wattnow

SOFTWARE ENGINEERING

contents

SAIEE   @saiee

wattnow

abc
5906

Winter is fast approaching and the time for surfing the cool Atlantic waves has now come and gone. As we enter the fourth month of the year, it seems that we have hit a frenzy in getting ready for the southern hemisphere's colder months, time to cuddle up indoors and start surfing the Internet instead.

Technology demands that we stay connected and are able to work from anywhere. This issue features Software Engineering and sports a few interesting articles.

Our first feature article, "When Software Crosses a Line" discusses the software glitch Volkswagen experienced last year, which amounted to a recall in some of their vehicles. Read more on page 26.

Page 30 features "The new Innovation Economy of data" article, which explains how the information economy is giving way to a new variation that will have an enormous impact on industries.

The Industrial Internet of Things (pg 40) discuss the ability to link automation systems with enterprise planning.

Page 50 gives you 5 vital steps in successful software delivery. With daily software updates, things are constantly changing and a person can feel totally perplexed when you are not on top of the latest developments.

Our Opinion Piece on page 56 was aptly written by John Lovelock, and he informs us on how "The internet of things is shifting hackers' targets".

We are inaugurating the 2016/2017 SAIEE President, TC Madikane. He will be visiting the various SAIEE Centres nationwide. The dates I have so far is 14 April – Durban, 19 April – Western Cape, 20 April – Southern Cape, 21 April – Eastern Cape and 26 April – Pietermaritzburg. For more information, please contact Gerda on geyerg@saiee.org.za or visit our website to RSVP to these events.

Herewith the April issue, enjoy the read.

Minx

Earn CPD Credits

Visit www.saiee.org.za to answer the questions related to these articles to earn your CPD points.

YOUR *ULTIMATE* SMART
UTILITY METERING SOLUTION

PREPAYMENT METER

WATER METER

BULK METER

INTERNET

INVIROHUB MDM

SUBSTATION

NETWORK
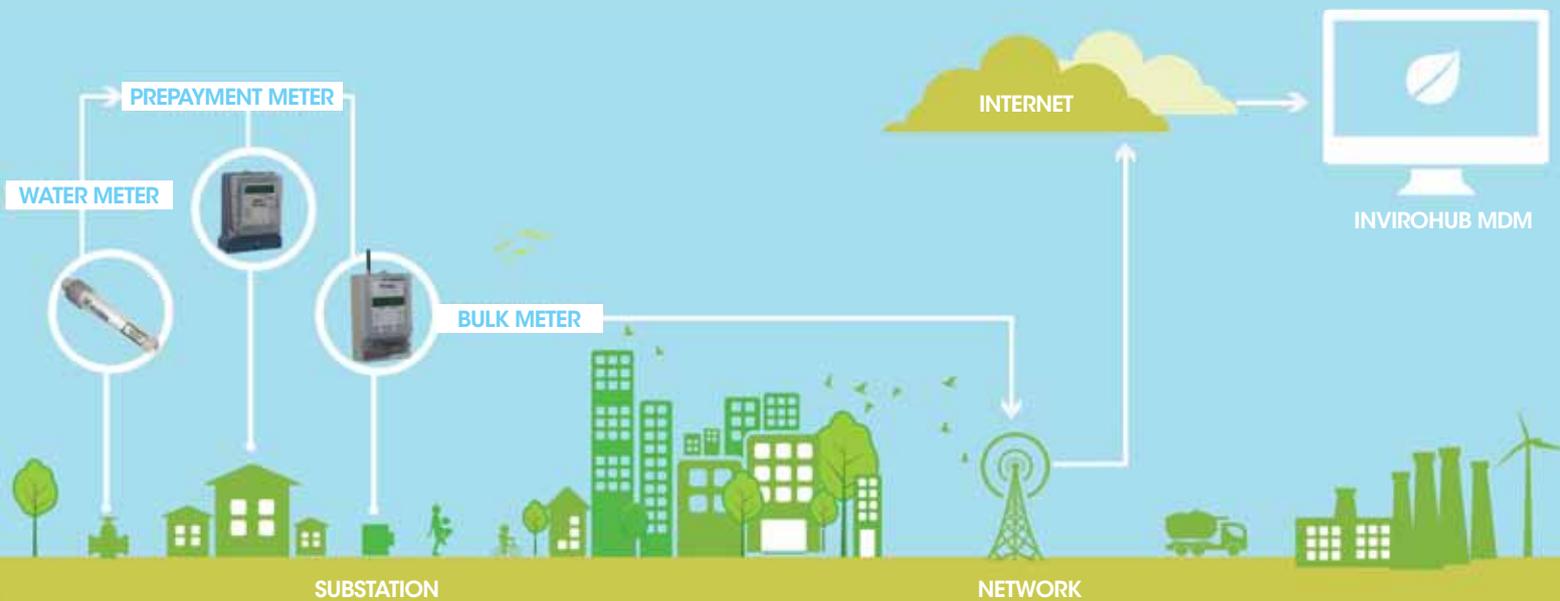
Benefits of Smart Meters:

- Smart meters are read remotely, more frequently and automatically, affording customers improved efficiency and reduced operational costs.
- Consumers, landlords and supply authorities are able to gain insight not only on their usage for the period but on the pattern of their consumption as well.
- Smart meters can be converted between credit and prepaid mode without the need to physically change the meter.
- Smart meters can facilitate demand side management and control initiatives through load limiting and/or individual appliance control functionality.
- Smart meters are able to support multiple tariff structures including time of use.

For more info contact us today on
www.invirohub.com
or email **modishane@invirohub.com**
or call **011 483 0252 / 011 100 3070**

Our Vending System
Our software solution supports flexible vending options for pre-paid utilities that includes custom developed virtual wallet, XML Vend and the ability to interface to the popular STS vending system.
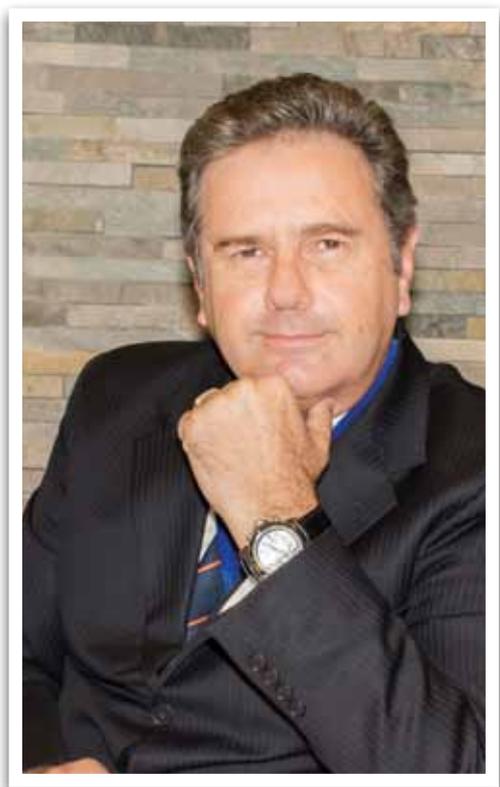
André Leo Hoffmann
2015 SAIEE President

It has been my privilege and pleasure to serve this Institute over the past year. We set out this year with the intention of placing a renewed emphasis on 'Paying it Forward' by investing in the medium and long-term future skills required to build the nation.

We all hope to live here, and leave it as a legacy for our grandchildren. We made the case for taking a 'longer view' on things, in order to get a better, more rational perspective on the challenges we face.

Visiting the SAIEE Centres was the highlight of my year, as we took at least two tours to various Centres over the year, and met with the grassroots membership and Centre leadership, which is the foundation of our Institute.

The President's Invitation lecture, held in May, amplified the interest in Robotics and Artificial Intelligence among our younger members, and saw us extend our reach to include the University of Pretoria in the lecture tour, which is traditionally held at the University of Johannesburg.

The early part of the year was characterised by significant electrical supply constraints affecting the stability and reliability of supply in the country. The Institute embraced the challenge by informing and managing a responsible message to our membership, in collaboration with key stakeholders in Eskom, and held a well-attended "Electricity South Africa Quo-Vadis" workshop, which set the stage for further engagement. Fortunately the situation has stabilised, and the memory of load-shedding is slowly fading - not that we are out of danger, or need to be complacent.

Between the President, Office Bearers and the CEO, a number of stakeholder engagements were undertaken during the year. This included meetings with the SABS, IEC, IEEE, ECSA, AMEU and many others throughout the year. Interaction with peer institutes such as Mechanical, Civil, Mining and Metallurgy, Instrumentation and Control and others also took place. This continues to cement relationships and build the professional credibility of the Institute among our peers.

Financially, the Institute has had to operate within tough economic conditions over the past year. Operating revenues are down 3% on the previous year and expenses have increased by 10% when compared to 2014. This has been further affected by weakened market performance on equity investments over the same period last year.

Operating activities such as CPD that have traditionally done quite well, although still contributing, have nevertheless under-performed against budgetary expectations this year. In addition, advertising income for the publications activities have also not met budgetary expectations. Added to this is a growing trend of increased out-of-budget requests being placed on the Institute, which given the slow growth in traditional revenue streams means that if any of these demands are taken 'on-board', however noble they are, they do erode other capital investments, and weaken our balance sheet going forward. Consequently, this year we show a deficit of revenue relative to expenses. Fortunately our investment portfolio has cushioned the effect. However, this is not sustainable in the long term, and we will need to be carefully managed going

forward, so that our Institute can adapt in order to weather the economic turbulence currently facing our environment.

What is also clear however, is that member subscriptions have contributed only 56% towards our operational expenses for 2015. This implies that 44% of value has been conveyed to members through sound administration, and the contribution of other activities and investments in support of delivering services to our members. We acknowledge the diligent efforts of our CEO and his team, the Honorary Treasurer and the Finance Committee, in navigating us through this tight economic journey.

Membership has grown 4.3% over the past year. This year saw us launch the Gauteng Centre on 27 August 2015, the 8th Centre of the Institute. This contributes in our growing as an organisation, and in

developing grassroot leadership. It makes our activities more accessible across Gauteng, particularly to members resident outside the immediate Johannesburg area.

Going forward, the Institute is embracing relevant new fields of interest to cover a wider scope of potential membership. A growing interest in Robotics has resulted in the initiation of a Robotics Interest Group within the Institute.

The Electronics and Software Section will be the gateway for this activity. An early objective of the Robotics Interest Group is to have the SAIEE speak and act on behalf of 'Robotics South Africa', and provide codicils that satisfy sponsors, funders, as well as supporters nationally and internationally. The aim of the Robotics Interest Group would thus be to create a

strong robotics cohort of SAIEE Members present and potential.

Much is often discussed about what value there is in becoming a member of the Institute. Let me attempt to quantify some of the value adding activities we undertook this year. Besides the direct financial benefit to each member, which in the past year represents an average saving of R558 per member on their annual subscriptions (42%), in addressing the actual costs of services received.

Table 1 represents a summary of the quantifiable value available to members of the Institute over the past year.

While these are not audited results, they represent a conservative view of the estimated reach of the Institute. This grows

Event / Activity	Deliverable	Event days	People Reached	Comment
President's Inaugural Lecture	8 lectures attended by over 400 people	8	408	
Presidents Invitation lecture	2 lectures held and attended by 180 people	2	180	
Bernard Price Lecture	6 lectures attended by over 400 people	6	422	
National Students Project Competition	Hosted by Central University of Technology in Bloemfontein. Three prizes awarded totalling R14 000	1	35	
SAUPEC Conference	3 day conference , attended by 140 delegates from all the major Universities and industry	3	140	
SmartGrid BootCamp	1 day free event for students attended by 90 people	1	90	
SmartGrid 2016	3 day premier conference attended by 293 people	3	293	
Presidents weekly Messages	42 weekly messages published on our SAIEE website and social media		8,000	Facebook, LinkedIn and Twitter
Bursaries	over R500 000 was provided for 13 undergrad and 1 post-grad bursary	14	14	
wattnow	11 issues with a circulation of over 5900	11	97,449	11 x 5906 x 1.5
Africa Research Journal	over 20 peer reviewed papers published in 4 journals per year	50	150	
CPD Courses	26 courses run over 51 days with 51 CPD credits allocated	51	266	
Mentorship Programme	10 mentors addressing 124 candidates		124	
General SAIEE events and visits	Various breakfast sessions and visits	19	440	
Outreach	Over R270 000 was allocated to 2 key projects (Bergville and TechnoLab) reaching in excess of 2500 learners reached		2,620	
	TOTAL	169	110,631	

Table 1

President's Message

daily through channels such as the Social Media, and others, enabled by the growing penetration of broadband, the internet and 'smart' devices within our market. These results exclude the many events run by our very active and competent regional Centres and Student Chapters. Altogether a significant value-add to any member or prospective member.

Over and above this, our Institute awarded FIVE prestigious awards, has had oversight over FOUR Technical Sections, EIGHT regional Centres, and TEN Technical committees. We also launched the SAIEE Museum in November at Innes House, which provides members and stakeholders with a fantastic resource and archive to consult, visit and appreciate the achievements of the giants of this industry over the past years.

In terms of outreach, I am proud to say that our Institute has risen to the Pay It Forward challenge, and not only continues to support the Bergville Community Builders project, but is also invested in the TechnoLab and AfrikaBot initiative at the University of Johannesburg. Hopefully this support will continue, and will be expanded further with the support of our members and corporate partners.

Through the initiative of Dr Pat Naidoo, the Institute has also successfully negotiated and implemented a ground-breaking initiative for Workplace Integrated Learning (WIL) between Eskom, and various Universities across South Africa. This is with the SAIEE providing program oversight and mentorship to the candidates.

Some of the less quantifiable benefits, but

no less value-adding, are the networking opportunities and relationships and reputational advantages that membership of the SAIEE offers.

It would be remiss of me if I did not highlight the value of the Institute's successful three day conference on Smart Grids and the Internet of Things held in Midrand in February 2016. Those of you who attended the conference, or the Boot-Camp that preceded it, will acknowledge that it was well attended, and well received by delegates. With gratitude to George Debbo and his organising committee for bringing it all together, and to the Administration for all the organisational support for the event. What this conference achieved was to bring together a diverse group of engineers and technologists talking about the challenges of power, telecoms and control systems. It has provided a great platform for discussion and debate, and has given some direction for future events.

In terms of communications, and embracing the 'Millennial' Generation who are so invested in social media, I have made a personal effort to keep the flow of discussion relevant and ongoing with a weekly message posted on our website and linked to our social media pages.

This has stimulated some commentary, not always favourable, but generally appreciated by a growing audience. It remains to be seen whether this is considered to be of sustainable value going forward.

The strategy of our Institute was discussed at a workshop in October. The objective of the meeting was to discuss how to add value to our members and grow membership.

It was apparent during the discussion that the organisation wrestles with issues that have not changed significantly over the years. Somehow, as a volunteer based organisation, we struggle to make significant impact on it. The list below represents the key areas being discussed, unpacked and further considered:

1. Student Members/youth/new graduates;
2. Growth (should this be Organic or Acquisitional?);
3. Marketing;
4. Benefits for members;
5. Relevance of SAIEE to its members;
6. Centre involvement;
7. Relevance to South Africa;
8. Measurements (KPI); and
9. Improvement of Membership Programme.

Going forward, these points needs to be prioritised and some of the above areas must be actioned on. Success will depend on the continued support of our volunteer members and what can be achieved within the constraints of existing or affordable resources. Success also depends on the organisation's leadership, administration, structures, processes and ability to remain relevant in a world of rapid change.

Members who feel they have a contribution to make to our organisations strategy, in any of the above areas, are invited to put their recommendations forward.

Politically, this has been a watershed time in the history of the new South Africa, as we have witnessed growing restlessness with the slow pace of economic transformation.

This is particularly evident amongst the youth, and is manifesting itself in public

Learners	Students	Post Grads	Productive Professionals
Outreach	Undergrad Bursaries	Postgrad Bursaries	Continued Professional Development
		Job placement	
	Mentorship		
	ARJ		wattnow
		website	
	Seminars & Conferences		
	Networking		
Student Chapters	Council Committees		
	Professional Status		
Official Events			
Centres			
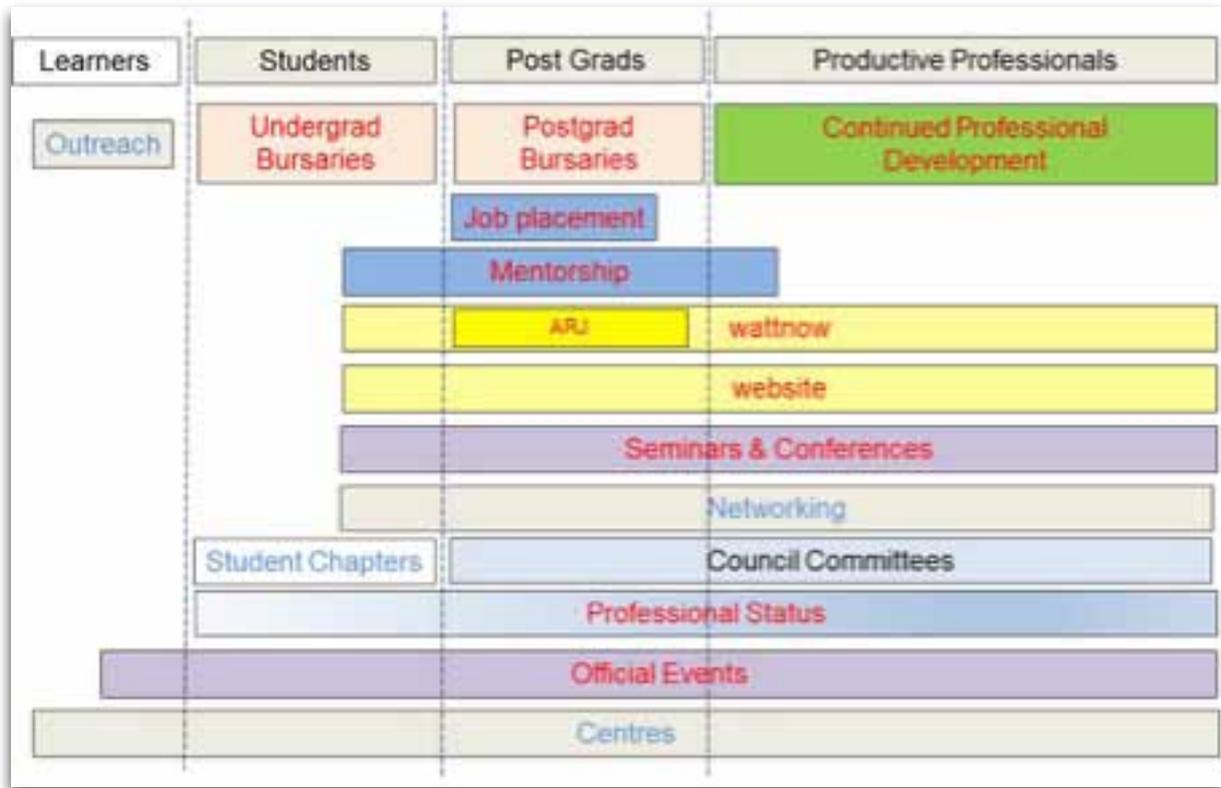
The graphic above summarises a view of the current benefits of the SAIEE over the lifecycle of the member.

demonstrations against the economic barriers to qualify and to register for tertiary education.

Of concern to me is not just the pipeline of electrical engineering skills, but we are seeing another bottleneck developing of limited opportunities for the new group of engineering practitioners, emerging from the system. We are seeing a growing number of requests for internships and first time job opportunities flood into our SAIEE social media channels.

What can the Institute do to match the need with the opportunity, or what can we do to facilitate the opportunity creation for our newly skilled engineers, technologists and technicians?

It is imperative that we navigate our way forward with this challenge if we hope to make our mark.

In conclusion, I would like to thank Council, Office Bearers, Exco and the SAIEE administration team for their support during the past year.

I appreciated the support of all the Centres and the various committee chairpersons in driving the Pay It Forward campaign so effectively. My gratitude also to my employer, Link Africa for allowing me the flexibility to fulfil this role for the Institute.

With thanks to my wife Janine and my family for all the encouragement and support.

Lastly, I would like to congratulate Thembinkosi Madikane on his election as the next President of our Institute and wish him an enjoyable and productive year.

Assuring you all of my continued support.
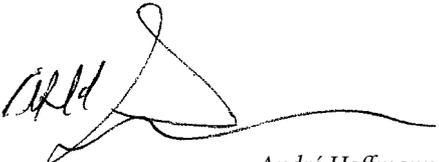
André Hoffmann
Pr. (Tech.) Eng | FSAIEE

WATTSUP

Partners Picnic on the SAIEE Express

On the 6th of March, SAIEE Council members and their partners met at Park Station to take the Steam train to Magaliesburg. The train arrived with much fanfare on platform 14.

The steam engine Janine, is a 15F, No 3046 war baby, built by North British (Glasgow) in 1945. In 1947, this engine pulled the Royal Train. After 43 years of main line service, she was retired at Germiston in 1988. She was kept intact as a reserve and the boiler tested until 1992. She was restored to full steam in 2009. The big 6-axle tender carries 18.3 tons of coal and 43 000 liters of water. She is the only steam engine still operational in South Africa.

A number of SAIEE Council members had gone to a lot of effort to dress up for the occasion – the President André Hoffman was in an Alpine outfit with the appropriate hat, and Past President Mike Crouch was resplendent in a Bowler hat and waistcoat.

The train wound its way through the West Rand, stopping a few times for other higher priority trains to pass us. We stopped at Krugersdorp for a while where we could get out and examine the engine properly. A long and heavy goods train coming towards us had broken down, which held us up for some time. This was because, the further out the line goes from Johannesburg, it becomes a single track, with passing loops constructed every now and then. All the way along our journey people waved and cheered as the steam train passed. The driver of the train blew the whistle appreciatively.

The steam train is run by a cheery group of volunteers, and regular announcements kept us informed of all hold-ups. They were enthusiastic and informative. When we arrived at Magaliesburg, the coaches were uncoupled to allow for a set of steps to be lowered from the platform, allowing passengers to cross the tracks to get to the picnic spot. We collected our picnic baskets full of delicious goodies and found shady places to eat the fare.

André Hoffmann

An enterprising vendor showed off his formed wire product, and found a good number of buyers.

On our return journey, the steam train crossed the main road of Magaliesburg with huge fanfare with whistle tooting. This was to warn the road traffic of our approach. A long phalanx of black leather jacketed bikers raced their accelerators in a deep throated roar in appreciation, to greet the train and its passengers as it crossed the road in front of them.

We arrived at the Johannesburg Park Station just after 5pm – and everyone was exhausted after a tremendously enjoyable day!

Ready for departure from Magaliesburg

Patrick & Bianca O'Halloran

Andries & Fikile Tshabalala

Mike Crouch

Maureen & Pat Naidoo

Gerda & Anton Geyer

Angus Hay

Amelia Mtshali

Hermann & Julie Broschk

Exhaustion

George Debbo & Sharon Stobbia

Jan de Kock

André & Janine Hoffmann

WATTSUP

Schneider Electric signs multi-party agreements with French Ministry

Front from left: Mrs. Zanelle Dalglish, Schneider Electric SA; Dr. Abel Ephraim Mashele, Sedibeng TVET College; Prof Tshilidzi Marwala, University of Johannesburg; Mrs. Marianne de Brunhoff, The French Ministry of Education, Higher Education and Research; H.E. Mrs. Elizabeth Barbier, Ambassador to South Africa, French Embassy; Ms. Jackey Mosesi, Sedibeng TVET College; Prof. Alexandre Sebastiani, Vaal University of Technology; Mr. Ben Groenewald, Cape Peninsula University of Technology. Back from left: Prof. Johan Meyer, University of Johannesburg; Mr. Frikkie O'Connell, College of Cape Town for TVET; Mrs. Canninah Mapena, Schneider Electric SA; Mr. Mduduzi Manana, Department of Higher Education and Training; Mr. Eric Legér, Schneider Electric SA; Mr. Ebrahim Peters, College of Cape Town for TVET; Mr. Louis van Niekerk, College of Cape Town for TVET; Mr. Ian Robertson, Cape Peninsula University of Technology.

Schneider Electric, the global specialist in energy management and automation, signed partnership agreements with the Cape Peninsula University of Technology, College of Cape Town for TVET, University of Johannesburg and Sedibeng TVET College for the establishment of four additional training centres, in conjunction with the Schneider Electric Foundation and The French Ministry of Education, Higher Education and Research.

This comes on the back of the success of the earlier collaboration between Schneider Electric and The French Ministry of Education, Higher Education and Research almost four years ago, which was piloted through the Vaal University of Technology by the French expert, Alexandre Sebastiani, from the French Ministry of Education, Higher Education and Research.

At the signing ceremony, held at the Schneider Electric Midrand Campus in Gauteng, Eric Leger, Country President of Schneider Electric Southern Africa, said that these agreements formed part of the company's vision to accelerate vocational training in the field of energy across the country for previously disadvantaged students.

"We identified the need to have more students trained in the field of energy in line with our sustainable development strategy, and we are pleased to sign these new agreements," explained Leger.

The new partnerships will see the establishment of training centres, called French South African Schneider Electric Education Centre (F'SASEC), with a primary focus of the training of future artisans, electricians and technicians in the field of energy. It is anticipated that the doors to the new training centres will open during the second quarter of 2016, hosted at the respective institutions. This deployment takes part of a worldwide programme lead by the French Ministry of Education, Higher Education and Research and Schneider Electric Foundation to create a network of many Schneider Electric training centres in Southern Africa and all over the world, as in South America, India and Asia.

Mozambique at the heart of Southern African development

Gigawatt Mozambique announced a $200-million investment into Mozambique's power sector, alongside several global stakeholders including Standard Bank and the World Bank, amongst many others.

The investment will assist in harnessing Mozambique's natural-gas resources, which will further benefit many of Mozambique's neighbours in the southern Africa region.

This - along with several other projects in the SADC region - will be presented and discussed at EnergyNet's upcoming Southern Africa Energy and Infrastructure Summit (SAEIS), taking place in Maputo, Mozambique 4 - 6th May 2016. The summit will celebrate regional cooperation, and promote energy and infrastructure projects that require both private- and public-sector support in order to be realised.

EnergyNet's Regional Director for East and Southern Africa Veronica Bolton-Smith commented that 'regional development is the key to unlocking Africa's energy investment potential - SAEIS will bring together countries from the SADC region to discuss live infrastructure and energy projects which require investment'.

This vibrant region has experienced many positive developments in recent years, both in energy and infrastructure development. Progress in governance, institution-building and democratic consolidation are contributing factors to the positive indicators that long-term investors seek.

The Summit will explore some of southern Africa's success stories, and how these can be replicated. Southern Africa has witnessed local private-sector led initiatives, and wider participation in exciting projects such as South Africa's ground breaking REIPPPP programme - an initiative which will be explored at the SAEIS.

The Summit will also hear from key stakeholders participating in the Moatize/Nacala railway project, which will run between Malawi and Mozambique: an infrastructure project set to re- define southern Africa and its investment potential.

For more info, visit
www.southern-africa-summit.com

The importance of testing and monitoring surge protective devises for IT systems

Lightning, which is categorised into distant, nearby or direct lightning strikes, may cause transient over voltages. Even if the point of strike is several kilometres away, the energy entering the buildings via the conductors might still destroy electrical and electronic consumers. Lightning current arresters provide protection by safely conducting this high electric energy to the ground via the equipotential bonding system of the building.

Transient over voltages are not only caused by lightning strikes. Switching operations in high, medium and low-voltage systems are a more frequent cause. They electromagnetically inject interferences into data lines such as those of measuring and controlling equipment. This means that failure may occur even if the conductors are not directly or galvanically connected. These interferences do not present a problem for surge protective devices, which reliably discharge these over voltages.

As with all electrical and electronic devices, components of surge protective devices are also subject to ageing. In information technology systems, faulty surge protective devices normally interrupt information transmission and the availability of the system to be protected is immediately compromised. Therefore, it is vital to monitor the status of surge protective devices to ensure protection and availability of the systems and to reduce maintenance expenditure.

Future-oriented surge protection technologies in conjunction with adequate testing and monitoring strategies are an important factor for efficiency.

The more complex and important companies are, the more protected and reliable should the technology be. Whatever testing and monitoring devices you will use, surge protective devices from DEHN + SÖHNE provide all the protection and thus a higher degree of availability for systems.

WATTSUP

Shaw Controls Customises E-House For Zibulo Colliery

Custom built E-Houses offer a rapid and far more cost effective alternative to the building of brick and mortar substations, and this is especially true in an underground application. This is one of the reasons why Zibulo Colliery contracted Shaw Controls, a division of Zest WEG Manufacturing, to design and manufacture an E-House for its operation in the Mpumalanga coalfields.

Containerised electrical control installations in underground applications are not new. Bevan Richards, COO of Shaw Controls, says the concept was first used during the sinking of many of South Africa's gold mining vertical shafts when ISO marine containers were equipped with mimic panels and other ancillary equipment.

"However, the evolution and development of pre-manufactured electrical substations or E-Houses has opened up numerous possibilities including the ability to completely customise the unit according to process and plant requirements," Richards explains.

Specifically designed by Shaw Controls for this underground application in a coal mine, the E-House was designed with several specific parameters taking precedence.

Specifically designed for this underground application in a coal mine, the E-House was designed with several specific parameters taking precedence. Underground height restrictions meant that the structure itself had to be lower than usual but would still need to accommodate all necessary electrical infrastructure and allow for sufficient headroom for cooling.

Richards says it is testimony to Shaw Controls' mechanical design capability that its engineers were able to design such a low profile steel structure that could house all the equipment and still maintain the requisite internal clearances. He says that extensive use was made of Solid Works CAD software during the design process and this ensured the integrity of the design.

Rittal SA announces change in top management

Ute Schoeman, interim MD Rittal SA

Rittal South Africa has announced that Mr Stephen Venter, Managing Director has stepped down from his duties as of March 2016.

The responsibilities have been taken over by Ms Ute Schoeman who has stepped in as acting Managing Director for the local operation. Ms Schoeman is no stranger to the industrial arena and has strong management and leadership capabilities having been in charge of another local multi-national corporation for a number of years.

Rittal GmbH & Co. KG remains committed to the South African market and continues to invest and support the local operations. Rittal is the leading systems provider for enclosures, power distribution, climate control, IT infrastructure and software & services. *"Customers can be assured of our commitment and that we endeavour to ensure a smooth transition in leadership"* comments Ms Ute Schoeman. *"I look forward to the new role and to meeting with the staff and customers of Rittal South Africa"* she concludes.

Let your feet speak for your heart

National Tekkie Tax Day has been part of the South African calendar for the last three years and this time around we're celebrating it on Friday 27 May. This campaign gives you the opportunity to show with your feet where your heart lies. Choose your sticker for a cause close to your heart, spunk up your tekkies with a funky pair of our Tekkie Tag shoelaces and you are ready for National Tekkie Tax Day!

The campaign started in 2013 when a few of South Africa's biggest and most accountable welfare organisations joined forces. Marieta Kemp, Director Social Services from the SAVF says *"The large number of welfare organisations involved helps us to keep the costs structure low and this will ensure that the maximum of donations can be used by us to deliver our services on grass roots level."*

There are 11 National Beneficiaries and they represent more than 1 000 local non-profit organisations.

- Epilepsy SA
- Child Welfare SA
- SOS Children's Villages
- CHOC (Childhood Cancer Foundation)
- Special Olympics SA
- CANSA
- Imisebeyelanga Services
- Meals on Wheels
- VVA
- NG Welsyn
- SAVF

Tekkie Tax raised more than R13,7 million and the impact on ground level is remarkable. Gary Westwood, Director of Epilepsy SA in the Free State & North West province says; *"We used our Tekkie Tax donations in serving persons with epilepsy and other disabilities in our residential care facilities."* Imisebeyelanga Services used their Tekkie Tax donations to purchase tables and chairs for some of their Early Childhood Development centres. Samaritan's Feet SA bought shoes

for the needy. The list is long and these are only a few examples of how the donations were utilised in the past.

There is really no excuse to not participate in this year's campaign. The Stickers (R10 each) are available from mid April at all Toys R Us stores. The Tekkie Tag shoelaces (R35) are available from all Clicks stores and selected Toys R Us stores. There are also more than 250 participating non-profit organisations selling these items and together they aim to convince every South African to be part of the fun. Orders can also be placed via the Tekkie Tax website www.tekkietax.co.za.

Walk the extra mile for a welfare organisation close to your heart by wearing your sticker of choice on Friday, 27 May and spunk up your tekkies with a pair of funky Tekkie Tag shoelaces.

Along with our 2015 Celebrity Ambassadors, Jack Parrow (Animals), Sorina Erasmus aka The Flooze (Children) and Linda Mali (Education) - Top Billing Presenter and Model, Jade Hubner and former Lions and Springbok Rugby player Lawrence Sephaka, have joined the Tekkie Tax family and are representing the Disability and Bring Hope sectors respectively.

There is really no excuse – put your best foot forward and support National Tekkie Tax Day on Friday, 27 May 2016.

PwC's research with over 2,000 working SA adults shows that 72% of employees would be happy to use a piece of wearable technology provided by their employer and allow the employer to collect data from it. If there are benefits for the individuals, the proportion of employees who are prepare to share information rises to 87%. The most enticing benefits of wearing devices and sharing information are: flexible working hours (76%), fitness incentives (72%), lower health insurance premiums (70%), and free health screening/annual health check (59%).

These are some of the highlights from PwC's 'Wearables in the workplace' report. Barry Vorster, PwC Leader of People & Organisation, says: *"Many employees are*

still not comfortable about sharing any of their personal data with their employers, but our research shows that most people can be persuaded if they can see personal or workplace benefits.

Giving employees wearable devices could be a novel and powerful way for employers to gain a better understanding of their workforce and tailor working patterns and office life to their individual needs, ultimately leading to more engaged and happy employees."

The purpose of the study was to explore how employees feel about wearables and whether it might be viable for employers to consider providing wearable devices to employees in order to collect health and

Wearable devices in the workplace

New research shows that more than three-quarters of South African employees would consider wearing a wearable device, such as a smartwatch, from their employer if the data was used to improve their conditions in the workplace.

work related information. The term 'wearable technology' refers to clothing and accessories incorporating computer and advanced electronic technologies.

It is interesting to note that South African employees are more willing to share personal information with their employers than their counterparts in the UK.

Furthermore, employees are most likely to share information with their employers on: marital status (78%), number of children (74%), frequency of physical exercise (64%), average blood pressure (63%), and

average heart rate (63%). In exchange for the right benefits, respondents stated they would be happy for their employer to collect and analyse data on certain aspects of their health and lifestyle. This includes: travel time to and from the office (74%), blood pressure (69%), heart rate (68%), movement (62%), and time of arrival and departure from work (61%).

According to the report, trust is the main barrier to employees being willing to share their personal data with their employer. Twenty-percent said they don't trust their employer to use their data for their benefit, and a similar percentage said they don't trust their employer to not use this data against them.

Nanie Rothman, an Associate Director in PwC's Actuarial, Risk and Quants Division, says: "Companies exploring health and wellness programmes involving wearable devices can expect buy-in if incentives and proper polices are in place ensuring the privacy of employees' information.

Policies should be set to clearly identify what data will be shared with employers and what this data will be used for. *"Employers should also be careful about what categories of data they collect as this will also impact employees' buy-in."*

A high 95% of working adults said they own or use a smartphone followed by a tablet (55%), fitness tracker (20%), e-book reader (16%), and a smartwatch (3%).

More than half of respondents (61%) think they have legal ownership of the data produced by their smartphone and other devices themselves, while 17% say the service providers they use online do (e.g. Google, Facebook). Nine percent say they don't know who has legal ownership of the data.

Vorster concludes: *"Organisations have more data than ever before. The key to success for both companies and their employees will be overcoming the trust barriers by having clear processes for acquiring, using and sharing the data securely and responsibly."* **wn**

All change in South Africa's telecoms industry as demand for data soars

The key part that rising demand for data is playing as a driver of telecoms growth in South Africa is analysed in the latest report published by Oxford Business Group (OBG).

The Report: South Africa 2016 explores how operators are adjusting to the shift from traditional voice and SMS services to data, particularly when it comes to rolling out 4G long-term evolution (LTE) services and infrastructure.

The global publishing, research and consultancy firm's report also looks in detail at the challenges industry players face, which range from a competitive and crowded market to a lack of spectrum. In September 2014, mobile usage stood at 77.8% of the population, or 42m users, according to South Africa-based ICT consultancy World Wide Worx. A total of 80.2m sim cards were in circulation.

The Report: South Africa 2016 considers the positives for operators as they look for ways of expanding their customer base, led by strong equipment sales and opportunities in value-added data bundles.

Other issues given wide-ranging coverage in the publication's Telecoms & IT chapter include the growth prospects for e-commerce and anticipated digital TV migration.

OBG's analysis contains a detailed, sector guide for investors, alongside contributions from industry personalities, including Sifiso Dabengwa, the former Group CEO of MTN, and Asher Bohbot, the CEO of EOH Holdings.

Dabengwa highlighted the need for public and private-sector collaboration if South Africa is to achieve its aim of providing universal access to broadband. *"There needs to be a technology mix to reach the rural areas, including things such as Wi-Fi, but generally fibre should be everywhere,"* he told OBG in a wide-ranging interview. *"… a minimum speed must be set out as well."*

The private sector also has a role to play in supporting business process outsourcing (BPO) growth, according to Bohbot. He noted South Africa's ongoing efforts to position itself as a global BPO centre, which included *"reasonably lucrative Incentives",* but added that more could be done. *"We need to market ourselves more actively on a global basis…"* he told OBG. *"However, to be effectively mobilised, the private sector must get more involved."* wn

African Utility Week | Clean Power Africa

The largest global meeting place
for African utilities

#AUW2016

6000 attendees

230+ exhibitors

16 years

70+ countries

6 site visits

Host utility **Eskom** (Exclusive 2014 -2018)

10 industry awards

210+ speakers

17 – 19 May 2016
Cape Town, South Africa

www.african-utility-week.com

Host utility	Trade association partner	Co-located event	Host ministry	Media partner
Eskom Exclusive 2014 - 2018	SOUTH AFRICAN ELECTROTECHNICAL EXPORT COUNCIL	**AFRICA POWER** FINANCE & INVESTMENT FORUM	energy Department: Energy REPUBLIC OF SOUTH AFRICA	**wattnow**

Asset Protection
System for
Vehicle-to-Vehicle
Surface Applications

Booyco Electronics has extended its electronic safety equipment offering having recently launched its Asset Protection System (APS) which is specifically aimed at enhancing vehicle and operator safety in surface mining operations.

n combination with its underground Pedestrian Detection System (PDS) technology, the company now offers the mining industry a turnkey, fully integrated surface and underground safety solution for machinery and personnel.

Having secured its forefront position in the PDS field years ago, Booyco Electronics is determined to replicate this success in surface applications. *"Our current surface solutions were developed using our underground VLF systems but work optimally for pedestrian speeds and movements, rather than fast-moving vehicles,"* Martin Vermaak, chief operating officer at Booyco Electronics, says.

Designed for easy and effective communication between vehicles, the APS transfers information between users via a new, in-house designed and developed human machine interface. It incorporates a high definition LED screen and high-level controller with *"massive computational power"* to operate quickly at high speed.

"Because our system can process a large amount of data really quickly, it meets the requirements necessary for vehicle-to-vehicle safety protection," Vermaak continues.

All forms of system communication are exchanged with the operators using icons, making it easy to use and understand; a significant advantage for users who are illiterate. Additionally, messages can be provided via a pre-recorded voice programme and can be customised to any language, which *"encourages adoption and prevents alienation of the system as well"*.

Protocol and redundancy measures have also been incorporated to ensure the system continues working, despite a faulty sensor for example. Importantly, Vermaak notes, *"if the system loses GPS signal, we can still determine where a vehicle is relative to other vehicles by accessing recently compiled information."* Wireless internet (Wifi) capabilities provide users with the option to download data for incident analysis and can even

The Booyco Electronics Asset Protection System (APS) is specifically aimed at enhancing safety in surface mining operations.

aid in productivity by drawing comparisons between scenarios and vehicle operators. The system can be customised to suit specific requirements, without impacting on changing the primary software design.

"By providing both surface and underground safety system applications which are completely integrated and can operate via a single interface, the resultant economy of scale and shared equipment functionality enables us to reduce capital costs and risk management for our customers," Vermaak highlights.

Having completed the first APS prototypes at the end of 2015; taking customer requirements, previous lessons learnt and failure mode testing into account, Booyco Electronics has already commenced with its first on-site trial tests and has already received its first order. **wn**

IN MEMORIAM
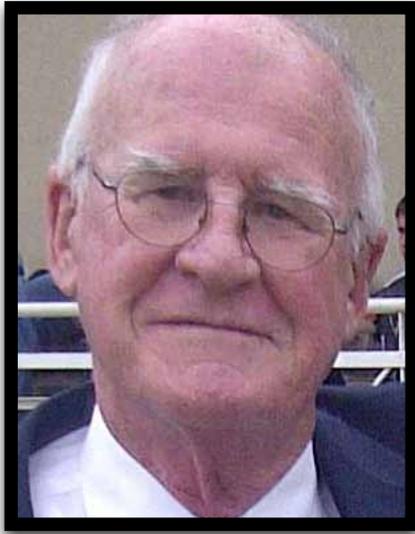
1938 - 2016

Prof Duncan C. Baker

Duncan Baker, a well respected South African engineer, educator and volunteer, passed away on 12 March.

Prof Duncan Charles Baker, a well respected South African engineer, educator and volunteer, passed away on 12 March 2016. He was 77.

Baker, who was born on 5 September 1938 in Grahamstown, counted among his achievements the development of a multi-segmented quasi-parabolic ionospheric electron density distribution model for communications research applications.

He joined the South African National Antarctic Expedition as an ionosphericist, on the maiden voyage of South Africa's first Antarctic supply ship in 1961-1963.

He headed ionospheric research at the National Institute for Telecommunications Research at the CSIR from 1969 to 1982, and then moved to the University of Pretoria until his retirement in 2003.

After retirement, he continued serving South Africa as a councillor for the City of Tshwane.

Baker was appointed as a Fellow of the Institute of Electrical and Electronic Engineers (IEEE) in 1998 for *"leadership in engineering education in electromagnetic compatibility, computational electromagnetics and ionospheric propagation, as well as contributions to ionospheric modelling"*.

He was later awarded a Life Fellowship. The South African Institute of Electrical Engineers (SAIEE) acknowledged his professional work in 1995 when he was elected as a Fellow of the SAIEE.

He was Chairman of the IEEE South Africa Section in 1993 and held a number of positions through the years in the IEEE at various levels. He joined the SAIEE in 1980 and volunteered his time with them, too.

His recent efforts included his successful nomination of SpaceX and Tesla founder Elon Musk, for the IEEE honorary membership that was awarded last year.

"A great engineer and tireless volunteer, Baker will be missed by all who had the honour of working with him," said Shaun Kaplan, the South Africa Section chair at the IEEE.

Besides engineering, Prof Baker was an active Ward Councillor for the Menlyn area in Pretoria.

Rest in Peace old friend - you will be sorely missed. **wn**

© Info courtesy TechCentral

IN MEMORIAM

Dr Lawrence Musaba

It is with great sadness that we report the passing of Dr Lawrence Musaba, the SAPP Coordination Centre Manager. Dr Musaba passed away on 14 March 2016 after a long illness.

1965 - 2016

Dr Lawrence Musaba received his Bachelor of Engineering Degree (BEng), with Distinction, from the University of Zambia in 1989. He went on to earn his Masters Degree in Power Engineering and PhD from the University of Manchester Institute of Science and Technology (UMIST, England) in 1991 and 1996 respectively.

He worked for the Zambia Consolidated Copper Mines as Senior Electrical Engineer, Midlands Power International (Birmingham, UK) as Assistant Project Development Manager and the University of Zambia as Lecturer and Head of the Department.

He joined the Southern African Power Pool (SAPP) in June 2000. From February 2002, he was appointed the Co-ordination Centre Manager.

Dr. Musaba was instrumental in the development of the SAPP Short-Term Energy Market (STEM) and had been working on the development of a competitive electricity market for the SADC regional, under the umbrella of the SAPP Power Market Project.

He was a Chartered Electrical Engineer of the Institute of Electrical Engineers of the United Kingdom, a Member of the Engineering Institution of Zambia and also a Registered Engineer.

Dr Musaba was the recipient of the Lifetime Achievement Award at the 2015 African Utility Week. Musaba always down played his role in the sector, even though he was seen as a respected and results-oriented energy expert in southern Africa.

Musaba, was also a member of the Southern African Development Community (SADC) Energy Thematic Group (ETG). He has been lauded by members of the working groups, who said that his passing had deprived southern Africa of a courageous campaigner who always believed that deeper cooperation among SADC countries will enable the region to address its energy challenges.

"It is with great sadness that we have to learn about the passing away of Dr Lawrence Musaba. He was a cherished and well-respected member not only of this group but of the southern African energy community as a whole," Deputy Head of Mission at the Austrian Embassy in Pretoria, Matthias Radosztics, who chairs the ETG, said.

In a release by the SAPP, Musaba was lauded as "a true champion" with a "great passion" for the energy sector in Southern Africa. He devoted his life, and was dedicated, to the principles of fairness in addressing the challenges of the power situation in the SADC.

Our condolences to his family and friends and the staff at SAPP. **wn**

THE
Art OF
ACCOMPLISHMENT

Afrika
2016 BOT

THE WORLD'S
MOST AFFORDABLE
ROBOTICS
COMPETITION
www.robotscience.co.za

RETHINK. REINVENT.

UNIVERSITY
OF
JOHANNESBURG

It would appear that aside from the normal and burgeoning functionality in the tens of millions of lines of code embedded in modern automotive systems,[2] in some cases, there might be code intended to deceive. The question is, when does a feature cross the line from what lawyers call harmless "advertiser's puff" to outright deceit?

THE DEFEAT DEVICE

In the case of VW, the change appears to have been tiny - just a few lines of code in what's likely to be millions. Allegedly, the software monitored steering movement while the engine ran. On a test harness the car wheels move but the steering wheel doesn't. This is unlike normal running in which both are continually in motion. By tracking this, the software could detect when the car was in test mode and therefore control the degree to which catalytic scrubbing was done on the emissions.

Catalytic scrubbers inject a mixture of urea and water into the diesel engine emissions, converting harmful nitrogen oxides into the more benign molecules of nitrogen, oxygen, water, and small amounts of carbon dioxide. The trade-off in a diesel engine is basically one of emission toxicity against car performance. The software, now known as a "defeat device," simply turned up catalytic converters' efficiency when it thought the car was under test. It's believed to have been embedded in approximately 11 million VWs and two million Audis.

PUSHING THE BOUNDARIES

This development is entirely predictable but nevertheless shocking, although there's a rich history of such hardware and software fragments in devices intended to push the boundaries of what's reasonable. We recall hardware switches in early computers that simply doubled the clock speed for a disproportionately large fee. Similarly, there are possibly apocryphal stories of software wait loops intended to slow software performance that could also be removed for a suitable fee. However, these weren't intended to deceive, although they might well be considered morally suspect.

When Software Crosses a Line

Like many people, we've been closely following the rapidly unfolding story on the "defeat" software at Germany's giant automotive company, Volkswagen (VW). This, we believe, adds a new dimension to our original questions, *"Software: What's in it and what's it in?"*[1] - particularly, *"What's hidden in it, and how many people knew?"*

BY I LES HATTON **&** MICHIEL VAN GENUCHTEN

Going beyond this, a legal case, some years ago, in which a specific test case was embedded in a software package, such that the software gave favourable results for that test case during demonstrations. In reality, those results weren't typical for that software. Indeed, this situation has raised its head again, and there's considerable debate on the Web about the rigging of Android benchmarks.[3] Johann Rost and Robert Glass explored this Jekyll-and-Hyde nature of software under a wider set of categories.[4]

PAYING THE CONSEQUENCES

A cynical observer would claim that if someone can get away with something, he or she will, but did the engineers responsible really believe that such a device would never be found? Of course, unless you knew what you were looking for, finding it by inspecting the code would be like finding a needle in a haystack. And,

even if you did know, finding your way round a giant software system isn't for the fainthearted. Nevertheless, you can't defeat the laws of physics or, in this case, chemistry.

The VW defeat device was basically discovered by independent monitoring of exhaust emissions, which found glaring differences between what was observed in normal running and what was being claimed. So, it seems naive to think the device wouldn't have been discovered eventually. Ironically, one of software's most important contributions to automotive engineering has been to reduce such noxious emissions by continually retuning the engine as it runs. By overstepping the mark, did the engineers responsible think that people wouldn't mind, or that the financial benefit of selling more cars would outweigh any potential downside? If

they did, they're likely in for an unpleasant surprise, with VW already setting aside several billion dollars to deal with potential claims.

Software is an ideal medium for this because, unlike other products, its reproduction costs are zero. Only a very small fraction of the millions of diesel vehicles sold by VW end up on a test bench, so putting a two-dollar integrated circuit in every car for the deceit would have cost a lot of money. However, copying a few lines of software into every car was a cheap solution.

This is exactly why hackers and spammers can do so much damage. Spammers wouldn't send out a million emails if they had to pay postage. Similarly, if thieves want to cheat somebody at an ATM, they could go there (to put a fake front on the card reader, observe PIN entry, and so on)

When software crosses a line

and run the risk of exposing themselves. If, however, ,they do the cheating via phishing and emails, they can reach thousands of users without leaving their PCs. Software can be turned into a weapon of mass deceit very cheaply, and we might need more explicit governance and legislation to at least discourage companies and individuals from deploying such software.

As of October 2015, when this article was written, it was estimated that over one million vehicles might be affected in the United Kingdom (UK) alone.

The UK is Europe's second-biggest diesel user after Germany. In fact, VW doesn't appear to know whether the software is present or, if so, whether it's activated in vehicles currently on the road.

VW will also have to consider the possibility of "breaking" something else in the process of removing the software, or even simply deactivating it, owing to the possibility of unintentional side effects. These can occur through, for example, shared global variables, or one of a number of mechanisms familiar to professional software engineers. In short, the software's removal could introduce even more defects.

Perhaps the hardest thing to understand is that this, allegedly, is due to a very small number of rogue engineers. This is difficult to square with the detailed obligations of revision and specification control for systems that are often due to safety, and demand significant oversight. VW's CEO has already lost his job, but we have yet to hear what will happen to the engineers responsible, and their respective managers.

AN ETHICAL CONUNDRUM

Speaking of defects, let's raise an interesting question: is this better, or worse, than releasing automotive software containing defects that weren't found in testing?

One of the more recent examples of this is Toyota's unintended-acceleration bug.[5] Toyota isn't alone; the automotive industry has faced numerous recalls due to software defects that in some cases should have been found before release. Only two months ago, Fiat Chrysler had to recall 1.4 million vehicles fitted with the touchscreen Uconnect radios. A defect let professional hackers remotely take over an unmodified 2014 Jeep Cherokee, and perform alarming maneuvers, including turning the engine off while the car was driving by and later, in a parking lot, reversing it into a ditch.[6]

When an automotive manufacturer releases such a defect while advertising how safe its cars are, is it not being similarly misleading? Ignorance is no defense, but does the automotive industry in particular, and many other industries in general, rely too much on end users being generally relaxed about software defects, even if they might be unsafe? Contrast, for example, the following two more factually appropriate statements that cover the previous two eventualities:

We've adjusted the catalytic converter to behave more efficiently if you drive at a constant speed without moving the steering wheel, so your emissions will be much lower. If you depart from this, as seems very likely, you'll get better performance, but your emissions will be very considerably more noxious.

We believe that software innovation is vital in automotive development.

However, the systems we release to you are so complicated that they'll quite possibly have defects in them that might sometimes prejudice your safety. However, we hope

that most of the time they won't and that the overall experience is beneficial to most drivers.

Would you still buy the car? You could, of course, argue that these statements arise from different ethical viewpoints. However, any software engineer worth his or her salt will know that the chances of releasing a complicated defect-free software system are effectively negligible.[7]

If, by some miracle, that system was defect-free, the engineer would never know it, would never be able to prove it, and would never be able to repeat such a feat systematically.

We await the answers to several obvious questions. Are any other companies doing this, or - if we take a more cynical standpoint - how many are doing this?

If they aren't, are they still using software practices almost as dubious? How do we decide what's reasonable, given software's extraordinary ability to give hardware its character? **wn**

REFERENCES

1. M. Genuchten and L. Hatton, *"Software: What's In It and What's It In?,"* IEEE Software, vol. 27, no. 1, 2010, pp. 14–16.
2. J. Mössinger, *"Software in Automotive Systems,"* IEEE Software, vol. 27, no. 2, 2010, pp. 92–94.
3. A. Lal Shimpi and B. Klug, *"They're (Almost) All Dirty: The State of Cheating in Android Benchmarks,"* 2 Oct. 2013; www.anandtech.com/show/7384/state-of-cheating-in -android-benchmarks.
4. J. Rost and R.L. Glass, *The Dark Side of Software Engineering: Evil on Computing Projects,* John Wiley & Sons, 2011.
5. D. Douglas and M.A. Fletcher, *"Toyota Reaches $1.2 Billion Settlement to End Probe of Accelerator Problems,"* Washington Post, 19 Mar. 2014; www.washingtonpost.com /business/ economy/toyota-reaches -12-billion-settlement-to-end-criminal-probe/2014/03/19/5738a3c4 -af69-11e3-9627-c65021d6d572 _story.html.
6. L.P. Vellequette, *"Fiat Chrysler Recalls 1.4 Million Vehicles to Install Anti-Hacking Software,"* Automotive News, 24 July 2015; www.autonews.com/ article/20150724 /OEM11/150729921/ at-chrysler-recalls-1.4-million-vehicles-to-install-anti-hacking.
7. L. Hatton, *"The Chimera of Software Quality,"* Computer, vol. 40, no. 8, 2007, pp. 104–107.

© Article courtesy of IEEE.

```
// life motto
if (sad() === true) {
 sad().stop();
 beAwesome();
}
```

BUILD AND MANAGE APPS MORE EFFECTIVELY AT REDUCED COSTS

Earn CPD Credits

The new Innovation Economy of data

Today, something profound is happening to the world economy. The traditional understanding of the information economy is giving way to a new variation that will have an enormous impact on jobs, wealth and entire industries.

COMPILED BY I MINX AVRABOS

his new economy has its roots in data, but of equal importance are Application Programming Interfaces (APIs) and mobile apps. A fourth factor is also working as an accelerator on the other three: the Internet of Things.

The business entry point for this new economy is low. All you need for success is a good idea and the will to take it forward. The result is a vast surge of human creativity. For this reason, perhaps the most appropriate name for it is the Innovation Economy. The Innovation Economy is being made possible through new tools that make it easy to connect data

sources and monetizable application components, accessed through published interfaces called APIs. These APIs enable applications to be coupled with other APIs to develop completely new application solutions. A catalyst for the development of these new applications is the emergence of cloud-based Platform As Service (PaaS) offerings such as IBM® BluemixTM.

THE NEW INNOVATION ECONOMY

It might seem cliché to say something profound is happening to the world economy, but something profound is indeed happening and the business community must pay attention. The agricultural

economy, the industrial economy and the information economy have had a major impact on this world. The new economy of today and tomorrow might just be a new phase of the information economy, but if so, it is very different from what people have experienced thus far. The participants are different. The impact will be different and therefore, the new economy deserves a different name.

The new economy has its roots in data. You could call it the data economy, but it would be insufficient. Data is central, but the new economy is characterized by other elements also. The term "the API economy" is also popular, which is important, but again it represents only part of the picture. Mobile applications and the Internet of Things also play a role, as does a new class of programming tools.

What is singularly different about this new economy is the impact it will have - indeed is already having - on human creativity and innovation. As a result of the ability for an everyday programmer to easily incorporate advanced technologies into his or her app, business people can rethink how applications and business processes can be recreated. You are already beginning to see a profound impact on almost every industry. New ideas are easily shared, which serves to accelerate the further stimulation of yet more new ideas. Because barriers to entry are low, virtually anyone can build new business offerings and services at a much lower entry cost. All you need to participate is a good idea

The Innovation Economy of data

and the will to build a business around it. As a result, this accelerated generation of ideas will grow and unleash innovation on a scale the world has not previously witnessed. Because of this impact, perhaps the best name for this new phenomenon is the innovation economy.

IT ALL BEGINS WITH DATA

For decades, the international economy has been fuelled by a specific natural resource: oil. Take oil away, and as the world has witnessed, economic activity slows. The innovation economy is similar, but the fuel is different; the fuel is data. Take data away from today's economy and activity would slow.

Data has a unique property from oil that changes how it impacts economic activity. Physical resources are finite by their very nature and therefore have limited reusability; data is not. Data is infinitely reusable. While both natural resources and data can be mined and processed for value - that is the creation of insightful information - data is different in that it can be combined with other data, and then mined and sold over-and-over again. In the innovation economy, you do not run out of fuel. The fuel generates more fuel.

It is important to note that there is a distinction between data and information. Data is typically raw information; it is not necessarily meaningful. Information is data that has been processed and has value. In the context of this article, when the word data is used, it could be either.

Almost every major industry is being regenerated by data; from healthcare, to agriculture, to manufacturing, to insurance, to banking, to retail. Data is having a massive impact.

Look at healthcare, one of the largest segments of today's modern economy. In many respects, the healthcare industry is still in the dark ages. Yes, doctors know a lot about how diseases progress, and have wonderful medicines to target them, but doctors still use a lot of guesswork. They do not have definitive processes to capture and compare symptoms, diagnoses, treatments and out-comes across the population. Whenever a doctor is presented with symptoms, he or she has to rely on his or her experience to make an educated guess as to what the problem is. Doctors do not always have enough information to determine a diagnosis. Treatments similarly, are also driven by best guesses based on individual experience.

But what if doctors had a massive amount of additional data at their fingertips upon which to formulate both diagnosis and treatment? The effects would be different. That day is fast approaching. You might see it happen as more and more people begin using wearables, portable sensor technologies that measure everything from blood pressure to glucose levels to muscle fatigue. Right now, wearables are used by only a small portion of the population. The uptake of mobile phones started that way too, and look at how ubiquitous they are today. People care enormously about their health; they have huge vested interests in monitoring and maintaining it. The problem with wearables is the hassle factor, but if the devices were non-intrusive, tracking made easier and users received massive benefit from wearing them, almost everyone would wear them.

Big things happen when you get enough data to see what is going on in a whole system. When a sizable portion of the population begins using wearables, and sending real-time anonymised data to the cloud, big things can happen to the healthcare industry. Certainly the effect on individuals might be great in itself, but the best insights will be achieved when information is compared across the population. With such a transition, doctors will be able to capture much better information upon which to base both diagnoses and treatments.

People get nervous about having their medical information put up in the cloud and potentially misused. With the rash of breaches of confidential information, it would be naïve to say these concerns are not justified. But at the same time, there are techniques to protect information and prevent abuse. Client-doctor confidentiality can be put in place so that diagnoses and treatment cannot be linked to a specific individual. Data anonymisation techniques can mask the identities of individuals but preserve the characteristics of overall populations. When large quantities of anonymised health data are analysed, the value for all can be amazing. Such analysis can lead to commercial opportunities for the data - both raw and analysed. With this analysis, people can drive great innovations in healthcare, enabling improvements in efficiency and effectiveness on a large scale. The benefits of anonymised data can be tremendous across many industries. Bankers can sell anonymised data to marketers and policy makers to better understand the characteristics of a population, and help target businesses better. Telecom executives can do the same.

For some industries the use of data can remake the industry. For instance, the

Extended Guarantees
on WEG Products

Extending product guarantees is aligned with Zest WEG Group's strategy of forming long term partnerships with customers, and allows you absolute peace of mind.

Tel: +27 11 723 6000   www.zestweg.com

ZEST
WEG Group

Please contact your nearest sales office for further details.

The Innovation Economy of data

business of insurance is built on the idea of measuring risk; the more accurately people at an insurance company can measure risk, the more accurately they can price a policy. As of now, the insurance industry tends to focus on averages. More and more they will focus on targeting based on individuals.

The retail industry is also becoming data-centric. The more a retailer knows about what a specific customer wants, the better he or she can target offerings. There is a reason why Google makes so much money while giving away so much for free. Google executives have data about individuals that retailers are willing to pay for, handsomely.

Data is a core fuel for this new economy. If one can access large amounts of data, analyse it, and offer insights, organisations will pay for it especially as they recognise the economic value of data. Entrepreneurs have already set up companies that will act as data brokerages in the data economy.

APIs - A MECHANISM OF TRADE
If data is the raw material for the innovation economy, APIs are the machines used for getting at and consuming the data. You can use APIs to access commercial application components that can be bought and sold in their own right.

What are APIs? In computer programming, an API specifies how to interact with a particular software program. An API is an interface to a service.

Messages are sent to an API, or request something through an API and a program executes a function, or returns a specified result. APIs are not new and the term can be applied to a broad set of callable functions. In the context of the innovation

economy, APIs often refer to a specific type, REST APIs. Representational State Transfer (REST) is a mechanism that enables two applications to interact over the Internet using tools similar to that of a web browser.

The way a web browser works is that when you type in a URL, you are pointing to an address of a resource, in this case a specific set of data. A URL is like a GPS coordinate for information. The browser grabs the data found at the coordinate and formats it for you as a web page. The web page itself is just a representation by the browser of the resource.

REST APIs work similarly, in that they use URLs to identify the location of a resource. But rather than representing the resource through a browser, the resource is represented in a manner that is suitable to the particular application program. Another dimension is added with REST. It uses additional verbs to do things with the resource. The resources can be data or whole applications, or even parts of applications.

An example of a REST API most people can relate to is the API used to call Google Maps. As a user, you typically think of Google Maps as a web or mobile

API service economy

- Banking APIs
- Analytics APIs
- Insurance APIs
- Work Order APIs
- Warranty APIs
- Buyer APIs
- Delivery APIs
- Location APIs
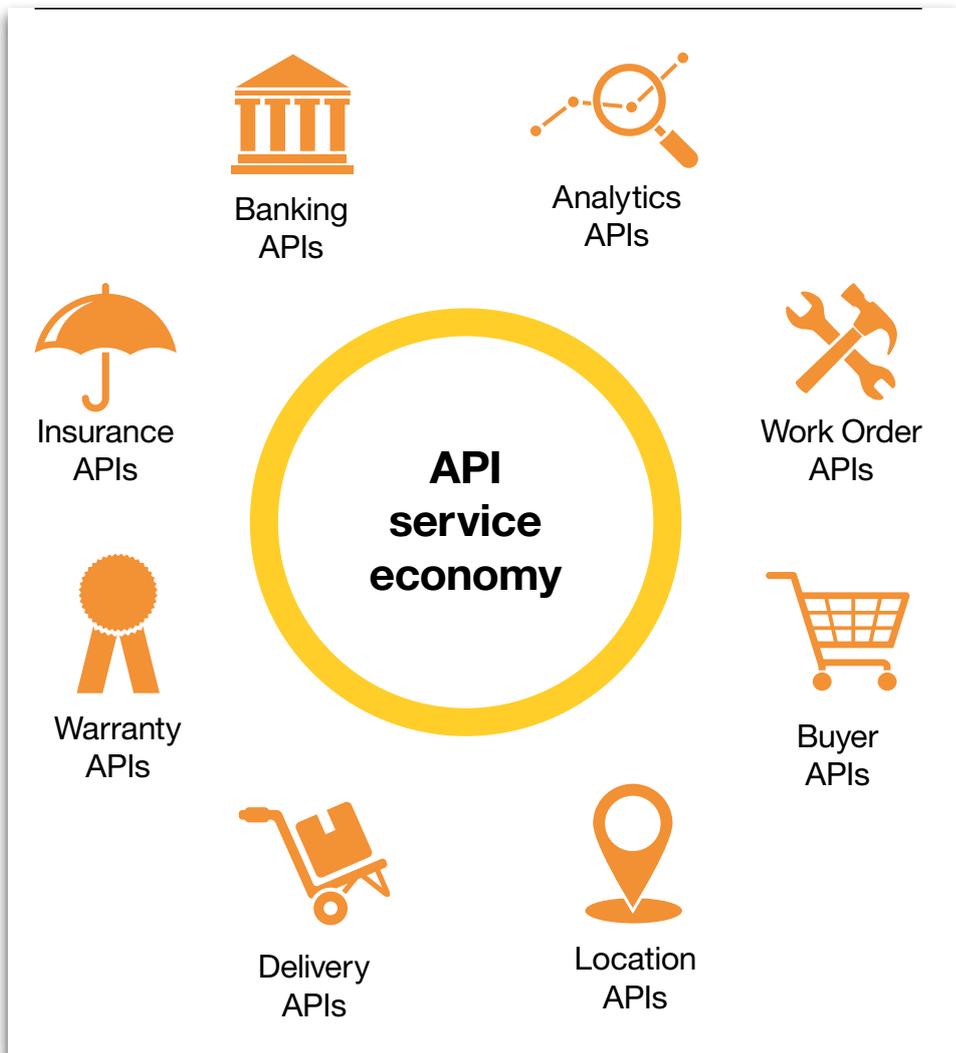
application. But Google also provides Google Maps as an API. Google allows third-party programmers to call Google Maps functionality and to incorporate that functionality into their own applications.

Many apps, today, are assembled from APIs from multiple sources. For instance, cars.com is a website that provides a single point of service for buying, selling, researching, financing, or repairing cars. The company has effectively composed a business that uses APIs from several sources - auto dealers, banks, insurance companies, map providers and an analytics provider.

Vendors can choose to make their APIs available for a fee or free. Google Maps is available to the general public free of cost, or at least you might think the app is free. The reality is that Google has made a deal with you. The deal is that you have given Google the right to your information and in return the Google team is giving you all kinds of free app functions.

Check the fine print on any Google application. Therefore, Google Maps is not really free of cost; advertisers are paying for it. It is a similar business model to television or radio.

But Google Maps is not free for everyone. When a third party incorporates Maps into its own app, the Google team charges for the privilege. APIs that access data are therefore essentially commercial building blocks for the new economy.

APIs that access data can be bought and sold; the role of data and APIs are therefore interrelated. APIs provide a mechanism for accessing data and packaging it up for commercial purposes. Data can be presented in many different ways using various APIs. Raw data can be accessed as a simple query API.

Analyzed data for providing specific insights can be presented as a more advanced API. You can also aggregate data from different points, run new analysis on it and produce new consumable APIs.

APPs USHER IN THE ERA OF THE COMPOSABLE BUSINESS

According to Portio Research, the global market for mobile apps will be worth $63.5 billion by 2017.[1] That is just for paid mobile apps primarily off the Apple App Store and Google Play. Free apps account for 94.5 percent of all downloads[2]. When you factor in the free

apps and consider the fact that most free apps make money using alternative business models such as the Google Maps example, the size of the total market driven by apps is enormous - bigger than the economies of many countries.

In the late 1990s, IBM's marketing team coined a term and ran an ad campaign around e-business, betting that company websites would become as necessary to every company as a logo. Today, the prediction is that mobile apps will become as commonplace for every company as a website. In fact, given the more focused nature of mobile apps versus web apps, developers at companies are more likely to build more mobile apps. Having

The Innovation Economy of data

mobile apps is becoming table stakes for running a business.

Just as cars.com has fashioned a differentiated business by aggregating various APIs into a useful new consumer service, executives at other companies are realizing the power of APIs too. The new apps being developed are not just coming from startups. Traditional business professionals are realizing that they can dramatically refashion their own existing businesses with mobile apps.

The two most differentiating features about mobile apps are:
1. Mobile phones are almost always with people;
2. Mobile phones enable a new class of apps that are based on context awareness.

On the first point, 91 percent of people keep their phones within an arm's reach 100 percent of the time[3]. Therefore marketing executives are realizing that if they want to reach their customers, the most important channel for them is the mobile phone. On the second point, mobile devices come with all kinds of sensors - GPS and WiFi for understanding location, accelerometers for understanding the direction you are going and how fast you are moving.

In addition, mobile devices also include cameras and QR scanners that can provide feedback about the immediate world around you. All of these features give app owners a better picture of the context of the user. Business leaders are realizing that they can dramatically improve their business processes by reshaping themselves with context-aware mobile apps.

Although there are many context-aware apps available, the reality is that the market for new context-aware apps will explode once the last input to the innovation economy story is considered - the Internet of Things.

THE INTERNET OF THINGS AS THE ACCELERATOR

In 2000, IBM's marketing team ran a TV ad called the refrigerator. The ad opened with a doorbell ringing. A woman opens the door and a repairman says, *"I am here to fix your refrigerator."* The woman says, *"My refrigerator? There is nothing wrong with my refrigerator."* The man says *"Not yet."* The ad then flashes to a line that says, *"Appliances that call for help before they break down - they are coming."*

The ad was meant to illustrate that the era of machine-to-machine (M2M) communications was just around the corner. At the time, the IBM team even put together a pervasive computing organization. Unfortunately, the IBM team

was a little ahead of the market on that one, but the prediction was accurate. The era of machines that report back when they need help is indeed coming, and in many industries these machines are already here.

In today's market, people have largely stopped using the term M2M and have instead adopted the term Internet of Things. For years, Internet of Things or M2M had a relatively consistent level of media chatter. But near the end of 2013, that chatter started to pick up and by mid-2014 interest has increased exponentially. The top sources of chatter around the world are South Korea and San José - the centers of gadgetry and technology.

The Internet of Things is currently very popular. There are probably a few reasons for that. Mobile phones are maturing. You are seeing technology companies such as Apple move into new spaces. It is evident with technologies such as Continuity, available with Apple iOS8.

Continuity helps to preserve state across devices. You start a task on an Apple Mac, move to your Pad, later pick up your iPhone and potentially interface with Apple Carplay in your car. The point is that you can interact continuously with a number of things in your world.

It is in this context that is best to view the Internet of Things. People want to be able to interface with their world so that their interactions with devices are not occurring in silos. Technology is supposed to make life easier not harder. The Internet of Things is really the beginning of a system for integrating technology more seamlessly into people's lives.

To make the Internet of Things work, you require open communications protocols that allow for the integration of devices from many sources. You also require the aggregation and analysis of data.

Lightweight open protocols such as MQTT, supported by information technology standards bodies such as OASIS and open source proponents such as the Eclipse Foundation, are putting in place the standards for Internet of Things inter-operability.

But the big advances for Internet of Things will come from the ability to access all of this data and to do analytics on it. It is estimated that by 2020 there will be more than 50 billion things connected to the Internet[4]. Data from Internet of Things devices will eclipse all other data currently available.

As these data sources come online, the potential for the innovation economy will accelerate. But it will be the revolution in developer tooling that will make it happen.

When all of the pieces are put together, you can potentially unleash a vast surge of human creativity. That is when you can start seeing the real results of the innovation economy. **wn**

REFERENCES

1. Mobile Applications Futures 2013-2017, Portio Research, 2013
2. Gartner Says Less Than 0.01 Percent of Consumer Mobile Apps Will Be Considered a Financial Success by Their Developers Through 2018, Gartner, January 2014
3. Fifty Essential Mobile Marketing Facts, Forbes, November 2013
4. Internet of Things, Cisco

5 Mobile App Techniques Hackers Don't Want You to Use

Chief Information Security Officers must adopt new practices when deploying enterprise apps on mobile devices.

The digitalization of business processes and practices is relentless and inevitable. One trend, of interest to both businesses and hackers, is the increasing number of organizations that are developing mobile versions of their enterprise applications for employees and customers.

The mobile environment is evolving and presents new vulnerabilities and threats. App developers lack mobile expertise and tend to apply traditional application development practices to mobile with a focus on functionality, not security.

Why are things different on mobile devices? First, these devices, and any sensitive data they contain, are more likely to be lost or stolen. Second, new attacks are emerging that exploit mobile devices. Malware can be installed on adjacent devices to extract sensitive information. Electronic eavesdropping can intercept data being sent wirelessly between apps and organizations. Hackers can also repackage apps, add malicious code to them, and then reload them to app stores - a tactic that has been prevalent with banking apps.

Listed below are five ways in which Chief Information Security Officers (CISOs) can protect their organizations:

1. Lock down app permissions - Mobile apps interact with a device's firmware and hardware by gaining user permissions, either at the time of installation or during use. Links to a mobile device's camera or microphone can have benefits for the user, but they also increase the risk to security. For business purposes, CISOs should minimize the permissions of each app to the ones strictly required to carry out their tasks.

2. Don't rely solely on client-side checks - User identity and app integrity validation checks should not be performed in isolation by the client. A hacker can easily bypass these checks to access sensitive enterprise data stored in the app. Server-side controls should be used for app authentication. If the information is really sensitive, incorporate behavioral and context checks, such as on the geographical location of login attempts.

3. Look for third-party expertise and always test - CISOs should assess how they can best handle mobile app security. Some businesses will have the internal resources to dedicate to coding security controls, but these businesses are likely to be aggressive, early adopters of technology. For most organizations, internally created security functionality will prove difficult to maintain and evolve. CISOs should consider architecting security code in an externalized way. Some may need to hire a consultancy or cloud service provider. Whether you go it alone, or use external support, always test apps before deployment using a third-party tool for app security testing.

4. Harden applications - Reverse engineering is now a common technique for exposing system details and repackaging apps with malicious code. To help prevent it, start by obfuscating your software code using a third-party tool, which makes it harder for an attacker to understand what an app is doing.

5. Perform regular health checks - Security is an ongoing concern, so perform platform health checks constantly to identify weak spots. For example, you can check whether a device has been "jail-broken" on iOS or "rooted" on Android by looking for evidence that inbuilt app sandboxing has been compromised.

However, keep user privacy in mind, as health checks can be considered invasive as they sit on the boundary of the app to check the health of an overall device. **wn**
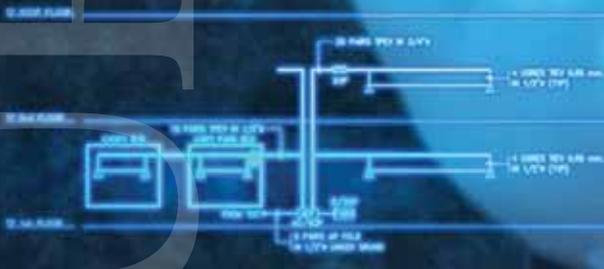
BY I JOHN CONWAY

The Industrial Internet of Things (IIoT) is not about ripping out current automation systems in order to replace them with new ones. The potential lies in the ability to link automation systems with enterprise planning, scheduling and product lifecycle systems. This paper analyses how the linkage can be implemented across the complete enterprise value chain in order to enable greater business control. Experts also offer perspectives regarding key aspects of IIoT deployment.

The Industrial Internet of Things

The emergence of the IIoT megatrend has created both hope and confusion among stakeholders responsible for operating industrial plants. Much of the early hype is focused on the impact of technological advancements on existing automation platforms.

However, one of the challenges in understanding the potential of IIoT is the very large scope of applications. In the area of smart enterprise control, for example, we will see self-organising machines and assets that enable mass customisation. In the realm of asset performance, the collection and analysis of data from increasing numbers of cost-effective and intelligent sensors will increase business performance and asset uptime.

A new generation of "augmented" workers will leverage cutting edge technologies, including mobile devices and augmented reality. With easier access to information across the enterprise, their work becomes simplified and production systems grow more profitable.

Some of these changes can be implemented in the short to medium term, others will require a gradual evolution, with end users and Original Equipment Manufacturers (OEMs) incrementally adding functionality to their existing legacy systems as new international IIoT standards are established.

The IIoT vision of the world is one where smart connected assets (the things) operate as part of a larger system or systems of systems that make up the smart manufacturing enterprise.

The "things" possess varying levels of intelligent functionality, ranging from simple sensing and actuating, to control, optimisation and full autonomous operation.

The smart manufacturing enterprise is made up of smart machines, plants and operations all of which have higher levels of intelligence embedded at the core. The linked systems are based on open and standard Internet and cloud technologies that enable secure access to devices and information. This allows "big data" to be processed with new, advanced analytics tools and for mobile technologies to drive greater business value. This, in turn, enables improvements to efficiency and profitability, increased cyber security and innovation, and better management of safety, performance with reduced CO_2 emissions impact.

While the long term impact of IIoT is at times difficult to predict, three distinct operational environments will set the stage for the smart manufacturing enterprise to emerge.

SMART ENTERPRISE CONTROL

IIoT technologies will enable tight integration of smart connected machines and smart connected manufacturing assets with the wider enterprise. This will facilitate more flexible and efficient, and hence profitable, manufacturing. Smart enterprise control can be viewed as a mid-to-long-term trend. It is complex to implement and will require the creation of new standards to enable the convergence of IT and OT systems.

The Industrial Internet of Things

ASSET PERFORMANCE MANAGEMENT

Deployment of cost effective wireless sensors, easy cloud connectivity (including WAN) and data analytics, will improve asset performance. These tools allow data to be easily gathered from the field and converted into actionable information in real time. This will result in better business decisions and forward-looking decision making processes.

AUGMENTED OPERATORS

Future employees will use mobile devices, data analytics, augmented reality and transparent connectivity to increase productivity. As fewer skilled workers are left behind to man core operations, due to a rapid increase in baby-boomer retirement, younger replacement plant workers will need information at their fingertips. That information will be delivered in a real-time format that is familiar to them. Thus the plant evolves to be more user-centric and less machine-centric.

While these three areas are closely related, and share many inter-dependencies, they also have differences. For example the time scales on which they can be implemented, and the kind of automation market segment that they address, are not the same.

There are two other areas: collaborative robotics and 3D-printing, which are also pertinent to the discussion surrounding IIoT, but these are not discussed in this paper, as they are specific technologies that cannot be applied to all manufacturing enterprises.

SMART ENTERPRISE CONTROL

One of the biggest potential benefits of next generation IIoT systems is the breakdown
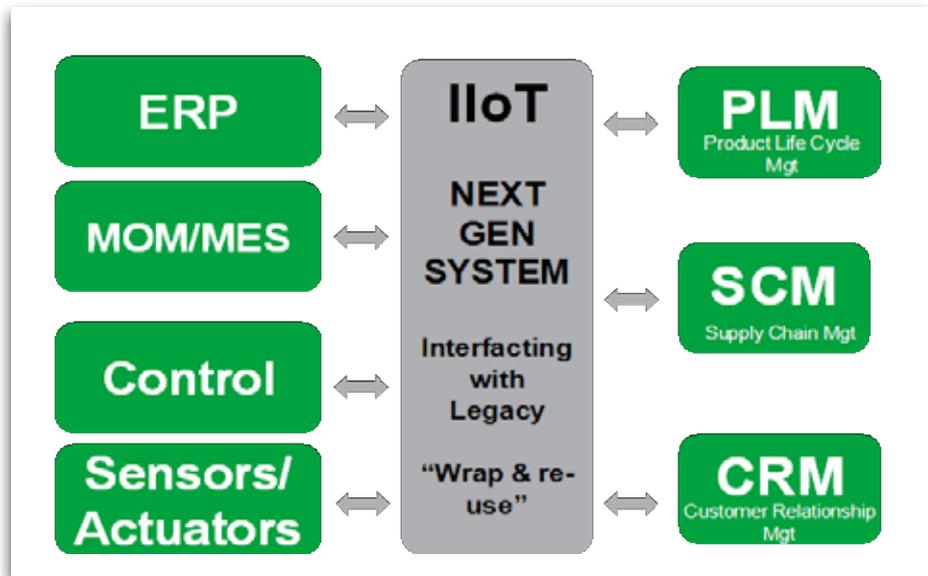

FIG 1: Holistic enterprise control breaks down enterprise silos and facilitates better business control.

of enterprise silos. The technologies will allow for closer integration of production systems and Enterprise Resource Planning (ERP) systems, Product Lifecycle Management (PLM) systems, Supply Chain Management (SCM) and Customer Relationship Management (CRM) systems (see Figure 1). Today these systems are managed somewhat independently of each other, which prohibits a holistic view of the enterprise. It is believed such a holistic approach could facilitate an enormous efficiency gain of up to 26 % for enterprises.

Smart enterprise control does not mean replacing current automation systems with completely new systems. Instead, it implies the connection of current automation systems with enterprise, lifecycle and value chain systems. This optimises the entire manufacturing enterprise and enables a much greater degree of business control. Tighter integration will allow enterprises to not only be more efficient, but also more profitable thanks to greater flexibility and responsiveness to volatile

market conditions. The notion of control will expand from the real-time control of a physical parameter, to the right-time control of the whole business, including both physical and non-physical parameters. Benefits will include the ability to enhance protection against cyber threats, more innovation, and the ability to better manage safety, performance and environmental impact.

Examples of smart enterprise control include the following: mass customisation and lot sizes of one, reducing the size of product recalls, detection of defective products earlier in the manufacturing process and modification of product design to eliminate root causes, modification of production planning based on weather forecasts, modification of production plan/recipes based on the spot price of raw materials.

ASSET PERFORMANCE

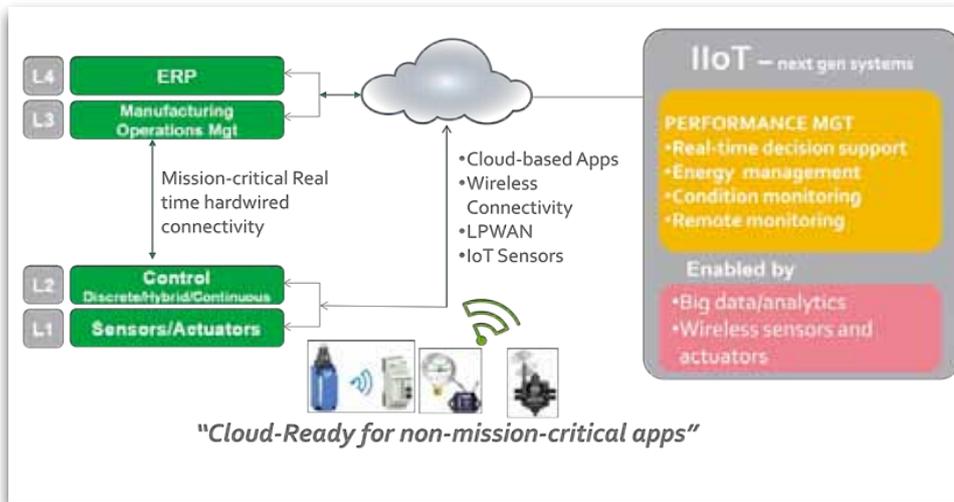Asset performance management applications such as energy management

Figure 2: Asset performance accelerates the adoption of new performance management applications leveraging big data and analytics, and cost-effective wireless technologies.

Today, operators only have access to information from automation systems. Tomorrow, augmented operators will access information from all of the needed enterprise systems and will manage not just process performance/efficiency, but also process profitability.

BARRIERS TO ADOPTION

Several barriers will need to be overcome before next generation IIoT systems are widely adopted across manufacturing industries. These include the establishment of industry standards around IIoT, cyber security protection, and workforce adaptation to new sets of skills.

and predictive maintenance are not new to industry, but have had limited uptake due to the cost of implementation. The costs of physical connectivity (the cost of cabling to the sensors) and logical connectivity (integration with existing systems) have been prohibitive. Wireless IP connectivity and cloud-based architectures now overcome these cost barriers. In addition, a new generation of simple, small and low cost sensors is emerging; As a result, next generation IIoT systems will deliver innovative solutions in the area of asset performance (see Figure 2).

Consider the example of condition-based monitoring/predictive maintenance. Much money is wasted maintaining equipment that doesn't require maintenance, or by neglecting equipment that subsequently fails and causes unanticipated production downtime. Solutions such as condition-based monitoring do exist today, but uptake has been limited by cost. Next generation IIoT systems promise to significantly reduce implementation costs for such solutions.

AUGMENTED OPERATOR

The use of mobile Human Machine Interface (HMI) technologies such as smart-phones, tablets and wearables, combined with IP-access to data and information (analytics and augmented reality) will transform the way operators work. Portable wireless devices will expand their capabilities and technologies such as dynamic QR codes will improve the operator experience and render the "augmented" operator more productive (see Figure 3).

STANDARDISATION

Standards are required to allow smart connected products, machines and assets to interact in a transparent fashion. This goes beyond the simple communication protocols, and involves the creation of standard semantics and mechanisms that will allow smart devices to discover each other and interoperate. Some standards, such as PackML, do exist in this area, but they are incomplete and do not cover all aspects of manufacturing. The Industry 4.0 and the
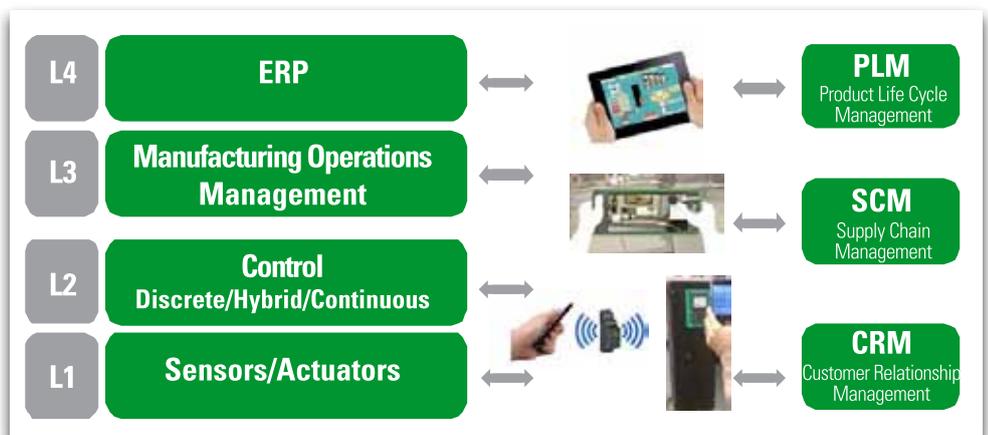

FIG 3: Augmented operators are more productive because they receive the right information at the right time

The Industrial Internet of Things
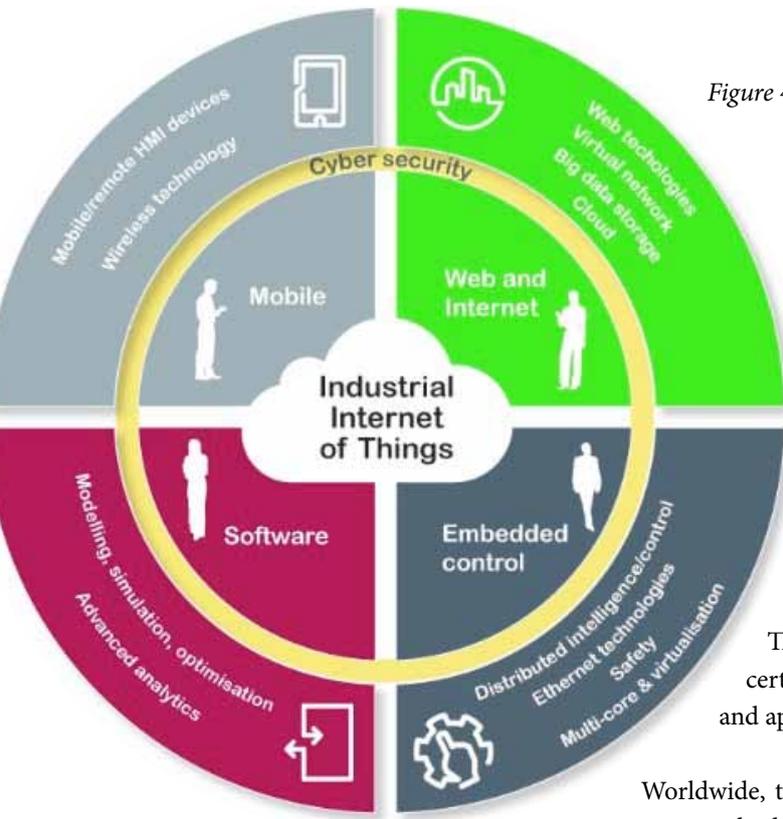
Figure 4: Many new skills will be required to design and operate IIoT systems.

Industrial Internet Consortium initiatives are currently addressing the question of standardisation.

CYBER SECURITY

The advent of the IIoT is accelerating the need for cyber security in industrial control systems. The complexity of IIoT will mean that cyber security must be designed into the components that make up the automation system.

The adoption of industrial security standards with certification will be essential to the advancement of IIoT because it will ensure the security not just of individual assets but also of the larger systems and systems of systems. These certifications will play a role similar to those which occur in the realm of safety certifications. Adherence to the certification means that the elements of a system hold the key security building

blocks. The elements are combined in a secure way by security certified teams and are operated as a secure system by security trained operators.

The key to security certification is consistency and applicability.

Worldwide, the IEC62443 series of security standards covers all elements of security from product development through to product features, system features, delivery and operation.

It is important to note that while today some independent bodies offer certification to IEC62443, IEC itself has not yet endorsed any of these bodies for IEC62443 certification.

Complementary to IEC62443 security standards, existing industrial standards are also evolving to be more secure. DNP3 has evolved to DNPV5 to add security, OPCUA offers significant security enhancements, Modbus is evolving to Modbus Secure, EtherNET/IP is becoming EtherNET/IP Secure.

In addition many IIoT systems are adopting security features derived from existing IT standards such as HTTPS, certificates, and encrypted/authenticated protocols.

WORKER COMPETENCIES

The skill-sets required to design and operate an IIoT-based system are somewhat different from those needed to run a classical automation system (see Figure 4). A significant amount of re-training will be required for existing operators and maintenance staff to manage such systems. The good news is that the IIoT systems will use technologies that are familiar in everyday life, and the new generation of young operators will have no problems adapting to this new approach. The main challenge for automation suppliers will be to design and supply diagnostics/debug tools that can rapidly identify the root cause of problems. This will ensure that a malfunctioning or downed system can be restored quickly.

INFORMATION DRIVEN ARCHITECTURES

As smart manufacturing enterprises start implementing smart enterprise control and asset performance systems managed by augmented operators, automation vendors will respond by implementing IIoT at all levels of the automation hierarchy. This will allow easy integration with next generation IIoT systems. In addition, with the increasing power of embedded electronics, connected intelligence will migrate down to the lower levels of the automation hierarchy – to the control level and to the sensors and actuators. As a result, operations technology (OT) systems will merge with information technology (IT) systems and the automation hierarchy will evolve to

A ONCE IN A LIFETIME OPPORTUNITY FOR A YOUNG PROFESSIONAL FROM SOUTH AFRICA TO VISIT GERMANY WITH THE IEC IN OCTOBER 2016

IEC YOUNG PROFESSIONALS' 2016 WORKSHOP

The South African National Committee of the IEC along with the South African Chapter of IEC Young Professionals is offering young professionals the opportunity to attend the 7th IEC annual workshop for Young Professionals in Frankfurt, Germany from the 10th – 12th of October 2016.

Who can apply?

► Young professionals (early 20s to mid-30s)

► Managers, engineers or technicians

► Those working for a company or institute in SA which uses or contributes to electro-technical standards

Why attend?

► Participate in a dedicated workshop that provides an introduction to the IEC, its standardisation processes and conformity assessment systems

► Networking opportunities with professionals from all over the world

► Platform for long-term involvement in the international arena of the IEC

► The opportunity to experience the 80th IEC General Meeting

► An invitation to attend a technical meeting where international standards are developed

To be part of the selection process, please complete our online screening questionnaire: https://www.surveymonkey.com/r/9C6PD7L

Entries close 22 April 2016. Shortlisted candidates will be invited to write an entry essay. All those who participate will be invited to the South African Chapter of IEC Young Professionals annual seminar in May 2016 where the winners will be announced.

Please connect with us on Facebook and LinkedIn to stay up to date.
http://www.facebook.com/IECYPSouthAfrica/
https://www.linkedin.com/groups/7441602

Here's what the 2015 Young Professionals from South Africa had to say…

"For me the most valuable thing about the Young Professionals workshop has been the networking opportunities. I've managed to meet my counterparts in various different countries and those are great industry contacts that I'm sure to use in the future. We'll be able to call on one another in our day-to-day work."
Zoë Lincoln, Eskom Holdings SOC Ltd.

"The IEC YP Program provided the exposure required in understanding the process of developing international standards. This program is one of the buildings blocks towards long-term involvement within the IEC which helps in technology development and staying ahead of global trends in the industry.
Sagar Dayabhai, Consolidated Power Projects (CONCO).

The Industrial Internet of Things

be a much flatter and more information-driven architecture. Since the future implications of this are still unclear, the technologies and architectures employed must be flexible, adaptable to change and capable of integrating with legacy systems. The monolithic, single-source, hierarchical approaches and architectures of the past will not work in the future.

The information-driven topology is shown below in Figure 5.

Figure 5: The information-driven automation architecture

The architecture consists of two distinct layers. Information flow across both layers will be transparent using semantics and discovery mechanisms based on industry standards. Both layers are explained below:

1. A time-sensitive layer for real-time deterministic control. This layer is often referred to as "fog" or "edge". However using the term "time-sensitive IP-based" for this layer underlines the fact that the technologies included in this layer are fundamentally the same IIoT technologies used in the enterprise cloud layer, but are optimised for real-time deterministic communications.

The OT devices that comprise this time sensitive layer (sensors, actuators and controllers) will be cloud-ready and capable of interfacing transparently with the IT business systems of the second layer. Those same devices will also have a high degree of intelligence. Consider the example of control valves with embedded temperature, pressure and acoustic sensors.

They are able to operate autonomously using set points from the enterprise, determining their own needs for preventive maintenance, and informing the maintenance department of their condition in a timely manner.

2. A cloud enterprise layer where enterprise systems (ERP, MOM, PLM, SCM, CRM, etc) and next-generation functions including asset management and energy management interoperate with each other and with the time-sensitive cloud-ready systems.

The use of the term cloud above refers to the technologies used, rather than the physical location of the infrastructure. There are many reasons to believe that,

in the industry automation business, "on-premise" clouds (commonly referred to as "edge"), will be the most widely used architecture.

CENTRALISED VERSUS DISTRIBUTED CONTROL

The arguments for highly centralised redundant control systems versus highly distributed control systems have gone on for many years. Proponents of each architecture fiercely defend their position with valid arguments.

The advent of IIoT does not resolve this long-standing debate. On the one hand, the use of cost-effective embedded electronics in field devices argues for more distribution of intelligence and control. On the other hand, the high speed IP-connectivity of field devices enables a more centralised architecture where all the sensors and actuators are connected to a highly redundant and powerful multi-core processor located in a secure on-premise data centre.
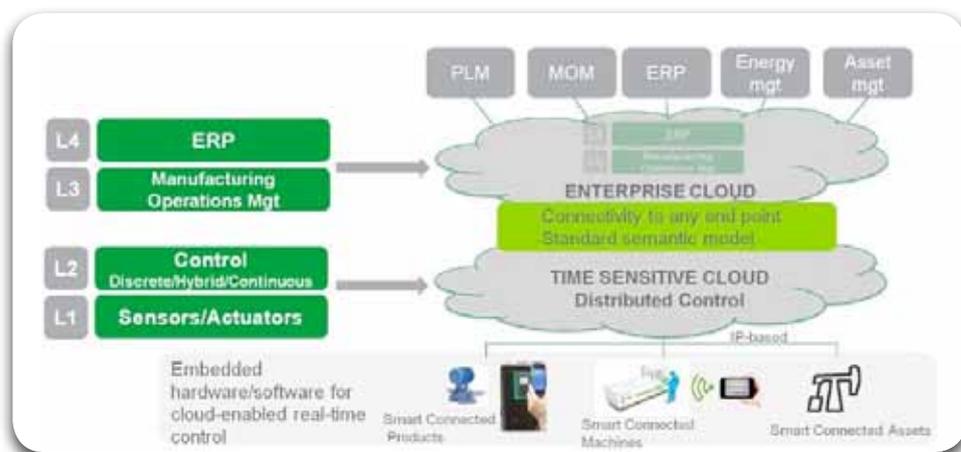
Today an application is programmed with a particular hardware target in mind, for example a PLC. Tomorrow, an application will be programmed independently of the underlying automation hardware, and the system will distribute the application transparently to the hardware, configuring all communication mechanisms automatically. This approach will allow users to choose either a highly centralised or distributed architecture, or a hybrid approach based on their specific requirements and concerns. A Distributed Control Standard (IEC 61499) exists that will facilitate this work and which can be used as the basis for an IIoT distributed control standard.

The distribution of intelligence into the field will allow smart connected products and smart connected machines to publish important information in a standardised format. Intelligent brokers will make this information available in a transparent manner to the systems and applications that require it. This approach will overcome one of today's current challenges: the location of information is unknown and therefore cannot be discovered or exploited without custom programming.

NETWORKED AUTOMATION ARCHITECTURES

Networks will see an exponential increase in the number of smart connected devices. These devices will exploit a time-sensitive IIoT/Ethernet backbone to interoperate with each other and with devices residing in other enterprise systems,

An example of the sheer number of connected devices can be seen at the Torresol Energy Gemasolar solar power plant where 4000 Schneider Electric PLCs/drives are connected via Ethernet to control the displacement of solar mirrors.

The large number of networked devices presented many new challenges not only in the area of network management and performance but also in the area of managing the overall configuration of the distributed control system and its application software.

Implementing such large networked systems with today's classical automation techniques is complex. Tomorrow's IIoT-based automation systems will require a new approach to simplify the design, the management, and the maintenance of networked automation architectures.

IIoT is often described as a revolution that will change life as we know it. In the areas of consumer goods, building management and others there is some truth to this.

However, across industry, IIoT will be applied more slowly as different sectors of the industrial markets evolve their specific needs and address their unique challenges. wn

The natural way to optimize performance, across the grid

Envirotemp™ FR3™ fluid is a renewable, natural ester dielectric fluid uniquely formulated to optimize transformer performance and enhance overall grid efficiency.

FR3 fluid increases load capability up to 20%, extends transformer life and improves fire safety – enabling utilities to significantly minimize cost/risk and maximize operational efficiencies.

The high-performance, fire safety and environmental characteristics of this fluid enables utilities to optimise transformer performance and gain cost efficiencies. Increase load capability up to 20% by taking advantage of the high temperature capability of Envirotemp™ FR3™ fluid.

IMPROVE PERFORMANCE
- Uses up to 15% less fluid and up to 3% less construction materials
- Increases load ability up to 20%
- Increases reliability
- Twice the fire and flash point as mineral oil significantly increases fire safety for workers and the community

GAIN COST EFFICIENCES
- Slows asset replacement
- Reduces routine maintenance
- No need for fire mitigation systems
- Potentially reduces insurance premiums due to increased fire safety
- Minimize need for concrete basins
- Supports supply chain sustainability
- Optimizes inventory management

Envirotemp FR3 fluid is a natural ester fluid derived from renewable vegetable oils – providing environmental benefits that are superior to mineral oil and unsurpassed by any other dielectric coolants.
- Ultimately biodegradable as designated by the EPA;
- Reduced carbon footprint – 56 x less carbon emissions than mineral oil;
- Non-toxic – Contains no petroleum, halogens, silicones or sulfurs;
- High saturation point removes water from the insulating paper; and
- Maintains dielectric strength in cold temperatures.

High Fire Point Delivers Unsurpassed Fire Safety FR3 fluid possesses a 100% fire safety record making it the ideal choice for transformers positioned indoors, underground, and in close proximity to buildings and other equipment:
- Prevent costly replacements due to fires
- No fire mitigation or deluge systems required
- Exceptionally high fire and flash points of 360°C and 330°C, respectively
- Highest ignition resistance of any high fire point dielectric fluid available
- FR3 fluid is FM Global Approved and Underwriters Laboratories classified as a Less-Flammable Dielectric Liquid.

$$life(T) = A \cdot e^{\frac{15000}{T+273}}$$

Envirotemp™ FR3™ uid: $A = 7.25 \times 10^{-17}$
Mineral Oil: $A = 9.8 \times 10^{-18}$

Per Unit of Normal Life vs. *Hottest Spot Temperature (°C)*
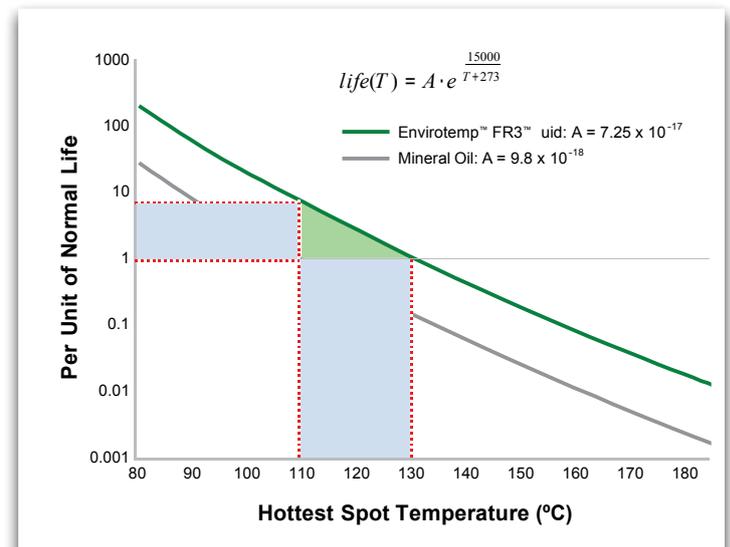
Unit Life vs. Hottest Spot Temperature
FR3 fluid gives utilities the ability to increase overload capacity up to 20% or extend asset life. This results in significant cost savings over the life of each transformer.

APPLYING DevOps THROUGHOUT THE DEVELOPMENT LIFECYCLE

5 Vital steps for successful software delivery in a chaotic world

Delivering applications that meet the needs of the business can be a challenge in a complex business climate that is constantly changing. Diverse, multiple heterogeneous environments are the norm, all of which must be maintained and deployed.

COMPILED BY I MINX AVRABOS

Multiple tools and technologies connect, support and create work. Processes are inconsistent, which contributes to difficulties with end-to-end lifecycle governance.

Waste, rework and technical debt abound. At the same time, organisations are striving to be leaner by eliminating tasks that do not add value, and by preserving existing IT investments. Woven throughout almost every one of these challenges is the need for speed and innovation, while balancing quality and cost.

If you have found yourself in this complex, chaotic world, what should

you do about it? What improvements should you consider? What practices should you have in place? This paper covers five steps that can help you address today's challenges, and deliver software that yields better business results.

A CHANGED LANDSCAPE

The current IT landscape has moved from one characterized by monolithic applications with infrequent update cycles. Today's environments are characterized by frequently updated system-of-engagement applications. Delivery has shifted from updates that occurred once or twice a year for system of record applications (for example,

billing systems) to building, testing and deploying system-of-engagement applications as often as daily. These web and mobile applications that engage users have a dramatic effect on the business, and are critically important to capturing market share. In addition, they have created the expectation for system-of-record applications to be rapidly enhanced with innovative capabilities.

As a result, the business expects IT to act with speed and flexibility and release all types of applications faster. Balancing speed of delivery with improving quality, reducing cost and minimizing risk, and engaging the customer early, and often for feedback, becomes imperative. Several factors that define the IT environments of today make this a significant challenge.

Successful Software Delivery

Development, infrastructure, and operational environments are more diverse and complex. Your organisation must develop for many platforms and then support them, including distributed, mainframe, mobile and cloud. The norm is multiple investments in technology and tools from many commercial software vendors, and open source solutions, to deliver applications that run on these platforms. On the positive side, this approach puts the right tool in the hand of the right role. On the negative side of this diversity are competing internal tools that overlap, in capability and functionality. Typically, this diverse environment is also connected by brittle point-to-point integration, that is costly to maintain, and does not scale easily. Companies are reluctant to "rip and replace" their investments for sole sourcing to address integration challenges, and barriers to effective communication, collaboration and connection. A platform that enables the various delivery team roles to collaborate, integrate their activities and key data elements has become essential.

Managing the software delivery lifecycle as a true end-to-end supply chain becomes more difficult as time goes on. Diverse tools and technology stacks are certainly contributing factors here. Combined with organisational silos, diverse tools tend to produce information in multiple applications and repositories.

As a result, complete traceability and governance of the flow of information from business planning, release planning, requirements, design, development, test and deployment seem almost insurmountable. Everyone from producers to consumers of information encounter poor hand-offs and long waits. Key

information is often missing, or is error prone, because communication is hindered by the organisational silos. These issues are magnified as the delivery ecosystem spans global regions, and third party subcontractors or partners. A platform that enables collaborative management of workflow and information, and makes it easier to apply the necessary governance, is needed.

A disconnect between Development (Dev) and Operations (Ops) teams is another contributing factor to today's challenging software development environment. The DevOps movement addresses this need and area. DevOps arose from the desire to have these two groups work together, even though their measures and focus differ. Development teams focus on speed and change, and operations teams focus on stability. These teams typically have a mix of processes that defines how applications are planned, coded, tested, built, deployed and delivered to production systems. Generally, these processes have different levels of maturity, and are applied in techniques that range from manual and on-demand, to advanced automation.

If an organisation is operating with more manual processes, it can experience inconsistencies that result in higher incidence of errors, wasted work and prolonged wait times. This impacts delivery speed. And lack of reliable, repeatable process standards can have an effect on operating efficiently to scale. Areas that are targets for process automation are code construction, test, build and deployment. The organisation standards should be documented and institutionalized with configurations defined and managed by automation. An organisation can achieve

benefits by applying proven DevOps practices that can lead to improved enterprise scalability.

Managing the changes to code and configurations through development, staging, user acceptance and production environments is another software delivery issue. Many organisations struggle with the contention for these environments, and the lengthy ordering and provisioning processes to set them up. More "production like" environments that can be controlled and serviced by the development team can add value, eliminate waste and speed delivery. Creating such environments can eliminate risk because more errors can be found well ahead of production deployment, when they are less costly to fix.

Despite these factors, the challenge of software delivery in today's changed IT landscape can be overcome. Five vital steps can help you adopt DevOps, improve your execution and deliver high quality software for better business results.

STEP 1:
ESTABLISH A COLLABORATIVE PLATFORM

As mentioned previously, today's software delivery environments are characterized by silos of teams and stakeholders plagued by disconnected communication. This communication breakdown can dramatically affect the ability of software delivery to function as an end-to-end business process. Communication challenges can result in deliverables that must be reworked, which can add costs and delays.

A collaboration platform breaks down the silos and provides a way for groups of

Since 2006, we have been involved as consulting electrical engineers across a broad spectrum of projects. These include housing estate reticulation, office buildings, warehousing, shopping centres, automobile dealerships, training facilities, and emergency generating systems, to name a few.

DEDICATED TO DESIGNING YOU A
SAFER GREENER ENERGY EFFICIENT FUTURE

With a combined 60 years experience, we have developed a niche in various key projects in the electrical and construction industry. We are dedicated to provide the technical skill and service you deserve.

T 011 011 679 3481   **F** 086 537 3589   **E** wayne@bergmanfisher.co.za

BERGMAN FISHER ASSOCIATES (BFA)
CONSULTING ELECTRICAL ENGINEERS

Successful Software Delivery

individuals to work together toward the goal of improved software delivery. Without a common platform to share ideas, plans, activities, tasks, work items and status, the software delivery process can encounter significant delays.

Communication difficulties between stakeholders can also cause other issues, such as:

- Poor artifact handoffs. Key deliverables are produced but are not readily available to others. These artifacts can be in different repositories or not moved through the lifecycle efficiently. They become difficult to locate, which creates delays that affect delivery speed.
- Stale information. Information is out of date, not updated in the context of work being done or maintained outside the software delivery process. An example of this is when project plans are not updated in real time based on software delivery activity.
- Out of context discussions. Important information is exchanged outside the context of work being done. This exchange can lead to inadequate feedback and negatively affect the timeliness of deliverable review, which then affects quality. An example is the use of email. Email requires scanning through inboxes and remembering to copy everyone on important correspondence.

STEP 2:
CONNECT YOUR INVESTMENTS

IT environments today are heterogeneous. They are a result of investments in different kinds of tools. Some of these tools were internally developed, others are from one or more commercial vendors, and still others are open source solutions. A common goal is to assemble these investments into an integrated lifecycle solution. However, the diversity of applications can hinder the DevOps and Application Lifecycle Management (ALM) efforts aimed at integration and traceability. Each tool might have different Application Programming Interfaces (APIs), and some might be proprietary. Data is often stored inside the tools or in multiple repositories. Several approaches can solve this integration challenge.

One integration choice is point to point. In this scenario, each functional integration path is a custom bridge to the data needed or is moved by an understanding of each API involved. These architectures can be brittle and difficult to maintain or scale.

A better method is to keep the data where it is created and stored and link to it. Developers can reference information and use it to their advantage while staying in their tool of choice. The linked data approach is implemented as documented in the Open Services for Lifecycle Collaboration (OSLC) initiative. OSLC provides the community and the specifications for providers and consumers of lifecycle data.

After you have established your collaboration platform, you can build on it by connecting your preferred tool investments to create an end-to-end lifecycle delivery solution.

STEP 3:
IMPROVE THE SPEED OF APPLICATION DELIVERY

The agile movement gained traction by providing a workable alternative to the challenges of traditional waterfall software development processes. These processes relied on rigid plans with hard transition dates. This approach worked well for years when software was less complex and more importantly based on relatively well-defined and understood requirements.

In today's world, developing complex applications can start with what might be termed high-level use cases or even just ideas rather than well-defined requirements. These requirements are not well understood, evolve as the software is being developed and in some cases are refined based on what the developers produce. This requires constant collaboration between the business stakeholders and development team, along with rapid iterations. In these iterations, small pieces of capabilities are developed, tested, deployed and validated with the customer to get feedback for refinement toward a complete application. This method, based on lean thinking, is the essence of agile development.

As agile development entered the mainstream and evolved, the need to extend these lean principles to the entire set of stakeholders in an application development project became evident. This led to the evolution of the DevOps movement, whereby development and operations began to work together to remove barriers and improve collaboration and communication. The principles of DevOps now include the entire application delivery team and encompass ALM processes. As a result, the entire process is more "lean," that is, more efficient with reduced waste.

Establishing a common collaboration platform integrated with deployment automation tools provides the ability for
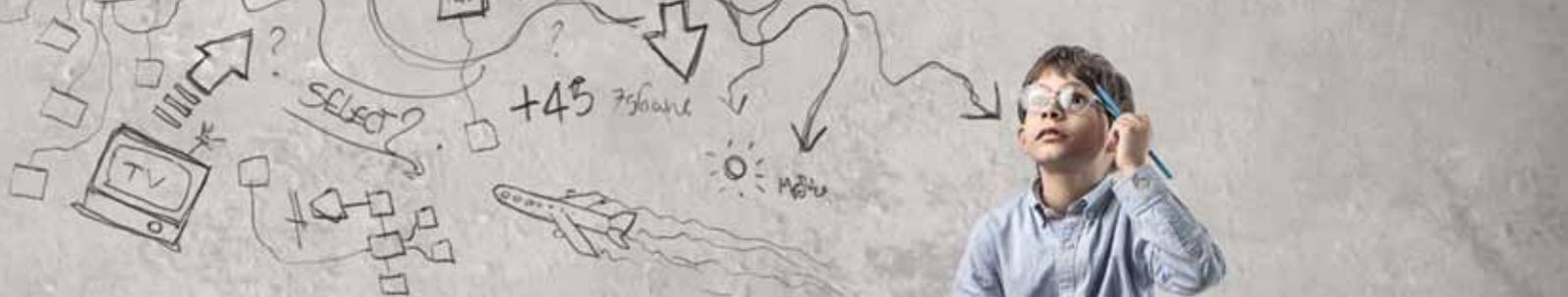
development, Quality Assurance (QA) and operations to collaborate with one another throughout the delivery lifecycle. One of the key concepts in DevOps is "shift left." This concept promotes the shift of operational concerns to earlier in the development cycle. A collaborative platform that includes development, QA and operations enables these teams to establish common goals and communications right from the beginning of the development cycle. Operational concerns are visible sooner and are made available to developers and vice versa.

STEP 4:
STRIVE TO GAIN CUSTOMER FEEDBACK EARLY

A critical component of agile development and DevOps is the feedback loop from all stakeholders who are further "right" in the delivery lifecycle and from customers or customer surrogates. To obtain the full benefit of DevOps principles, the feedback needs to be continuous throughout the delivery lifecycle. QA should be communicating with development.

System testers and system integration testers should be communicating with QA and development. All relevant feedback should go to the business stakeholders. The goal of this rapid feedback is continuous improvement of:

- The application being developed
- The operational efficiency of the environments being delivered, where applicable
- The process of delivering the application itself

Often, customer feedback, which is a critical part of this loop, is overlooked or addressed very late in the process, such as after a release. However, making

customer feedback part of the continuous information f low drives greater efficiency and effectiveness, which can lead to an overall increase in the business value of the software. When collaboration is not limited to one side but occurs throughout and beyond an organisation, the result is a connection between business and delivery. This connection enables teams to respond quickly to changes, mitigate risk early and adjust priorities as appropriate. Management, development communities and customers are properly engaged, which increases the levels of control and agility in development cycles.

A record of customer needs combined with establishing and communicating priorities can ensure that the right requirements are being addressed at the right time and thereby reduce rework. Customer issues and concerns are therefore identified more quickly and easily, and more stakeholders are involved in the resolution process.

Other than general feedback from testing and from observations of customer usage models, higher value reviews, comments, ideas and opinions can be gathered with A-B testing, application instrumentation and customer sentiment measurement.

The end result is the successful delivery of software that is driven by business needs rather than reactions to errors in earlier applications and versions. Releases can be planned and are predictable because few surprises occur, and project teams can resolve an issue before many customers even notice one exists. Organisations can provide differentiated and engaging user experiences that are based on customer input, which builds customer loyalty and increases market share.

STEP 5:
STANDARDIZE YOUR PROCESSES

One of the key values of adopting DevOps is that it represents a start in standardizing processes throughout the entire enterprise. Most large enterprises adopt standard processes for their key types of projects.

These processes are typically at a high level and the project teams adapt them for their individual needs. In some cases, such adaptation is at a very low level, such as for deployment processes or work item or task management. Although they adhere to the broader process guidance, these lower level adaptations can differ enough to require teams to spend time learning and adopting them.

Process standardization reduces the delays and learning curves associated with lower-level process differentiation, which can enable improved productivity and more effective software delivery projects.

Documenting these processes and automating them further improves productivity. When teams have standard processes they can follow and tools that automate error-prone tasks, they can be more efficient. In addition, process standardization and automation can result in less waste and fewer delays that are caused by errors or rework.

CONCLUSION

Over the last 25 years, developers and specialists have developed best practices that are based on common experiences. Real-time collaboration, visibility in the context of the work at hand, automation and process control enable ALM and DevOps from initial requirements definition to release management and beyond. **wn**

IN MY OPINION : JOHN LOVELOCK

The Internet of Things is Shifting Hackers' Targets

Thwarting new threats requires new tools and techniques.

BY I   JOHN LOVELOCK

arents have always worried about their children choking on a small part of a toy, but there are new dangers to worry about with the next generation of toys. Many kids' toys today are smart toys connected to the home's network, through which a hacker can gain entry into the family's home.

Once in control of a toy, a hacker will have access to smart TVs, mobile phones, computers, tablets, gaming systems - literally everything that is connected to the home network. And these devices aren't always safe. In fact, many of them leverage the cloud for security. The device's security is also tied to, and reliant on, the security of the manufacturer's use of cloud and software as a service (SaaS) offerings.

For those thinking this is a far-off scenario, it's not. There are examples of recent Internet of Things (IoT) breaches, such as compromised dolls, or the VTech data breach that exposed the personal data of 12 million people,

including 6.4 million minors. In each of these cases, the privacy of children has been called into question.

New "things" being deployed everywhere are exploding the attack surface. Gartner forecasts that 6.4 billion connected things will be in use worldwide in 2016, growing to 20.8 billion by 2020. In 2016, 5.5 million new things will get connected every day.

The IoT is creating a tremendous digital business future where interactions between things we wear, touch or utilize become integrated into the digital business fabric. As IoT grows, security risks grow with it.

Many good security tools and techniques are available in the market today, but the new threats can't be conquered with old tools and techniques. Your new security opponent will be a smart machine, so your new defender must be an algorithm. In the information security market, providers continue to improve their products through

greater intelligence awareness, with analytics-focused user interfaces that have the ability to quickly draw parallels between threatening activities, and the use of machine-learning algorithms to classify and detect strange or threatening behaviors.

As the need for enhanced security grows, the security market will experience continued, and relatively strong, growth. Enterprises will continue to grapple with securing cloud and SaaS environments. Many companies have augmented, or are in the process of augmenting, their capabilities to deliver greater cloud and SaaS support. Business-to-business intelligence sharing

is emerging with threat intelligence platforms. These new solutions help simplify collaboration while enabling sharing intelligence about threats.

However, the area with the strongest growth is IT outsourcing because many organizations are facing a skills shortage as they deal with the threats within their environments, as well as the compliance risks they face.

Regardless of the tight information security resources, they must still properly defend themselves against the rapidly evolving threats.

Discovery of devices, and provisioning new and maintaining security of existing devices will be paramount. Authentication services for emerging IoT devices and protecting the data they interact with will be instrumental.

IoT cannot be secured if security management personnel are unaware that the devices are part of the enterprise ecosystem. Protecting endpoints will be very challenging without an automated means to initialize and maintain all the new, diverse devices with secure configurations and security capabilities. **wn**

WATT?

EXPERT INDUSTRY ADVICE

ATT? is a forum related specifically to the industrial and commercial electrical sector.

Do you have any burning questions, topical issues or points of interest about the electrical industry, from the perspective of a contractor, supplier or professional service provider? Submit your comments, thoughts, ideas, suggestions or questions for the attention of our industry experts, and these will be addressed in a future issue of the magazine. This is your forum, and we would like to hear from you!

The rapid pace of technological change and product development is a global trend that affects entire economies. We may have access to more information than ever before, but is this information readily understandable? Does it give us insight into the fundamental issues? Is it precise and based on technical clarity?

WATT? is an opportunity for people on the ground to engage with each other and related professionals in an informative and friendly manner. This is a platform for you to discuss anything related to your particular sector, to highlight anything new, or to ask a specific question related to a technical topic or to engage in general industry issues. . Please note that we will not be considering anything related to the domestic sector, such as residential wiring.

We hope that this section of the magazine not only becomes a regular feature, but that it is widely read and distributed among your peers. Remember, it can only become a success with the full participation of our readers! Send your burning questions to minx@saiee.org.za - subject 'WATT?'.

We look forward to hearing from you.
- *Ed*

QUESTION ONE

Why are there so many different medium voltage (MV) variable speed drive (VSD) technologies whereas low voltage drive technology is basically the same?

ANSWER ONE

When most MV VSDs available on the market today were developed the limitation was the power semi-conductors. This restricted the designer of a MV VSD to using the devices that were available at the time. This would be either MV thyristors or LV semiconductors mounted in series.

Low voltage (LV) VSDs essentially use the same components and technology across manufacturers. The evolved technology utilises diodes in the rectifier and Integrated Gate Bipolar Transistors (IGBTs) in the inverter. These are considered the most cost effective, efficient and robust devices on the market and are therefore used commonly throughout all LV VSDs.

On the other hand, MV VSDs were developed using the best technology available at the time. Today, MV semi-conductor technology is still developing and has not yet arrived at the point where there is a single common technology standard. This has resulted in a situation where some MV VSD technologies use previous generation semi-conductor devices such as GTO thyristors or low voltage IGBTs in series.

The evolution of MV semi-conductor technology does mean, however, that as new designs become possible manufacturers are able to improve and/or update their MV VDS designs.

During the last five years or so it has become possible to manufacture a MV VSD that is essentially the same as the LV VSDs, i.e. diodes on the input and IGBTs (not connected in series) on the output.

QUESTION TWO

Are all MV VSDs voltage source inverter (VSI) design?

ANSWER TWO

No. While this is the case with LV VSDs, it is not so with MV VSDs. There are some

current source inverter designs available for MV VSDS. While these devices with a current source inverter design are suitable for certain applications their use is generally restricted to those not requiring a constant torque load or not needing a quick torque response, typically pumps and fans.

An example of an unsuitable application would be MV VSDs used in a steel rolling mill where the process demands a rapid torque response. In this application a current source inverter would not be suitable as the inherent characteristics of the large inductor used in the VSDs' direct current (DC) link would not facilitate the requisite change in torque.

QUESTION THREE

Harmonics can be an issue on LV VSDs. Is this also the case with MV VSDs?

ANSWER THREE

On MV VSDs great care must be taken to mitigate harmonics. This is because MV VSDs are always high power and therefore the effects of the harmonics are much greater than on the relatively smaller LV VSDs.

There are two ways in which to mitigate against this. One would be to use an active front end or regenerative inverter. The other option would be to use a phase shift transformer. Both are effective in reducing harmonics but have various advantages and disadvantages.

The advantages of an active front end are its inherently regenerative capability and that it can be connected directly to either 3.3 kV or 6.6 kV.

The disadvantages of the active front end are that it introduces more semi-conductors with subsequently increased losses. This therefore makes it less efficient and less reliable. An active front end is also sensitive to line fluctuations.

The advantages of a phase shift transformer are higher reliability and the ability to connect to virtually any network voltage as well as simplified operation.

The disadvantage would be the space required for a phase shift transformer.

Using the phase shift transformer does provide some secondary advantages. These include the limitation of possible fault current seen at the inverter, the reduction of common mode current and the inherent robustness against line fluctuations.

QUESTION FOUR

When using a phase shift transformer is it better to use 12 pulse, 18 pulse or 24 pulse?

ANSWER FOUR

While it is true that the higher the pulses the lower the harmonics, there is a trade-off in cost and complexity of the MV VSD system. In most cases, a 12 pulse transformer gives satisfactory results while at the same time being the least complicated or costly. In rare cases, it may be required to consider an 18 pulse transformer such as when connecting to a very weak supply network. Greater than 18 pulse is almost never required. **wn**

A nuclear power solution for Africa

Johannesburg play host to heads of various Nuclear Associations in the world at the 2016 Nuclear Africa conference.

BY | NIKOSHA PURAN

The conference was attended by Dr. Helmut Engelbrecht, Chairman of the World Nuclear Association; Mikhail Chudakov, Deputy Director General of the IAEA; Phumzile Tshelane, CEO of the South African Nuclear Energy Corporation (Necsa); Knox Msebenzi, Managing Director of the Nuclear Industry Association of South Africa, as well as other participants. Rosatom's delegation, which included representatives of JSC Rusatom Overseas Inc., the Central Institute for Advanced Training and Private Institution RAIN, was headed by Nikolay Drozdov, Director of the International Business Department of Rosatom State Corporation.

Participants of the discussion were unanimous in the view that the nuclear power industry would promote further sustainable development of the African continent. A reliable base-load power source will offer additional competitive advantages to the African industry and will enable stronger-than-expected GDP growth.

The conference chairman Dr. Kelvin Kemm, Chairman of the Board of Directors of the South African Nuclear Energy Corporation, pointed out that the NPP construction program in South Africa would open up tremendous opportunities for local producers, which would be able to benefit from NPP construction. According to Dr. Kemm, it is crucial that the South African government should select a foreign strategic partner for this initiative and that this partner should have the necessary experience and expertise and be willing to share its state-of-the-art technological solutions with the Republic of South Africa.

"Construction of an NPP in South Africa will help create 10,000 direct jobs; it will also generate a profit of USD 48.3 billion for local businesses and bring USD 52.5 billion in tax revenue to the national budget," stated Nikolay Drozdov.

In addition, representatives of Rosatom gave presentations on the corporation's integrated offer, nuclear education, construction of research reactors and establishment of nuclear technology centers. It offers customers an integrated set of services in the sphere of nuclear power development, ranging from preparation for the implementation of an NPP construction project to employee training, NPP operation and UNF management services.

Similarly, Rosatom State Corporation offers its customers an integrated approach to construction of research reactors and establishment of research centers. South Africa is currently Africa's leader and ranks among global leaders in terms of production and supply of isotopes for industrial and medical uses. As the Safari-1 research reactor is nearing the end of its operating life, it is necessary to start implementing the project to construct a new multipurpose research reactor in South Africa as soon as possible. **wn**

calendar

APRIL | MAY

APRIL 2016

5	SAIEE AGM	Johannesburg	geyerg@saiee.org.za
6-7	Leadership & Management Principles & Practice Engineering	Johannesburg	roberto@saiee.org.za
12	Electric Cables & Jointinh & Termination	Johannesburg	roberto@saiee.org.za
14	SAIEE Presidential Visit - KwaZulu Natal	Durban	geyerg@saiee.org.za
19	SAIEE Presidential Visit	Western Cape Centre	geyerg@saiee.org.za
20	SAIEE Presidential Visit - Southern Cape	Southern Cape Centre	geyerg@saiee.org.za
20-21	MS Project Professional 2013	Johannesburg	roberto@saiee.org.za
20-21	Fundamentals of Power Distribution	Johannesburg	roberto@saiee.org.za
21	SAIEE Presidential Visit - Eastern Cape	Eastern Cape Centre	geyerg@saiee.org.za
26	SAIEE Presidential Visit - KwaZulu Natal	Pietermaritzburg	geyerg@saiee.org.za

MAY 2016

9-11	Civilution Congress	Midrand	www.civilutioncongress.com
10-13	Managing Projects Effectively	Johannesburg	roberto@saiee.org.za
17-19	Africa Utility Week	Cape Town	www.african-utility-week.com
17-20	Insulating Oil Management	Johannesburg	roberto@saiee.org.za
24-25	Broadband Access Technology	Johannesburg	roberto@saiee.org.za
25-26	Fundamentals of Practical Lighting Design	Johannesburg	roberto@saiee.org.za
25-26	Photovoltaic Solar Systems	Johannesburg	roberto@saiee.org.za
27	Western Cape Dinner & Dance	Cape Town	roberto@saiee.org.za

April

COMPILED BY JANE BUISSON-STREET
FSAIEE I PMIIITPSA I FMIITSPA

Movers, shakers and history-makers

1 APRIL

1826   Samuel Morey (1762–1843), an American inventor and a pioneer in the field of steamships, patented the internal combustion engine. However, he didn't have a car to rev it in …

2 APRIL

1980   Microsoft announced its first hardware product, the Z80 SoftCard. The SoftCard was a microprocessor that plugged into the Apple II personal computer thereby allowing it to run programs such as WordStar.

3 APRIL

1966   The Soviet space probe Luna 10 became the first spacecraft to orbit around the Moon four days after it was launched.

4 APRIL

1964   The Beatles occupy the top five positions on the Billboard Hot 100 pop chart.

5 APRIL

1923   Firestone Tyre and Rubber Company began the first regular production of balloon tyres (a pneumatic tyre containing air at a relatively low pressure and having a wide tread).

6 APRIL

1916   At the age of 26, Charlie Chaplin became the highest-paid film star in the world when he signed a contract with Mutual Film Corporation for $675,000 a year.

7 APRIL

1933   After years of prohibition (imposed at midnight, 16th January, 1920) beer is sold once again in 19 of the 48 states in the USA.

8 APRIL

1992   In Britain, the last issue of "Punch Magazine", established in 1841 was published.

9 APRIL

1965   "TIME" magazine featured a cover featuring the entire "Peanuts" comic gang.

10 APRIL

1961   South African Gary Player became the first foreign golfer to win the Masters Golf Tournament in Augusta, Georgia, USA.

11 APRIL

2013   Toyota, Honda, Nissan and Mazda announced that they would be recalling a total of 3.4 million vehicles, sold between 2000 – 2004, worldwide due to a defective part in airbags.

12 APRIL

1976   Ronald Wayne, one of Apple Computer's three co-founders, left the company just eleven days after it was established. He sold his 10% share for $800. By 1982, a 10% share of Apple Computer was worth US$1.5 billion!
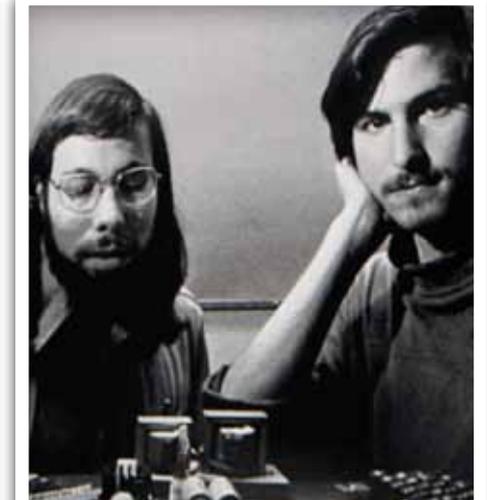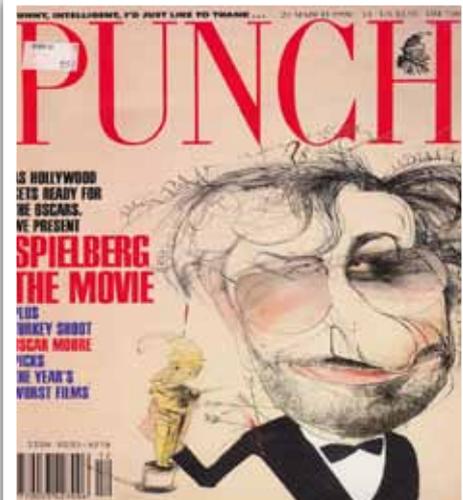
13 APRIL

1970 US astronaut Jack Swigert uttered phrase, "Houston, we've had a problem here" after an oxygen tank exploded in the service module of Apollo 13.

14 APRIL

2015 The oldest stone tools (approximately 3.3 million-years old) were found at the archaeological site Lomekwi 3, Kenya.

15 APRIL

1892 The Edison General Electric Company merged with the Thomson-Houston Company to form the General Electric Company, manufacturer of dynamos and electric lights.

16 APRIL

2012 The Pulitzer Prize winners were announced, it was the first time since 1977 that no book won the Fiction Prize.

17 APRIL

1397 Geoffrey Chaucer told The Canterbury Tales for the first time at the court of Richard II.

18 APRIL

2010 Air travel in Europe was disrupted for 4 days after the Eyjafjöll Volcano in Iceland erupted.

19 APRIL

2001 The world's largest pharmaceutical companies brought legal action against RSA to fight legislation, which would allow generic versions of their patented drugs to be made in, or imported to, SA.

20 APRIL

1998 During the COMDEX Spring '98 and Windows World shows in Chicago, a public demonstration of the soon-to-be released Windows 98 went awry when Bill Gates' assistant caused the operating system to crash after plugging in a scanner. This resulted in "Blue Screen of Death".

21 APRIL

2013 Sebastian Vettel won the 2013 Formula One Bahrain Grand Prix

22 APRIL

1969 John Madden, 54, became the recipient of the first human eye transplant. The donor eye was taken from a man who had died of a brain tumour. The historic procedure was considered a medical miracle.

23 APRIL

1985 Coca-Cola changed its formula and released New Coke to an overwhelmingly negative market.

24 APRIL

1990 STS-31: The Hubble Space Telescope was launched from the Space Shuttle Discovery.

25 APRIL

1859 British and French engineers broke ground for the Suez Canal.

26 APRIL

1986 A nuclear reactor accident occurred at the Chernobyl Nuclear Power Plant in the Soviet Union (now Ukraine).

27 APRIL

2014 Popes John XXIII and John Paul II were declared saints in the first papal canonization since 1954.

28 APRIL

1962 In the Sahara Desert of Algeria a team, led by Red Adair, used explosives to put out the oil well fire, the Devil's Cigarette Lighter. The fire had been caused by a pipe rupture on November 6, 1961.

29 APRIL

1852 The first edition of Peter Roget's Thesaurus was published.

30 APRIL

1938 Happy Rabbit first appeared in the cartoon "Porky's Hare Hunt." This rabbit would later evolve into Bugs Bunny. wn

SAIEE COUNCIL MEMBERS

GRADE	NAME & SURNAME	CONTACT DETAILS	EMAIL ADDRESS
President	Andre Hoffmann	011 783 9330	andreleohoffmann@gmail.com
Deputy President	T.C. Madikane	031 536 7300	tc@igoda.co.za
Senior Vice President	Jacob Machinjike	011 800 3539	Jacob.machinjike@eskom.co.za
Junior Vice President	Dr Hendri Geldenhuys	084 625 5522	GeldenHJ@eskom.co.za
Immediate Past President	Dr. Pat Naidoo	071 312 0111	pat@patnaidoo.co.za
Honorary Treasurer	Viv Crone		vivcrone@gmail.com
Honorary Vice President	Max Clarke	011 476 5925	mppc@mweb.co.za
Past President	Stan Bridgens	011 487 9048	s.bridgens@saiee.org.za
Past President	Mike Cary	011 894 3704	carymbc@netactive.co.za
Past President	Ron Coney	011 564 2349	rongconey@gmail.com
Past President	Viv Crone		vivcrone@gmail.com
Past President	Mike Crouch	011 728 2852	michaelac@intekom.co.za
Past President	John Gosling	011 651 6266	gosling@worldonline.co.za
Past President	du Toit Grobler	083 666 6855	du.toit.grobler@gmail.com
Past President	Rod Harker	021 553 2632	raharker@telkomsa.net
Past President	Dr. Angus Hay	011 585 0490	angus.hay@neotel.co.za
Past President	Ian McKechnie	012 663 4804	ianmac@gafrica.com
Past President	Andries Tshabalala	011 820 5094	andries.tshabalala@actom.co.za
Past President	Paul van Niekerk		paulvn@telkomsa.net
Fellow	Lt. Col. Bill Bergman	011 346 0395	william@bergman.co.za
Fellow	Hermann Broschk	011 728 4071	hbroschk@absamail.co.za
Fellow	Jane-Anne Buisson-Street		buisson@mweb.co.za
Fellow	Viv Cohen	011 485 2567	vivcohen@telkomsa.net
Fellow	George Debbo	012 991 3748	george.debbo@gdtelecom.co.za
Fellow	Prof. Jan de Kock	018 299 1970	Jan.Dekock@nwu.ac.za
Fellow	Sy Gourrah	083 321 5526	sgourrah@gmail.com
Fellow	Prof Sunil Maharaj	012 420 4636	Sunil.maharaj@up.ac.za
Fellow	Collin Matlala	011 997 8900	matlalac@global.co.za
Fellow	Prince Moyo	011 800 4659	prince.moyo@eskom.co.za

SAIEE COUNCIL MEMBERS

GRADE	NAME & SURNAME	CONTACT DETAILS	EMAIL ADDRESS
Fellow	Prof. Jan-Harm Pretorius	011 559 3377	jhcpretorius@uj.ac.za
Fellow	Prof. Rex Van Olst	011 717 7220	Rex.VanOlst@wits.ac.za
Fellow	Dries Wolmarans	011 793 9335	dwol@mweb.co.za
Fellow	Derek Woodburn	011 609 5013	woodb1@mweb.co.za
Senior Member	M. Chauke	012 661 2346	chaukemx@gmail.com
Senior Member	John Dal Lago	083 632 7654	Gianni.dallago@gmail.com
Senior Member	Theuns Erasmus	016 960 2496	theuns.erasmus@sasol.com
Senior Member	Mpumelelo Khumalo	011 800 6023	khumalp@eskom.co.za
Senior Member	Phillip Konig	011 239 5348	PKonig@hatch.co.za
Senior Member	Nishal Mahato	011 629 5341	mahathn@eskom.co.za
Senior Member	Hope Mashele	011 312 9902	hope.nga.mashele@gmail.com
Senior Member	Prof. Johan Meyer	011 559 3880	estherl@uj.ac.za
Senior Member	James Motladiile	011 629 5172	james.motladiile@eskom.co.za
Senior Member	Amelia Mtshali	011 871 2625	MtshalHA@eskom.co.za
Senior Member	Patrick O'Halloran	011 490 7485	pohalloran@citypower.co.za
Senior Member	William Stucke	011 566 3009	wstucke@icasa.org.za
Member	Refilwe Buthelezi	011 682 0972	schilwane@gmail.com
Member	Wayne Fisher	011 679 3481	wayne@bergmanfisher.co.za
Member	Thavenesen Govender	011 629 5738	thavenesen.govender@eskom.co.za
Member	Dr. Mike Grant	011 717 7256	michael.grant@wits.ac.za
Member	Prudence Madiba	011 800 4212	Prudence.madiba@eskom.co.za
Member	Dr. Nicholas West	012 656 1266	njwplasma@gmail.com
Chairman - E&S Section	Gift Mphefu		
Chairperson - Power Section	Max Chauke	012 661 2346	chaukemx@gmail.com
Chairman - Historical Section	Max Clarke	011 476 5925	mppc@mweb.co.za
IEEE Representative	Prof Willie Cronje	011 717 7224	willie.cronje@wits.ac.za
RMWG Representative	Mario Kuisis	011 326 2708	mario@martec.co.za

Bloemfontein Centre
Chairman | Dr Ben Kotze

Postal Address | Univ. of Technology Free State Private Bag X20539 Bloemfontein 9300

T|051 507 3088 **E**|bkotze@cut.ac.za

Eastern Cape Centre
Chairman | Carl Hempel

Postal Address | PO Box 369 Port Elizabeth 6000

T|041 392 4254 **E**|chempel@mandelametro.gov.za

Gauteng Central Centre
Chairman | Maanda Ramutumbu

Postal Address | Eskom Enterprises Park, Corner Leeukop & Simba Road, Sunninghill

T|011 800 6356 **E**|RamutuM@eskom.co.za

Kwa-Zulu Natal Centre
Chairman | Vincent Tiedt

Postal Address | SMEC SA 2 The Crescent Westway Office Park Westville, 3629

T| 031 277 6686 **E**| vincent.tiedt@smec.com

Mpumalanga Centre
Chairman | Ludolph de Klerk

Postal Address | Proconics Headquarters Kiewiet street Secunda 2302

T|017 620 9698 **E**|ludolph.deklerk @proconics.co.za

Southern Cape Centre
Chairman | Paul van Niekerk

Postal Address | PO Box 2487 Plettenberg Bay 6600

T| 044 535 0035 **E**|paulvn@telkomsa.net

Vaal Centre
Chairman | Danver Jacobs

Postal Address | 38 Rembrandt Street Sasolburg 1947

T|016 960 5104 **E**|danver.jacobs@sasol.com

Western Cape Centre
Chairman | Bruce Thomas

Postal Address | Water & Sanitation Building 3 Reyger Street Ndabeni

T|021 514 3651 **E**|bruce.thomas@capetown.gov.za

CIVILUTION CONGRESS
ENGINEERING REVOLUTION

9-10 May 2016 - Congress
9-11 May 2016 - Exhibition

Gallagher Estate, Midrand

Civilution 2016 aims to deliver a congress which targets issues such as Procurement and Delivery, Professionalism, Skills Development, Competency & Capacity, Value for Money and will drive the way forward by introducing new solutions.

Highlights:
- Two days of valuable conference, debate and workshop sessions
- Exclusive Civilution Exhibition Pavillion
- High level speakers from government and private sectors
- Co-located with African Construction and Totally Concrete Expos: Hear about opportunities in Africa's burgeoning construction industry in the joint keynote session

Civilution 2016 aims to deliver a congress which targets issues such as Procurement and Delivery, Professionalism, Skills Development, Competency & Capacity, Value for Money and will drive the way forward by introducing new solutions.

Book 4 delegates from the same company and get the 5th FREE!

Decision making
frustration spendthrift
VALUE FOR MONEY
Minimising corruption management
Minimising risks wastage
Procurement reform Public accountability
Ideology lack of funds
Delivery

Join the Engineering Revolution and help pave the way for South Africa's future.
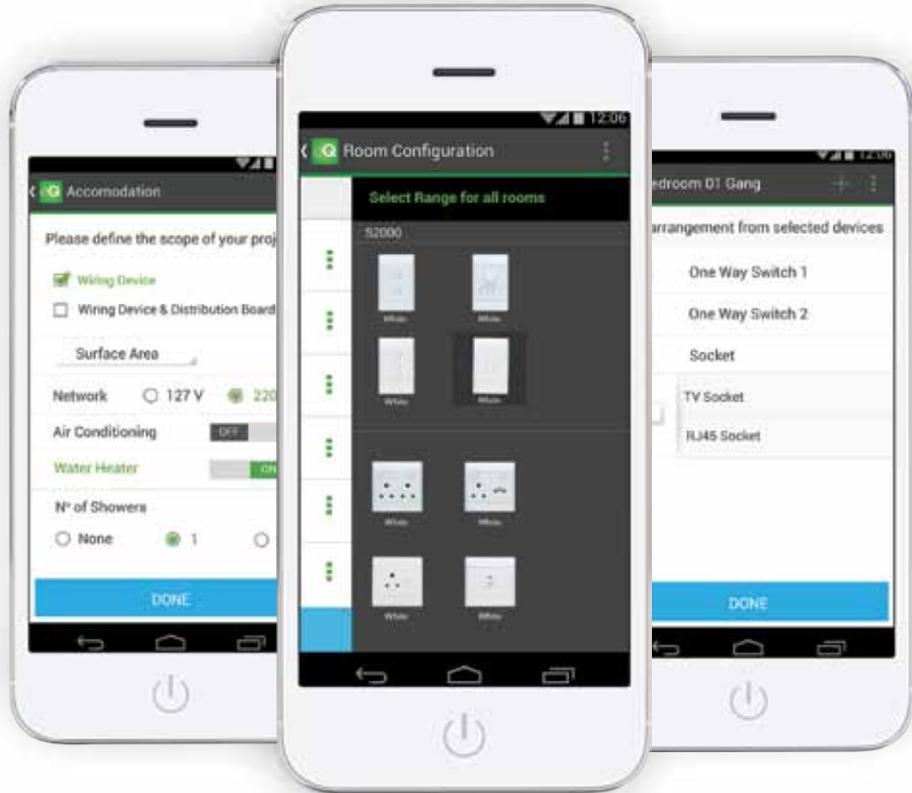
Book today!

Visit www.civilutioncongress.com or get in touch with Mfundo.Ndzuzo@hypenica.com

Civilution

For more information contact: Adrienne Taylor
e: adrienne.taylor@hypenica.com | t: +27 21 700 4300 | d: +27 21 700 4321 | m: + 27 72 904 5997

Schneider Electric launches an innovative app for electricians:
EasyQuote

Schneider Electric, the global specialist in energy management, has identified that quotations and bill of materials are time consuming tasks for electricians, based on the knowledge of its partners. In parallel, the capability to quickly answer the end-consumer and send quick quotes are important components of satisfaction, loyalty and word-of-mouth.

Schneider Electric has developed an easy-to-use mobile application for iOS and Android smartphones to help electricians better manage this pain point, generating bill of materials and quickly share quotations with their clients.

The bill of materials and quotations include distribution board and wiring devices for all the residential projects of the electrician.

EasyQuote is a free application available on the Apple App Store and Google Play, that will help electricians to create and send quotations faster.

www.schneider-electric.co.za

Life Is On

Schneider Electric