is required, group 3 will be connected simultaneously while group 1 is disconnected.
- Real binary sizing – 1:2:2 is exactly the same as 1:1:1:1:1

TRANSIENT-FREE SWITCHING

Electronic switching technology prevents any transients typically associated with conventional capacitor switching. This is extremely important in sites with sensitive electronic equipment, such as hospitals, data centers and facilities.

FIXED CAPACITY AND FILTER CHARACTERISTICS

The capacity of the ACTIVAR capacitors is virtually permanent over the years, which prevents the need to replace capacitors. Moreover, the tuning frequency remains constant over time, which allows system performance to remain at the highest possible level.

SLOW COMPENSATION TIME

Due to technology limitations, electromechanical switching has slow compensation time. Connecting 1 step in 10 - 30 seconds, and complete compensation can take several minutes.

SINGLE-STEP CONNECTION

A significant time period elapses between connection or disconnection of a step. As a result, the performance of the compensation system is reduced due to the following:

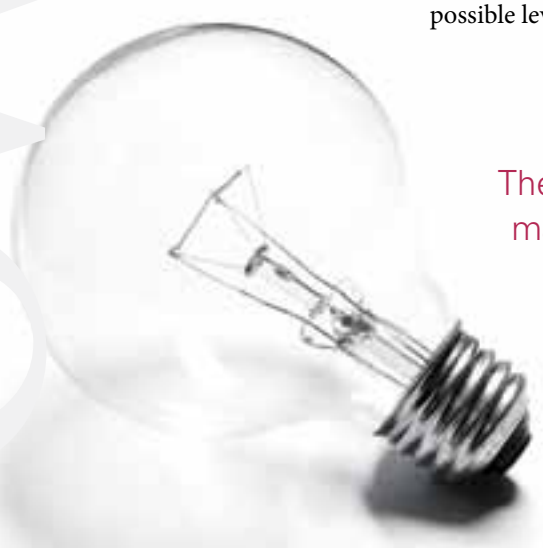
- Slower compensation, especially when more than one step is required
- For example, a 1:2:2 system configuration and groups 1&2 are connected. When 1 more step is required, group 3 will be connected long after group 1 is disconnected.
- Binary sizing affects performance

TRANSIENTS

Contactor-based switching causes significant current and voltage transients. These spikes can cause severe electrical damage, and is one of the leading causes of power supply failure.

CAPACITY DROP AND FILTER VARIANCE

The capacity degrades over time and may require replacement of capacitors. Further, the (de-)tuned filters dependent on capacitor-inductor ratings. As the capacitors degrade over time, the (de-)tuning frequency will change, and may create a resonance condition, even though the original system included harmonic inductors.



The supply of enhanced power quality presents a major challenge as the world demand increases. Quality-of-life and ecological issues lead the quest for new energy saving technology and systems capable of managing costs and supply. We compared the best switching solution for you.

ARTICLE COURTESY | WAYNE BROMFIELD | IMPACT ENERGY

FAST ELECTRONIC SWITCHING VS CONTACTOR BASED SWITCHING

LONG LIFE AND REDUCED MAINTENANCE COSTS

Elspec ACTIVAR reduces site maintenance costs by increasing the lifetime of:

- Switching elements
- Capacitors
- Sensitive electronic equipment

CAPACITOR DUTY CYCLE - SCAN MODE

The unique SCAN feature protects the ACTIVAR's capacitors, reduces their average current and temperature and extends their life. Simultaneous connection and disconnection of steps in FIFO (First In First Out) manner is shown on the right.

EASY TO USE AND MAINTAIN

The advanced DSP and microprocessor-based controller, with its large full graphic LCD display, provide easy-to-use operation. The controller includes a complete electrical measurement system, which can replace a facilities' main monitoring meter. The controller operates the BIT (Built In Test), which reports system or network conditions. The optional PowerIQ software can remotely control all ACTIVAR operation and display additional system power information.

LOW-COST SOLUTION

The initial cost of the ACTIVAR system is slightly higher than traditional electro-mechanically-switched solutions. However, when the costs of operating and maintaining a traditional system (contactor and capacitor replacements and/or possible equipment damage) are added, the ACTIVAR's overall costs are far less than an electro-mechanical system.

LIMITED LIFE AND HIGH MAINTENANCE COSTS

Contactors have a finite and limited life, and therefore need to be replaced frequently. Transients caused by contactor switching and capacity degradation over time requires repetitive equipment failures and expensive replacements.

UNEQUAL DUTY CYCLE

Groups in most conventional systems are engaged dependent on the actual load, but are not equally utilized. The first step generally gets the most usage and is the first to fail due to its high duty cycle compared to the other steps.

COMPLICATED USE AND MAINTENANCE

Electromechanical controllers normally require dip-switch programming and/or hard-to-follow programming manuals. Small display monitoring (or none at all) makes it very difficult to examine system performance. Usually, an additional meter is required to check the network power parameters. The option for remote communication and control does not exist.

LOW-COST SOLUTION

The initial cost of an electro-mechanical system quickly changes due do the component replacement and repair. When evaluating electromechanical switching over a period of time, the actual costs and indirect losses become much higher than the initial investment.

Earn CPD Credits

Radial Feeder Protection Training Module

This article shows the theoretical and practical application of the IDMT overcurrent protection system, namely radial protection in the form of a laboratory experiment. The laboratory experiment provides a real substation-like operating environment, which allows the student to familiarise with the fundamentals of protection with limited hazards. Radial overcurrent protection is used to protect the distribution network from excessive fault currents, which may damage equipment and bring harm or fatality to people. Analysis of the tripping curves and correlation between the protections relays assist in achieving optimum results. The tests will be done using an Omicron test set.

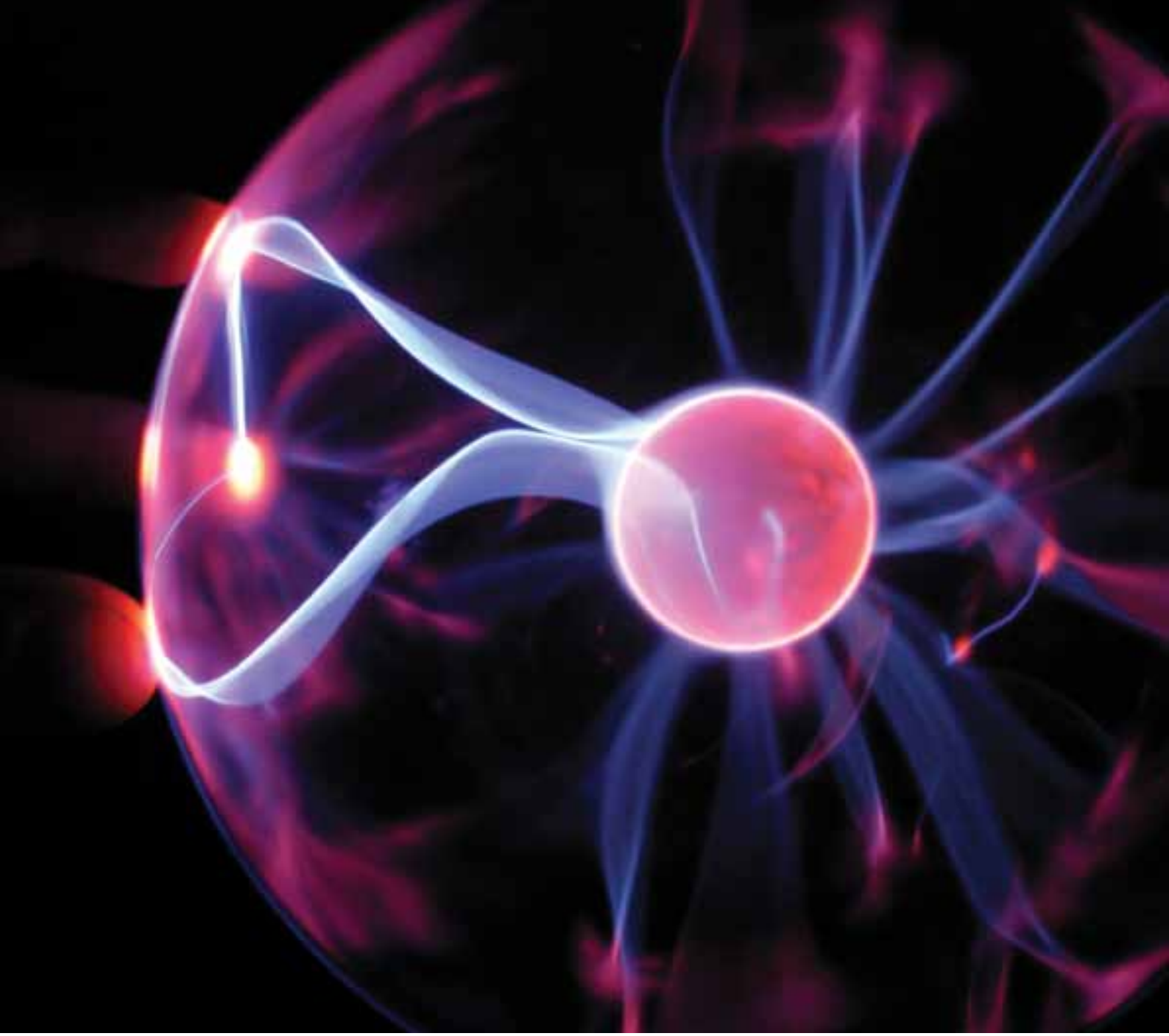
BY I T.U MZEKELI **AND** T.D JACOBS
CAPE PENINSULA UNIVERSITY OF TECHNOLOGY **I** BELLVILLE CAMPUS

Overcurrent protection, especially radial protection, is extensively used for the protection of long distribution high voltage (HV) lines. [1] The correct settings and the correct coordination between protection relays, on the same HV line, are important for correct protection operation of the network. The relays on the line are positioned so that they can form a particular system of protection, which operates on a time- grading system. [5]

When there is a fault on the line, all the relays will see the fault; however they will not trip at the same time because of time grading. Time-grading allows the relay closest to the fault to trip first, and only if it fails to trip will the upstream relays trip according to their grading times. [6]

The network experiences faults that generate low voltages and extremely high currents. Since these faults cannot be avoided from occurring, reducing the fault time by using IDMT curves on the relays can minimize the effects.

Inverse Definite Minimum Time (IDMT) relays operate on the principle that the bigger the fault current the shorter is the time delay to trip the circuit breaker. Two requirements of the IDMT relay are



that: The operating current needs to be settable; the trip time at a certain operating current needs to be settable. [8]

BASIC OPERATION

A Radial System is a system where independent feeders branch out radially from a common source of supply in a radial design in which one bus feeds the next bus or set of buses as shown in the above fig.1.[2]

The main characteristic of this system is that power can flow only in one direction, from generator or supply end to the load. The radial system has a disadvantage that continuity of the supply cannot be maintained at the receiving end in the event of a fault. To mitigate this disadvantage, time-graded protection of a radial feeder can be achieved by using: Definite time relay or Inverse time relay.[6]

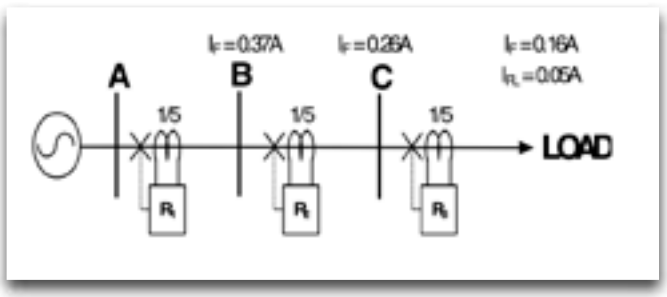


Fig. 1. Radial line protection

Radial Feeder Protection Training Module

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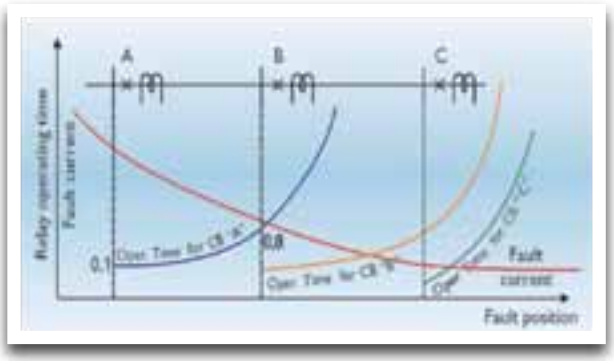

Fig. 2. Relay operating time vs fault position graph [1]

TABLE I
DIFFERENT IDMT CURVES [1]

Curve name	Formula
Normal inverse	$t_c = \frac{3}{\log M}$
Very inverse	$t_c = \frac{1.6}{(\log M)^2}$
Extremely inverse	$t_c = \frac{0.6}{(\log M)^3}$

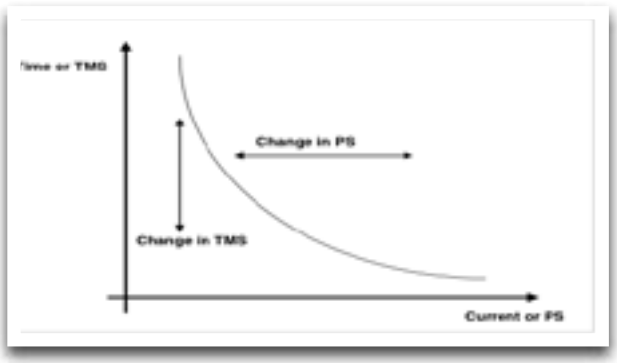

Fig. 3. Moving the curve by changing TMS and PS [9]

PROJECT OBJECTIVES

The main objective of the project is to design and build a representation of a radial protection feeder that can give students; a practical understanding of the application and operation of overcurrent protection relays on the electricity network as well as how settings should be applied in order to ensure effective operation of the protection systems (PS).

The training module should be portable and operate from 230Vac. It should be used for protection demonstration to students and be user friendly in terms of layout and operation.

CURVES & SETTINGS

Fig. 2 shows relay operating time versus the fault position and shows curves for the three circuit breakers and their tripping characteristics. From the curves we can see that the closer the fault is to the circuit breaker, the quicker will the circuit breaker trip. [1]

IDMT CURVES

tc is the set trip time of the relay and M is the plug setting multiplier. In the formulas shown in table 1 it is only possible to change the set tripping time by changing M and consequently PS. We need a mechanism to change the operating time without changing the set PS. Therefore a new term called the time multiplier setting (TMS) is introduced. This results in the actual operating time (ta) of the relay where:

$$t_a = t_c \times TMS \qquad (1)$$

The plus setting multiplier (PSM) or M is a ratio of the secondary CT current and the setting current.

$$M = \frac{I_s}{I_{set}} \qquad (2)$$

The time setting is called the time multiplier setting (TMS). The operating current is set by using the plug setting (PS). [3] From fig. 3, it is clear that to move the curve up or down for a constant PS, the time multiplier setting (TMS) is changed and to move the curve sideways for a constant TMS, M or the PS is changed. [9]

GRADING OF IDMT RELAYS

A discrimination period is applied to ensure that sufficient time is available for the main relay to trip the breaker before the backup relay operates. [2] The discrimination period is affected by the following factors:

1. Ideal vs. actual curve characteristics (=> error) = 0.1 s
2. Disc overshoot due to inertia after current removal = 0.05 s
3. Circuit breaker operating time = 0.15 s 4 Contact gap – the traveling distance of the backup relay = 0.1 s [7]

These amounts to a discrimination period of 0.4 s at the maximum fault level and will result in discrimination for lower level faults. For discrimination with fuses and miniature / molded case circuit breakers a discrimination period of 0.3 s is allowed, which is made up of the following factors:

1. Ideal vs. actual curve characteristics (=> error) = 0.1 s,
2. Disc overshoot due to inertia after current removal = 0.05 s,
3. Fuse operating time = 0.05 s and
4. Contact gap – the traveling distance of the backup relay = 0.1 s [1]

CIRCUIT DESIGN AND OPERATION

This project involves the design and construction of Laboratory Training Module to practically demonstrate the operation of a radial protection system to students. [5] The circuit consists of a main circuit and a control circuit. The main circuit represents the radial line simulation where the control circuit simulates the functionality of the module.

MAIN CIRCUIT DESIGN

The above circuit shows how the high voltage line is simulated from a 230AC supply. The current transformers transform the current so that it can be easily handled by the relay and the current flowing in the primary can be measured in the secondary. To simulate a fault, the switch is operated to resistors that have a lesser value of resistance than that of the load. This therefore simulates a fault, which will reduce the current flowing to the load, as the current flows to a path of lesser resistance. [4]

The training module must be portable so that it can be used in class to demonstrate to students. Also it should operate from 230Vac. Its construction incorporates the use of electro- mechanical and numerical protection relays and illustrates the advantages of new technologies that is done through the variation of the tripping curves. See fig.5.

Fig. 5 shows how the student module will look like. It is portable so it can be carried to class for demonstration and practice. The laboratory experiment manual will be made available to students to highlight the important guidelines they must adhere to. Using the training module will be done through the use of switches, pilot lamps, relays, and resistors for the loads. [5]

CONCLUSION

The laboratory experiment will definitely create the substation-like environment that will grant the students an understanding of the operation and effective setting of electromechanical and digital IDMT protection relays to ensure proper operation and coordination under fault conditions.

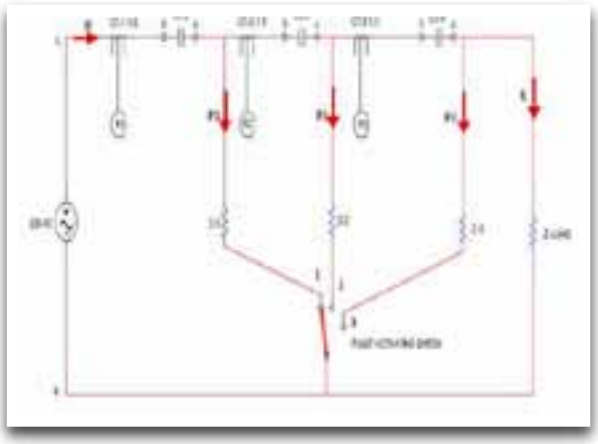

Fig. 4. Main Circuit diagram of the module

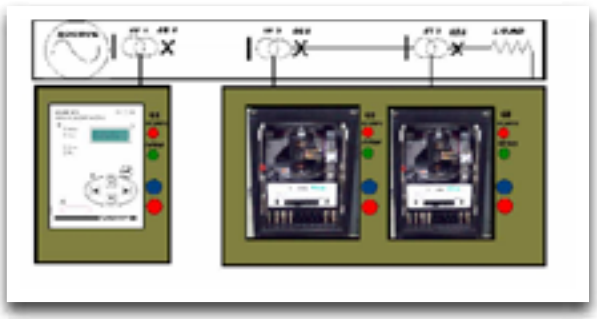

Fig. 5. Radial feeder protection training module design

TABLE II
COSTING OF THE PROJECT

No	Item	Unit price (excl VAT)	Total price
1	Current Transformer CT's	R 306.18	R 430.00
2	Push button Green	R 48.36	R 123.32
3	Push button Red	R 48.36	R 82.21
4	LED light Red	R 24.60	R 66.42
5	LED light Green	R 42.93	R 115.91
6	3 position switch	R 79.35	R 63.49
7	NC contact Block	R 14.82	R 25.2
8	Industrial Relay	R 66.00	R 297.00
9	Miniature Circuit Breaker	R 60.50	R 90.75
10	Box wood	R0.00	R 0.00
SUB TOTAL=			R 1294.29

COST ESTIMATION

REFERENCES

[1] Franco Mariani, "Inductive instrument transformers and protective applications Electronic book", Crown Publications cc, pp. 204-242.

[2] Electrical Power Research Institute, "Protective relay maintenance and application guide" pp.94, 98, 106, 204.

[3] GEC measurements, The General Electric Company, plc of England spec sheet, pp.1-4

[4] Alstom, Network Protection and Automation Guide, 1st ed., July 2002

[5] University of Idaho- "Introduction to practical protection guide".

[6] Badri Ram, D N Vishwakarma, "Power System Protection and Switchgear" pp.400

[7] Institution of Electrical Engineers, H.S, revised by J. Rushton, "Power System Protection: Principles and components" pp.22-23

[8] John S. Parsons and H.G Barnet, "Electrical Transmission and Distribution Reference Book" pp. 17, 667-684

[9] Jacobs T. D, Protection III "Time graded overcurrent protection notes" pp.1-7

André Hoffmann

Andre Hoffmann was born in August 1960 in Durban, KZN. Whilst being nurtured in the green valleys and hills of Kwa-Zulu Natal, he went on to spending his formative years at Hilton College from 1974 to 1978.

BY I MINX AVRABOS

He was an avid sportsman and participated in swimming, soccer and athletics at junior school and represented Natal in Junior Karate. He represented Eastern Cape in Senior Karate and was active in the Boy Scouts – 1st Durban North troop. He participated in Basketball and Rugby at High School and was active in lighting and projection crew (in those days they had 16mm movies to watch. He enjoys cycling and cycled in a tour from Pietermaritzburg (Hilton) to Cape Town (1978). He completed two Tour d'urban races and one Karkloof classic.

After passing matric with university exemption, he went on to work at Telkom where he stayed on from 1980 until 2006. During this time, he qualified with a National Higher Diploma in Electrical Engineering, majoring in Telecommunications in 1984 and in October 2003 he graduated cum laude at the University of Natal with an MBA. André planned and implemented the first managed Fibre To The Office optical ring network in South Africa in the Durban metropolitan SDH network.

After 25 years at Telkom, he went on to work in Mauritius from 2006-2007 running an IT Operation. During this time he was a speaker on IT Project Management at various conferences in Mauritius and Malaysia. He returned to South Africa and was registered with the Engineering Council of South Africa.

'The future depends on what you do today.'

- Mahatma Gandhi

Anbdré became a member of the South African Institute of Electrical Engineers (SAIEE) where he facilitated three Technology conferences and exhibitions along with his engineering colleagues from the SAIEE. He was awarded the Engineer of the Year award in 2001 and became a council member in 2005. Abdré will be inaugurated as Junior Vice President at the SAIEE AGM on 29 of March 2012.

In 2009, André founded the Robotics Association of South Africa (RASA) with Mike Barker.

He is currently the Chief Engineer at Broadband Infraco and is responsible for Transmission and IP Network Strategy, Network Optimisation, Evolution and Engineering, Technology sourcing. He manages the budgeting (Capital and Operational) for Broadband Infraco national long distance network.

At home, André enjoys getting involved in DIY and working in the garden. He is currently building a water feature and experimenting with cacti and bonsai. He loves going for walks in forests or the countryside and loves hiking and browsing through flea markets and antique shops. He enjoys a good book, preferably non-fiction. He is an avid Sharks supporter and a real patriot for supporting the Springbucks and Bafana Bafana.

He has two children, Vincent (28) and Alexa (22) and in his spare time he enjoys quality time with his fiancé Janine Meyer.

I recently had the privilege of meeting André and asked him a few questions:

In your opinion, what do you think needs to be done to solve the skills shortage in SA?

We need to deal with this on multiple fronts, firstly we need to start earlier in the cycle of learning... A focus on early childhood development (pre-school and junior primary) will build and encourage spatial, mechanical and logical appreciation of the basics of physics and reduce the pre-conception in minds of our youth that Maths and Science are difficult. Skills depend on good graduates coming from universities and institutions of higher learning. These in turn depend on good feeder systems coming from the basic schools system which depends on pre-school and family environments that encourage and develop basic life skills of reading, experimentation and discovery.

Secondly we should consider going back to a model of learner-ships and apprenticeships that allow young people to learn the craft from the older more experienced generation while not demanding wages beyond their ability to return value. Enterprise today needs skills and to expect a graduate from school or a tertiary institution to be productive from day one is unrealistic. We need to provide a mechanism to ease the burden on the enterprise (cost) and at the same time to provide a 'leg-up' towards economic freedom to those energetic and willing to take the opportunity.

Based on your previous answer, which are the three most important actions you think are required?

For the pre-schoolers we need to look for tools and learning aids that help young people learn, understand, retain and build on their knowledge in a fun way. A good example is Lego which helps to develop a sound appreciation of the principles of mechanics, levers and engineering while evolving into more complex problem solving and does so in a gradual and confidence building way. We need to debate and lobby for a return to Apprenticeships, the campaign of 'Each one hire one' is a good idea that can be enhanced if it includes development of skills. Schools leavers and graduates need to be more open to lower or non-monetary forms of reward in exchange for valuable skills and experience to get them started.

Your involvement with robotics should give good guidance to the SAIEE on what we should do to encourage youngsters to take up electrical engineering as a career. What would you advise?

Robotics is an amalgamation of electrical, mechanical, computer engineering and science to form intelligent and useful tools and machines that benefit society. Robotics allows young minds to express their creativity in new and interesting ways. For existing and aspiring electrical and electronics engineers the field of Robotics provides an opportunity to reach new frontiers of discovery and innovation that test and breach the limits we currently know. And what's more.... it's fun!

As Vice President Elect SAIEE, what are your ambitions for this noble institute when you become President in 4 years time?

To extend the capacity of the Institute and to improve its effectiveness in meeting the needs and expectations of its stakeholders both the existing and aspiring practitioners in the electrical and electronics communities and the users of that engineering skill, resource and capacity.

What do you find valuable in being a member of the SAIEE?

I derive a lot of personal satisfaction from making a positive contribution to society – it is what helps me enjoy my weekends and personal time. I guess it's like any 'investment' if you put something in then you can expect to get something more out.

André Hoffman

continues from pg 45

Active involvement in the SAIEE is like that for me, I enjoy the opportunity the SAIEE affords me to 'make a difference'. Besides the obvious professional networking benefit of being a member of such an institute, the SAIEE has been instrumental in helping me develop as a practitioner, a professional and as a leader. The technical and professional capacity and resource is vast and generally underutilised so it leaves much opportunity for personal growth.

What should the SAIEE be doing more to service its core business of servicing its members?

There are broadly three things I believe we can do to better serve our membership.

Firstly, get more 'in-touch' with our wider membership on the ground by exploiting all available channels including the Internet, social media and smart-tools to get our message across and to tap into the latent knowledge, ideas and capacity resident among our collective body of membership.

Secondly we need less focus internally and more externally, towards the society we serve. By this I mean our balance of priorities tends to favour a more conservative and incremental approach to growth and survival as an Institute and I believe we need to set aside some capacity and resources to seek a more inspiring set of ambitions that will inspire the members to be proud of their association.

Thirdly we can do more to lobby government and corporate influencers towards more sustainable long-term objectives rather than seeking short term 'survival' goals in policy and decision making.

The statutory Identification of Engineering Work for Engineers, Technologists and Technicians is in hand with the Engineering Council of SA – do you think this will enhance the status of the engineering fraternity in the eyes of the community?

Yes, this will give confidence to the engineering community and its stakeholders that matters of human and plant safety, engineering professionalism and ethics are taken seriously. Effectively and safely harnessing and utilising the power of electricity for the benefit of society requires a deep and continually updated knowledge and skill base. Not only do we want the engineering we are contributing to now to work effectively for us but we also want the world we live in to be sustainable for the next generations. Identifying specific Engineering work for Engineers, Technologists and Technicians is ensuring the right tool is used for the job and that can only mean higher efficiency and lower risks (costs).

What are your views on the thrust, by the powers that be, for everyone to be conscience of using energy efficiently?

It can do us no harm to be more energy conscious and energy efficient in our consumption driven lives. We have little hope of leaving a sustainable legacy for our grandchildren in this world if we continue to abuse natural resources and use more than we need. One of the unintended consequences of the current energy crisis in South Africa is that the escalating cost of electricity has driven many behavioural changes in personal and corporate lives. It has resulted in an acknowledgement that saving electricity means saving money and a realisation that often it is the non-electrical aspects of our lives that help the most such as better insulation and the innovation of 'off-grid' alternative energy solutions.

What and where will the magic of communications be in 10 years time?

'The future depends on what you do today.' – Mahatma Gandhi

Predicting the future has seen its fair share of quirky and somewhat hilarious (in hindsight) forecasting, so at the risk of becoming another one of those unfortunate forecasters I will rather talk of 'probabilities' when it comes to predicting the future. Ten years ahead is not that long in time, and if the Mayan calendar is wrong and we survive it past 21 December 2012 then I would postulate that the magic of communications will have evolved in multiple dimensions even in that short time.

As hopeful that we might be that the 'Holy Grail' of convergence of neuroscience and machines is breached in that time, it would be nice if we in South Africa and Africa in general could just have more affordable and more ubiquitous communications and Internet services. I firmly believe that with the right conditions that are possible and with the broadband highway extending deep and wide across our land, who is to say what the outcome might be?

I just know that I want to be a part of making that possible. wn

GET YOUR OWN COPY

"Living amongst the stars at the Johannesburg Observatory"
Written by Dirk J Vermeulen, vice-chairman of the Historical Section of the South African Institute of Electrical Engineers (SAIEE), has traced the fascinating evolution of the Johannesburg Observatory from the early 1900s to its current ambitious goal of becoming a dynamic science and education centre.
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"The First Ten Decades - the history of the SAIEE"
Written by Mike Crouch, Past President of the South African Institute of Electrical Engineers (SAIEE), was commissioned by the Centenary Committee to record and celebrate the contributions that electrical enigneers and in particular, members of the SAIEE made to the profession and the betterment of society over the past century. **Own it now for only R250***

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MEMORIES

It is important that we remember the early days of electrical technology and we urge members to submit short articles containing what they believe to be interesting anecdotes about their early careers, particularly those that contain some humour. This month we publish the first of the "memories" articles from Edwin Grobler who is a Fellow of the SAIEE living in Canada.

After my first month of Apprentice training with the Telephone Department in Cape Town, I joined a team to get field experience on how to install residential telephones and associated indoor wiring. The roles within the team were that the Telephone Fitter carried the phone and the Works Order and his assistant the bag of tools and a roll of indoor wire.

On this occasion, as a token of my joining the team as a third member, there was a great ceremony to appoint me to carry the roll of indoor wire! These guys, and everyone thereafter, called me "Grobbie". I had arrived!

We did not have company transport so we got return bus tickets from Dispatch to cover the journey to Oranjezicht where the phone was to be installed in a house a fair walk from the nearest bus stop.

The Fitter rang the bell. Leisurely the lady of the house answered. In the meantime, the assistant and I had noticed an African Grey Parrot in a cage on the veranda. It was eyeing us rather critically as we tried to coax it to talk with no success and we duly entered the house to complete our job. When done, the owner offered us coffee and biscuits as a mark of her appreciation for finally getting a telephone after long last.

Looking back on Apprentice days ... 67 years ago & 16 years old!

REFLECTIONS BY I EDWIN F. GROBLER, PRENG FSAIEE

The fact that in spite of his fairly humble tea-making apprenticeship, Ed rose to be one of the top research and development engineers in Standard Telephones and Cables in London. His experience stood him in good stead in the design field and he returned to South Africa in 1960 and held some top executive positions before retiring in Canada in 1999. Older Telkom technicians and engineers will enjoy Ed's reminiscences. People like Ed laid the foundations of our brilliant telecoms achievements.

On leaving, we again passed the parrot and as we descended the steps onto the sidewalk, the bird came through loud and clear - *"you loafers"*!

TEA ANYONE?

On this occasion I worked with a Cable Jointer and his assistant. The Area Supervisor took us by truck to the job site where the Cable Jointer's trailer was located in the street and contained all the paraphernalia for the job in hand. We unpacked the necessary tools and much to my innocent surprise I was handed a blowlamp and told to go to a small store nearby, fill the kettle with water and buy milk.

"*Grobbie - your first job*" said the Cable Jointer, "*is make the tea every morning, please!*"

Back on site I placed the kettle on the curbside and the blowlamp on a brick in the gutter below. Now, with only paraffin, I had to light the blowlamp - no Methylated Spirits to help! It was cold and rainy as one could only expect in July in Cape Town. When the water boiled, I made the tea for our team and also another two workers who had joined us.

MAN THAT TEA TASTED GOOD!

At lunchtime I repeated this 'Tea Ceremony' and each day for the whole week.

This training proved to be invaluable. In much later years (the 1970's), our family moved from Johannesburg to Cape Town and I bought a blowlamp and made tea every week-end when picnicking on one of the many Cape beaches.

Using paraffin only! And, at one time, the trusty blowlamp came to the rescue in the Transkei when I needed to repair my car's radiator which collapsed under the stress of a bumpy ride on the then untarred rocky/dirt highway from East London to Durban.

The blowlamp became a BBQ institution, serving us faithfully outdoors, even when we moved to Canada. Our guests were treated (to their amazement and amusement) to this method of making a Cuppa!

OF TRUCKS AND TRAINS

In my fifth year as an Apprentice in Beaufort West I had to go to Carnarvon (some 120 miles away) to do fault-finding on the Single Channel SOC long distance voice channel system, which had failed.

I drove a truck and gave temporary but noisy service at the destination and then returned to Beaufort West to look for a replacement condenser.

The Carnarvon Telephone Supervisor wanted the SOC up-and-running perfectly without noise ASAP *(I think the word she used was "immediately".)*

I found the correct part and drove back to Carnarvon for final repairs. Hmm… some 480 miles by truck? Rather expensive, but the job was done stemming complaints about poor long-distance telephone service.

Two months later I again had to go to Carnarvon as three recently installed new switchboards had "Cross-Talk" between them. This time I went by train, with a return ticket supplied by the Post Master in Beaufort West. (We were part of the Post Office Administration at that time.) Well, it started raining as the train departed for Hutchinson for a connection to Carnarvon and enroute the wetness got decidedly heavier.

I never reached Hutchinson! Five miles from the next railway station, Nelspoort, the train stopped.

Looking back on Apprentice days ... 67 years ago & 16 years old!

continues from pg 49

The conductor came through and commanded us all to get off the train and walk the five miles. Apparently the train was in danger of rolling over because water was undermining the ballast supporting the railroad ties. The train was already tilting.

The scene was this: a big lake had formed on the one side of the rails and the river on the other. Between the two, the elevated train stood on its ballast acting as a porous dam wall. Only the ties on one side, supporting the rails, were above water level and by hopping from one to the next I managed to get to the next station well before dark.

In fact I was the first to reach Nelspoort, phoned my boss in Beaufort West and, as the train conductor had said there was no guarantee that the train would move in the next three days, a truck was sent out to get me back to base.

A week later I was again entrained to Hutchinson and Carnarvon. The technician in Carnarvon met me and we went to the switchboard operating room, lifted off the back covers, used a meter to test and found that the "EARTH" on each switchboard was missing. This we rectified and the problem solved. It cost him an expensive late breakfast for me!

I caught the same train back that afternoon to Hutchinson and arrived in Beaufort West the next day. Funnily enough, the local newspaper got wind of my trip to Carnarvon and my name and the event was recorded on the social page!

YOUNG MAN, YOUNG MAN....

I left school at the age of 15 and went to study full-time for a year at the Cape Town Technical College.
(I completed matriculation through home-study later).

Toward the end of that first year and with the College closed for the Christmas period, I approached a leading Mens' Outfitters in the centre of Cape Town for a temporary position in "sales". A close friend, whom I knew from my school days, joined me in this adventure. We got the jobs and for a few weeks we actually had money to spend!

By co-incidence, 16 months after I became an Apprentice in the Telephone Company, I was with another Cable Jointer and his assistant and, lo and behold, we were stationed in the street outside the same Mens' Outfitters! Our objective was to locate a 504 pair cable in a manhole 7'6" below street level that was full of muddy water.

This we had to drain by means of a bucket on a rope. When just three inches of water remained I, being the youngest and newest recruit, had the doubtful privilege of going down a ladder to fill the bucket repeatedly from below.

Time and again I tugged on the rope alerting the assistant at the top to raise the bucket, empty it and return it to me to refill with a mix of mud and water from the sump. I stood on three bricks, pre-placed purposely around the sump for such a job - but this position was directly under the manhole entrance. Eventually we managed to complete the job.

Inevitably a lot of mud and water had dropped off each bucket load and landed on me. I was in a real mess when the floor of the manhole was finally cleared for the work-in-hand to be done by the Cable Jointer.

Eventually, back at the top, gathering my thoughts, I leant against a street pole and commiserated with myself about the dilemma I was in - mud over my face, shirt, pants and shoes.

Presently, the owner of the Mens' Outfitters came by, recognised me and took me into his shop for a clean-up in the washroom.

A khaki shirt and slacks, at an ex-employee's discount of 25%, made my day! This was offered by the owner in gratitude of my helping him reach record profits during the previous Christmas spell. A quick change of clothing and back on the job. I was much admired by my fellow workers, who asked the usual question to which my answer was *"it's not what you know but who you know!"*

... IT'S A TROUBLESOME TRAIN

From Beaufort West we had many telephone circuits radiating outward to Farm Lines, Trunk Lines to other centres as well as the circuits used by the Railway going south to Fraserburg Road and north to Nelspoort.

Once every two years we had to maintain them all by a pole-to-pole inspection - on foot! This in accordance with the Technical Instructions Manual. Some routes were done in ODD years, some in EVEN years. Not all in the same year, thank goodness.

The south trainline was allocated to a team of four - an electrician, myself (the apprentice) and our respective assistants. We worked in pairs: two of us walking five miles, then driving the next five miles along on an untarred service road running parallel with the railway. The vehicle was parked securely each time. And so we proceeded ... walk 5 miles, drive 5 miles. On one particular occasion, my assistant and I walked until we saw the truck parked on a farm road up ahead at a signed railway crossing. A welcome sight as our lunch was stored on board! At this stage the wind was blowing face-on.

My assistant was carrying the ladder and I had the bag of tools, binding wire and spare

insulators, plus a note pad. We walked on the railway line as usual because the telephone poles were separated from each other by bushes and the uneven terrain made it difficult for a direct pole-to-pole walk.

So - we were completely unaware of a train approaching from behind as it rounded a bend. When the driver remembered the upcoming crossing he 'hooted' as required. ***We panicked!***

My assistant threw the ladder down from the train track into the bushes, whilst I likewise disposed of what I had and we both jumped down off the elevated track. A smiling train driver recognised that we were safe and waved apologetically as he passed us ... but that was one really CLOSE CALL for us!

TRANSPOSITIONS, ETC.....

In the 19 months of class-room training during the first three years of my apprenticeship in Cape town, we were taught everything about Open Wire Telephone Lines (OWTL): the various types of OWTL, their uses in the city and to farmers, four types of Trunk lines, etc. It was an intensive and valuable learning program, and training also covered other aspects of the services offered by the telephone company.

The one OWTL that is under discussion now is the J3-type Carrier route designed for long-distance communication offering up to 16 voice channels with 15 multiplexed channels on the basic bearer channel which was used mainly for short distances. In between the above multiplexed channels there were later inserted a number of low speed telegraph channels, ideal for teleprinter use. The J3-route ran through Beaufort West (BFW) and served a very old CS 3-channel system from Cape Town (CT) to Johannesburg as well as a 3-ch system south from BFW to CT, and a 3-ch system north to De Aar. The route south was down - no communication - because of damage caused by an overnight flash flood north of BFW on the Gamka River. The deluge gathered strength with an added downpour through BFW and downstream.

Actually, there were two flash floods in the two years that I was in Beaufort West. Normally the area endured just one such flood every five years - and a "normal" rainfall every two years.... or so the locals said!

Anyway, on the downed route situation, our entire technical strength went to look at the problem about ten miles south. The torrent of water prevented any action to establish temporary service.

The main road crossed the Gamka River and the road bridge was intact. However, the approaches to the road bridge were washed away due to bushes and trees obstructing the flow under the bridge. This resulted in a backing-up of the water level like a dam, which eventually collapsed with pressure and took out the two poles, carrying our J3 route, in the now widened river!

The "Tacky Gang" was called out! This was a self-named highly efficient group of mobile engineers, technicians and assistants with the know-how and manpower to restore breakdowns in outdoor routes - in a hurry!

Fortunately, the original plan of this J3 river crossing (all rivers, for that matter) incorporated two "Line Stays" and two "Wind Stays" on each of the two poles located on firm ground beyond the river banks, with all lines terminating on insulators. This saved the route being destructed due to tension in the lines on both sides of the break. The gap in the lines was repaired by an ingenious engineer who saw fit to incorporate "Two Flying Transpositions" for each pair of wires that crossed the river.

It went this way: The transpositions were necessary to prevent "crosstalk" and were suspended from each stayed riverbank pole, which eliminated the need for poles to be planted in the riverbed itself.

It took a few days to finalize the new concept. Meanwhile our group helped to run temporary connection for each physical line, giving somewhat noisy but serviceable long-distance circuits on the carrier channels!

We had a terrific celebration when all channels were up and running again. All credit to the "Tachy Gang" ... the 'Geeks' of today? wn

You said...

Dear Editor,
I am writing in response to the letter from Geoff Carter "I was an ISCOR appie" in the November 2011 issue of **watt**now.

Before I go on to Geoff's letter, I would like to say that I really enjoy your magazine and always receive the latest with pleasure. I have even quoted from your magazine in some of my books with the blessing of former editor Antonio Ruffini. I do miss the short articles on Physics. Now to the reason for this communication.

I couldn't agree more with everything in Geoff's article and am sure there are very many of us who share the opinions expressed.

I have had a number of experiences where I have approached FET Colleges for trainees who have passed the NCV courses at level 4 and other relevant qualifications. I have had a number who even had N5 and N6 certificates. In all, these trainees were poorly equipped for industry, lacking the necessary fundamentals of how things really work in the industry.

Now that in itself is understandable, since being exposed to the working environment is somewhat different to a class where you learn to paint by numbers.

Take the numbers away and it seems that not one can paint by themselves, and we are talking about simple things like decoding resistors and testing transformers etc. So much so that not one of these trainees remained with us, they just never came back after 3 or so days. What they did ask for was their daily travelling allowance before they disappeared.

I think the problem lies with the speed at which the education dept is rushing them through the FET courses. (We won't even mention the cell phones which seem to occupy most of their attention in class besides the late arrivals and the early leavers). These young people need a much longer time to polish and grasp the real fundamentals. It makes no sense to rush them through with a low percentage pass mark and a certificate that is not worth the paper it is printed on just because the right blocks were ticked. By rushing them because we have a skills shortage, does not help the situation. Off course the large numbers per class also don't help. Could this be influenced by the money the institution gets (that is dependent on the numbers of learners and passing grades, so the more learners, the more money)?

Our Minister of Education is laying some of the blame on lecturers who are not trained well enough. Sure, there may be some who aren't, but most of the lecturers I have had dealings with are very knowledgeable in their subjects and have years of industrial experience and are very dedicated.

So giving them further expensive training is ok, but also spend more money on longer training periods for them to assimilate and grow in confidence. An extra year at the College will do wonders.

Something else that is needed is for these young people to read as many popular magazines and books on their subjects. Look at the number of British and American magazines on the shelves of the bookshops. The readership of those magazines is very large overseas but not so here in our country.

Students don't even buy books on their subjects besides the prescribed ones by the Dept of Education.

Best wishes
Deric Aspeling Pr Tech (Eng) MSAIEE

ED- Thank you for your mail, Mr. Aspeling. I'm sure many of our esteemed members share your view.

Dear Minx
Congratulations on your appointment as Managing Editor of **watt**now. You already have some fascinating articles in the magazine. I wish you all the very best for the future.

As regards to myself, I am a very old timer... an *"Oxygenarian"*... ie. when in your eighties they put you on Oxygen!!! I was Head of the Johannesburg Electricity Department's Consumer Branch for the last 15 years of my 30 years with them (known to hundreds of consumers as "John Davies", helping them with their electricity problems).

Now that I'm retired, I have plenty of time to ride a few 'Hobby Horses' and one of them is 'FREE ENERGY'. This of course, is viewed with horror in the world of conservative Electrical Engineering as it goes against all accepted principles in electricity. In spite of this however, I am afraid to say that there IS such a thing without any shadow of a doubt.

What is more, it is taking off at an alarming rate, there being dozens, if not hundreds, of actual working models in existence to proof this.

Here are a few examples - all fully substantiated...
In 2002 a Japanese firm manufactured 20,000 Free Energy Devices (converting 250 watt into 6kVA) but the Japanese Government issued a shutdown order on some feeble pretext and confiscated all the units.

Again, in 1930, the U.S. Navy used a Free Energy Device to SELF POWER its *"Network Analyzer"* without any Power Supply connected to it. Gabriel Kron, the Chief Engineer of General Electric U.S.A. in conjunction with Stanford University, developed the device. Gabriel has been called *"The greatest Electrical Scientist of modern times"*. However, he was strictly forbidden to state how the device worked or how it was actually made!! But he did, nevertheless, divulge the fact that the principles involve was that a *"Negative Resistor"* gathers *"Negative Energy"* from the Heavyside Component of the Free Energy's *"Open Path"*. It is now being offered for licensing by the general public... so watch this space!

Yet again, in the 1960's, America's "Westinghouse Ltd." patented an *"Over Unity Device"*, namely one having a Co-efficient of Performance (C.O.P.) greater than one. This device was subsequently actually used in the U.S. Army's 'minuteman' missiles!

Finally, a Turkish company, Attila Alperen has built some 100 prototypes of products of Free Energy Devices ranging from a few watts to Megawatts. These are targeted for the European market.

So, like it or not, Free Energy is here to stay and if 'Conservative Electrical Engineering' refuses to accept this fact, then it is going to be left far behind with egg on the face, as they say. You could perhaps say that the revolution is starting at "Grass Roots" level!

I think that the message is loud and clear, we Engineers MUST now start taking all this seriously and try and catch up. Things should be done such as;

- Making it a subject for a University Thesis, and
- Energy Conservation Organizations to research all the possibilities.
- The present theory of Electricity and Magnetism to be looked at more closely, especially the fields of the latter, but three dimensionally, as Faraday only looked at a single slice of a scan with his iron filings on a card, but it now appears that a North Pole has a chunk of South Pole in it and vice versa... (this fact has been utilised to produce one of the ways of Free Energy motor rotation by the researchers Howard and Johnson).

I've done a couple of *"Google Searches"* on the internet citing about two dozen cases of Free Energy, but you can investigate these for yourself if you are interested. See especially: *"Practical Guide to Free Energy Devices"* where 65 patents are listed with descriptions and a free eBook can be downloaded.

Kind regards and again, all good wishes for the future.
(John) Howard Davies
Pr.Eng. MSAIEE.

ED- Thank you for your mail, Mr Davies. This is really very interesting reading, and perhaps you can elaborate on this letter, and write me an article on your research for the **wattnow** *magazine?* wn

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BUDGETING FUNDAMENTALS: Benefits & Methods; MANAGING A BUDGET: Preparation & Control; EXPLORING THE GROUND RULES OF FINANCE: Who needs Finance? TRACT REVENUE AND EXPENSES USING FINANCIAL STATEMENTS: The Income Statement, The Balance Sheet, The Cash Flow Statement; EVALUATING PERFORMANCE: Make Comparison, Determine Liquidity, Activity, Profitability and Solvency; MAKING INVESTMENT DECISIONS: The Investment Decision, Making Process, Conduct a CVP Analysis, Project Appraisal Techniques, Market Demand Calculation Details, Table of Discount Factors, Activity Worksheets.

WHERE CAPE TOWN | **Contact** Dave Martin | 082 886 6504 | dave.martin@saiee.org.za
DATE 03-04 April 2012
COST R3,850 (incl. VAT) - 20% discount for SAIEE members
CPD CREDITS 2

SHORT CIRCUIT CURRENT COURSE

SHORT CIRCUIT CURRENTS: Symmetry & Asymmetry, Calculation of short circuit currents, Arcing in circuit breaking, Current & energy limiting, Principles of arc interruption, Contact breakdown, Insulation medium, Arc voltage & extinction, Arc extinction
NATURE OF THE ARC: Behaviour of electrical arcs, Electrical conductivity in gases, Arcing in air, Prospective short circuit currents, Arcing currents, Internal arc classification, Standards for internal arc testing, Requirements of IAC testing, Effects of the enclosure, Forms of separation in LV switchboards, Personal protection, Assembly protection.

WHERE SAIEE HOUSE, 18A Gill Street, cnr. Innes Road, Observatory, JOHANNESBURG
DATE 4 April 2012
COST R1,990 (incl. VAT) - 20% discount for active SAIEE members
CPD CREDITS 1

PRESENTATION SKILLS FOR ENGINEERS

MASTERING NERVOUS TENSION: Understand your nervousness, First time fever, The adrenaline rush, Dealing with nervous tension, Dispelling the fears, Some helpful habits, Developing focus; PREPARATION: Formulate your objectives, Identify the audience, Decide what reaction you want, Writing the speech/presentation, Preparing your notes; PRACTICAL SESSION 1 – VIDEO TAKE AND ASSESSMENT STRUCTURE: Preparation techniques – the newest, Developing an effective 'hook', Ways to package information, Sequential argument, Hierarchical decomposition, Question orientated, Pyramid; THE DELIVERY: The beginning, Get their attention, Establish a theme, Present a structure, Create a rapport, Administration, Holding attention, Enthusiasm, Removing negative thoughts, Regaining attention, Anecdotes; THE MEANS OF DELIVERY: The eyes, The voice, Expression, Appearance, Stance; THE TECHNIQUES OF SPEECH: Make an impression, Repeat, Draw a sign, Draw a picture, Jokes, Plain Speech, Short and sweet, The narrative, Rehearsal, Relaxation; PRACTICAL SESSION 2 – VIDEO ASSESSMENT QUESTION TECHNIQUES: Probing, divergent and echo questions, Fielding difficult questions, Best practices – questions; EFFECTIVE LISTENING TECHNIQUES: Paraphrasing, Giving feedback, Maintain healthy body language and eye contact.

WHERE SAIEE HOUSE, 18A Gill Street, cnr. Innes Road, Observatory, JOHANNESBURG
DATE 18-19 April 2012
COST R3,850 (incl. VAT) - 20% discount for active SAIEE members
CPD CREDITS 2

PROJECT MANAGEMENT

Your ability as a project manager to demonstrate best practices in project management – both on the job and through professional certification – is becoming the standard to complete in today's fast-paced and highly technical workplace. This course offers a job-related approach to successful project management across application areas and industries.

WHERE JOHANNESBURG
PRESENTER TONY LYDALL
DATE 8 - 11 May 2012
COST R8,050 (incl. VAT) - 20% discount for SAIEE members
CPD CREDITS 4

PHOTOVOLTAIC SOLAR SYSTEMS

Photovoltaic (PV) is a method of generating electrical power by converting solar radiation into direct current electricity using semiconductors that exhibit the photovoltaic effect. Photovoltaic power generation employs solar panels comprising of a number of cells containing a photovoltaic material. This course will provide the knowledge on how to inspect a site for the installation of a PV Solar System, provide the basic knowledge for installation, do necessary calculations for the correct applications, analyse different configurations and operating characteristics, provide the rules and regulations with regard to compliance of statutory requirements, and safety procedures and codes of practice. CONTACT GILL NORTIER - SAIEE (KZN) 031 562 9537 or email saiee@iafrica.com.

WHERE DURBAN
DATE 17-18 May 2012
COST R3,850 (incl. VAT) - 20% discount for active SAIEE members | **RETIRED MEMBERS** R1,925.
CPD CREDITS 2

ELECTROMAGNETISM – TRANSFORMERS

Part 1: FUNDAMENTALS - ELECTRIC & MAGNETIC FIELDS: The source of magnetism, Charges & magnetic fields, Magnetic moments, Diamagnetic materials, Ferromagnetic & Paramagnetic materials, Magnets - attraction & repulsion, Magnetic poles, Vector multiplication; THE B-H LOOP: Properties of magnetic materials, Permeability, Grain oriented steels, Annealing process, Stresses in transformer cores, Factors influencing the B-H curve, Eddy current losses, Hysteresis losses, Grain oriented steels, Magnetizing current; MAXWELLS EQUATIONS: History of electromagnetism, The importance of Maxwell, Maxwells equations', Amperes, Faradays and Lenz's laws, Electric fields, Electric & magnetic flux, Magnetic fields, Magnetic flux density, Currents & magnetic fields.
Part 2: TRANSFORMERS - OPERATION & LOSSES IN TRANSFORMERS: Basic principles of a transformer, Magnetic flux in transformers, Magnetising currents, Leakage flux, Transformer reactance, Phasor diagram of a transformer, Magnetic cores, Eddy currents & voltage drop, Skin effect & proximity effect; TRANSFORMER CORES & COILS: Types of transformer cores, Magnetic circuit designs, Core form & shell form cores, Core configurations, Core construction, Single phase & three phase cores, Types of transformer coils, Circular & Rectangular coils; TRANSFORMER DESIGN, SPECIFICATION & TESTING: Rated power, voltage & current, Tappings, Short circuit impedance, Transformer connections, Three phase & single phase transformers, Transformer connection symbols, Transformer cooling and coding, Temperature rise limits, Dielectric test requirements, Routine & type tests. EMC: Definitions, Degradation & damage, Electromagnetic interference, Mechanism of EMI, Coupling modes, Harmonic interference, Achieving electromagnetic compatibility, Electrostatics & Lightning, EMC Standards, High frequency & Low frequency interference, Actions regarding EMI and EMC.

WHERE JOHANNESBURG
DATE 16 - 17 MAY 2012
COST R3,850 (incl. VAT) - 20% discount for active SAIEE members - RETIRED MEMBERS: R1,925
CPD CREDITS 2

SAIEE CPD Courses 2012

For more information or to book your space, contact SUE MOSELEY | **T** 011 487 9047 |**E** suem@saiee.org.za

ELECTRIC POWER CABLE TUTORIAL

This tutorial will explain the techniques used in the correct selection of electric cables. Understand the use of de-rating factors applicable to particular conditions of installation. Find out how to calculate a cable's ability to survive fault current, volt-drop, fire performance, and a whole lot of other relevant and essential information.

WHERE JOHANNESBURG
DATE 24 May 2012
COST R1,990 (incl. VAT) - 20% discount for active SAIEE members
CPD CREDITS **1**

EAST LONDON COURSES

WHERE EAST LONDON | Blue Lagoon Hotel, Blue Bend, Beacon Bay
COURSE Power System Harmonics
LECTURER Prof. Piet Swart
DATE 4-6 June 2012
COST R5,650 (incl. VAT) - 20% discount for active SAIEE members
CPD CREDITS **3**

COURSE Transmission Lines
LECTURER Fred Visser
DATE 5-6 June 2012
COST R3,850(incl. VAT) - 20% discount for active SAIEE members
CPD CREDITS **2**

COURSE Photovoltaic Solar Systems
LECTURER Atillio Dalvit
DATE 7-8 June 2012
COST R3,850 (incl. VAT) - 20% discount for active SAIEE members
CPD CREDITS **2**

REPORT WRITING FOR ENGINEERS

A course for those in the technical environment needing to effectively communicate in writing and thus develop their relationships with colleagues and customers.

WHERE JOHANNESBURG
DATE 13-14 June 202
COST R3850.00 (incl. VAT) - 20% discount for active SAIEE members
CPD CREDITS **2**

EXCEL FOR ENGINEERS

WHERE JOHANNESBURG
DATE 20-21 June 202
COST R3,850 (incl. VAT) - 20% discount for active SAIEE members | Retired Members : R1,925
CPD CREDITS **2**

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SAIEE

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Mentorship

The offer comes at a time when our country is suffering a shortage of skills, and we believe that mentoring is an essential requirement in the training and development of the next generation of engineers. If, as a member of the SAIEE, you believe that you need a mentor you can request a mentorship service from the Institute.

The service will be of particular benefit to those young engineers working under the leadership of busy and pressurized Professional engineers, who may not have the time to assist young engineers in discussing and planning their career paths.

This initiative is particularly relevant to young engineers who are working in an environment devoid of engineers or with non technical managers. The young engineer may feel frustrated because he or she cannot benefit from the wisdom of an experienced engineer.

It will give a young engineer, the mentee, a chance to talk to a mentor, who will be his or her advisor, teacher and role model, away from the work environment. His or her mentor, matched to a similar profile, will understand the mentee's work and personal situation, having been there him- or herself.

The mentee will be able to discuss problems and frustrations with his independent mentor, who would have no stake in the outcome, and who would be able to provide an unbiased opinion and advice. The mentee might not be able to do so with his superiors, particularly if he is unhappy, and is considering an alternative career. The mentor and mentee could arrange to meet regularly, on terms that would suit both parties. The goal is to ensure both Mentee and Mentor have enough time to communicate any concerns or advice they have.

The mentor could recommend to the mentee what course of action to take without being too prescriptive while the final decision and the consequences remain with the mentee.

Among its more than 5500 members the SAIEE has many experienced engineers who are willing to act as mentors. They are spread across the country and include engineers who are experienced in steelworks, furnaces, rolling mills, mining, manufacturing, electrical generation, transmission and distribution, through to light industrial, process control, instrumentation, telecommunication, robotics, automation, software development and engineering management of these sectors.

So if you feel that you would benefit by talking to a mentor, please contact Sue Moseley on the number below. She has a database to match the profiles of mentors and mentees.

Prospective SAIEE Mentors

If you feel you that you have the time and interest to help mentees, please contact Sue Moseley on 011 487 9050 or suem@saiee.org.za. In addition you gain CPD credits for when you are required to re-register. wn

SAIEE Membership
What's In It For Me?

Members of the SAIEE now enjoy a wide array of benefits starting at a R950 discount on their ECSA registration fee which is due in April every year, provided you join the SAIEE before the end of March of the same year.

Upon joining the SAIEE there is a standard entrance fee of R650 and an annual membership fee of R756.00 for members, and between R924.00 and R1002.00 for senior members depending on age. Most of this will be recovered through the ECSA discount.

SAIEE members receive 11 issues of the **watt**now magazine valued at R330 along with the quarterly African Research Journal - our local research and development magazine.

However, the real rewards of being a SAIEE Member can be realized through attending our monthly lectures, debates, tours and site visits, which are mostly free and accompanied with refreshments at no extra cost. Members are awarded valuable CPD credits for attending these events & functions.

Being a member has significant career benefits, as membership holds prestige and recognized status in the profession. SAIEE gatherings provide excellent opportunities for its members to interact with normally inaccessable senior leaders in the industry. Letters after your name indicate your membership grade and are a useful measure of experience.

Members receive generous discounts on the SAIEE run CPD courses and earn (category 1) CPD credits. Members also have the option of joining the WattNow online CPD program at a fraction of the cost. The SAIEE mentorship program assists members in gaining professional status through the Institutes large database of mentors. SAIEE members are awarded 1 CPD credit (Category3) for being a member.

Members are able to serve on organizing committees and gain valuable experience in doing so, while learning how to run formal meetings and practice technical presentations in a low risk environment.

APPLICATION REQUIREMENTS FOR SAIEE MEMBERSHIP

It is always exciting to receive an application as it means that we will soon be welcoming another new and valuable SAIEE member to our family of nearly 6000 members. However, more often than not the application is incomplete.

To avoid unnecessary delays in the process it is important to highlight the problems regularly experienced within the administration with received applications:-
Many applicants do not read the list of requirements. We require the following documents:

- Copy of the applicants ***ID***;
- Certified copies of ***achievement certificates***;
- A copy of the applicants ***CV***;
- The completed ***application form***;
- ***Proof of payment*** for the application fee. Membership fee will be comfirmed on acceptance of membership.

Copies of the above listed documentation should ***accompany the application forms*** but frequently are submitted after the application forms are sent in.

A number of applicants do not fill in every answer to questions asked on the application forms, ***please complete the form in full.***

Payment of both application fees and membership fees are frequently ***not paid timeously.***

Only once all the above requirements have been met is the application considered complete, enabling the process to continue efficiently.

Please, help us to help you receive the many benefits of SAIEE Membership sooner rather than later!!

Membership Fees

Effective January 2012

Council at its meeting held on 02 September 2011 decided that subscription and entrance fees as from 01 January for 2012 should be as indicated below. Please note: In terms of Bylaw 3.2 annual subscriptions shall become due on 1st January each year. To encourage members to pay their subscription fee early, Council agreed to allow a discount if such fees are paid before 31 March 2012.

Grade of Membership	Annual Subscriptions paid before 31 March 2012		Annual Subscriptions paid after 31 March 2012		New Members FEES * see Notes 1 & 4 below.	
	RSA incl VAT (R)	Outside RSA excl VAT (R)	RSA incl VAT (R)	Outside RSA excl VAT (R)	RSA incl VAT (R)	Outside RSA excl VAT (R)
Student	106	75	118	84	118	84
After 6 yrs study	684	486	760	540	760	540
Associate	684	486	760	540	760	540
Member	756	537	840	596	840	596
after 6 years	884	627	982	697	n/a	n/a
after 10 years	924	656	1,027	729	n/a	n/a
Senior Member	924	656	1,027	729	1,027	729
after 6yrs/age 40	1,002	711	1,113	790	1,113	790
Fellow	1,002	711	1,113	790	1,113	790
Retired Member (By-law B3.7.1)	423	300	470	334	n/a	n/a
Retired Member (By-law B3.7.3)	nil	nil	nil	nil	n/a	n/a

NOTE

1. Entrance fee for all grades of membership is R650 (except Students which is free)
2. Transfer fee to a higher grade is R300.00 for all grades of membership (except Student within 3 months of qualifying).
3. Members are encouraged to transfer to a higher grade when they qualify. It will be noted that the fees of Member and Senior Member grades after 10 and 6 years respectively are equal to the fees at the next higher grade.
4. Members elected after June pay a reduced subscription fee.

By-law B3.7.1 reads "a member in good standing who has been a member of the Institute for at least ten (10) consecutive years, has reached the age of sixty (60) and who is no longer actively engaged in the profession, may apply to Council for an adjustment.

By-law B3.7.3 reads "any member complying with the conditions of B3.7.1 but who has been a member of the Institute for not less than 25 consecutive years, shall on written application to Council, be exempt from the payment of further subscriptions."

By-law B3.9 reads "any member in good standing who has been a member for fifty (50) consecutive years shall be exempt from the payment of further subscriptions."

Members not in good standing by failing to pay their subscriptions by end of July of each year will be struck-off the SAIEE membership role subject to Council decree.

18A Gill Street | Observatory |T 011 487 3003 |F 011 487 3002
www.saiee.org.za

CALENDAR

2012

Calendar of events

If you want to see your function or event listed here, please send the details to Minx Avrabos at minx@saiee.org.za

April 2012

6-15	Rand Show	JHB Expo Centre	www.randshow.co.za
20	Climate Reality Breakfast Briefing	venue t.b.c.	Presented by Jeuness Park
26-29	Decorex	Cape Town Intl. Convention Centre	
28	Notification of acceptance of Papers	Power Africa 2012, Wits, JHB	

May 2012

21-24	Metering Billing CRM-South Africa	JHB Expo Centre	
21-24	SatCom Africa	Sandton Convention Centre, JHB	
21-24	African Utility Week	JHB Expo Centre	www.african-utility-week.com
25	Rising Stars Careers Expo	Protea Edward Hotel, DBN	
28-30	4th Wind Power Africa Conference	Cape Town, RSA	www.afriwea.org/events

Have some fun and stand a chance to win R1000. Complete the Communications issue crossword puzzle and send it with your name, surname and contact details to: *Managing Editor, Communications Crossword Puzzle, P.O. Box 751253, Gardenview, 2047* or email it to *wattnow@saiee.org.za*. The completed crossword puzzle should reach us by no later than **30 April 2012**. The winner of R1000 will be announced in the May issue of the **watt**now magazine.

win R1000

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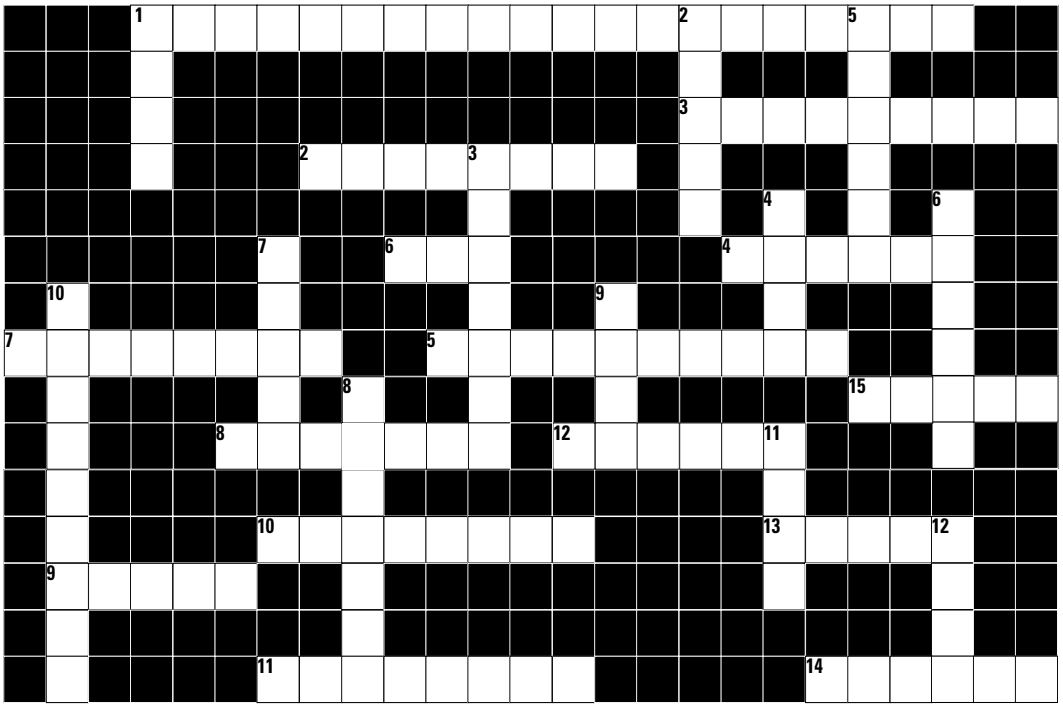

ACROSS

1. SKA (20)
2. Surname of 1 Down (8).
3. The first 140MB/s fibre link was installed in the UK between 2 towns. What was the town name starting with an S? (9)
4. Who lost out on patenting the telephone to Alexander Graham Bell? (6)
5. What event do both Globalstar and Iridium communications systems have in common? (10)
6. Who is recognized as the inventor of fibre optic communications? (3)
7. What is the furthest man-made object with which we have communicated? (8)
8. Name of 6 Across (7)
9. South Arican Institute of Electrical Engineers (abbr.) (5)
10. What variant of CDMA is used in UMTS networks? (8)
11. Which company made the first portable cellular phone? (8)
12. What was the first geostationary satellite called? (6)
13. _____ cable is the common name given to KSM series multi-pair cable used within the Krone System (5)
14. Sponsor of this crossword. (6)
15. Surname of the Chairman of the Publications Committee and the 2010 SAIEE Engineer of the Year (5)

DOWN

1. Who is the Business Director of the SAIEE? (4)
2. What is the current highest capacity African submarine cable? (5)
3. Russian global positioning system. (7)
4. Who invented PCM? (4)
5. Surname of 4 DOWN. (6)
6. What was Alexander Graham Bell's assistant's surname? (6)
7. Communications systems use constellations of LEO (Low _____ Orbit) satellites. (5)
8. What does the P stand for in the abbreviation UPC with reference to barcodes? (7)
9. Surname of 4 ACROSS. (4)
10. Who introduced the @ sign as a locator in email addresses? (9)
11. The name of the 2012 SAIEE President to be inaugurated on 29 March 2012. (4)
12. Engineering Council of South Africa (abbr.) (4)

Terms and conditions: 1. Only one entry per person. 2. Winners will be notified via email. 3. Incorrect information will automatically disqualify the entrant. 4. Anybody may take part except the office staff of the SAIEE, their family members and members of the Publications Committee. 5. **watt**now magazine and the SAIEE cannot take any responsibility for lost entry forms or any damage, losses or injuries related to the draw of the prize. 6. The winner must be prepared to be photographed and such photograph will be published in the relevant issue of the **watt**now magazine. 7. Closing date for entry is 30 April 2012. 8. The winner will be announced in the May issue of the **watt**now magazine. 9. The Managing Editor's decision is final and no correspondence will be entered into.

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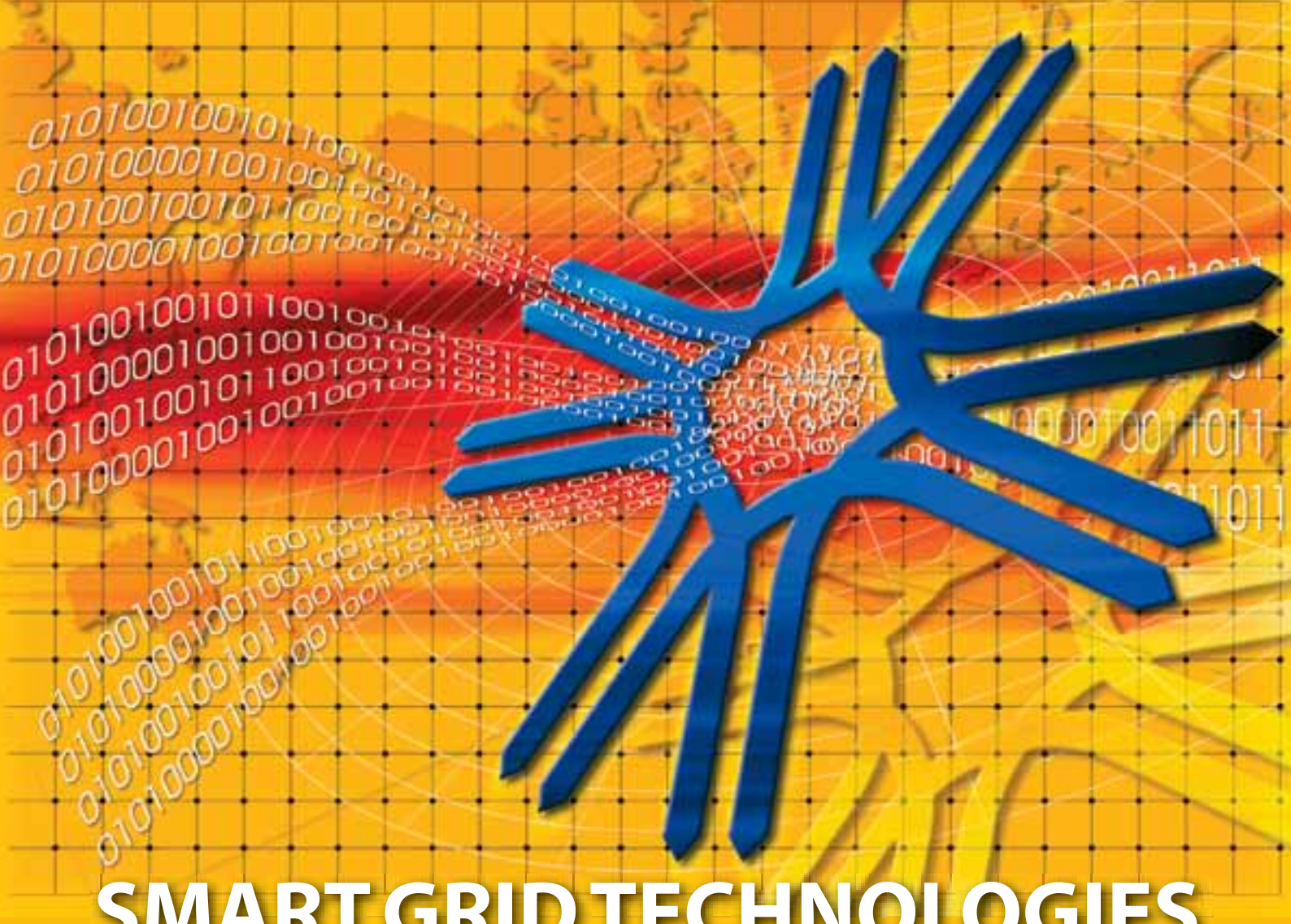

SMART GRID TECHNOLOGIES

Power Line Communications

Power Electronics

2013 IEEE International Syposium on Powerline Communications
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