WATTnow

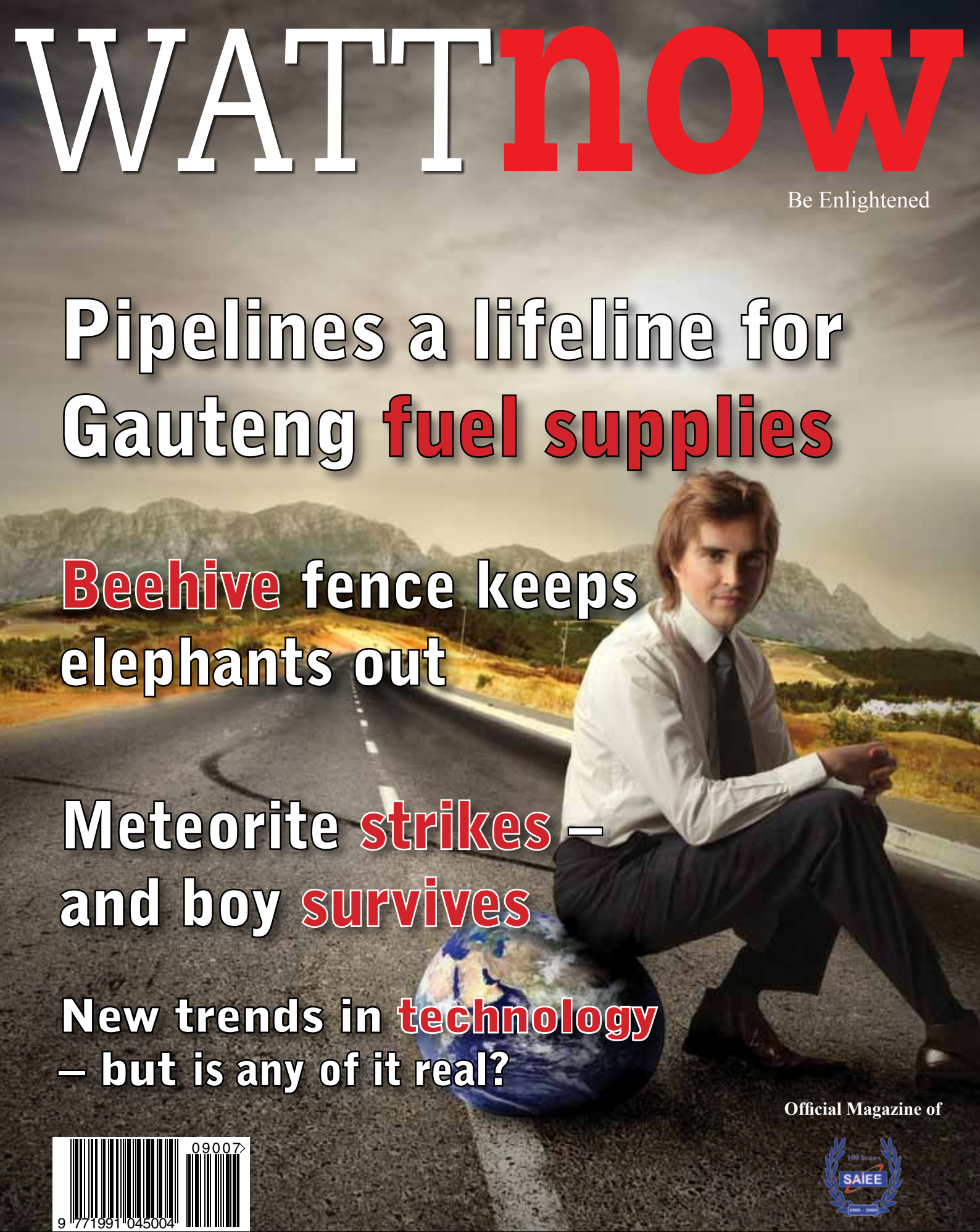
Be Enlightened

Pipelines a lifeline for Gauteng fuel supplies

Beehive fence keeps elephants out

Meteorite strikes – and boy survives

New trends in technology – but is any of it real?



Official Magazine of SAIEE

9 771991 045004 09007

South Africa • R23.50 (incl. vat) Other countries on application

July 2009

Final exams are on Monday. What do we do after that?

BEST EMPLOYERS™ SOUTH AFRICA 08/09 AWARDED BY crf.com

Put your theory into practice – at Siemens.

You've earned your degree. And now you've got a head full of ideas. At Siemens, you can turn those ideas into reality. We produce countless innovations year after year for the industry, energy and healthcare sectors – with highly motivated employees in all kinds of jobs, worldwide. And, soon, perhaps, with you. **www.siemens.co.za**

Answers for South Africa.

SIEMENS

Maybe tertiary education needs a new funding model

There is a particularly interesting idea that has come from the National Union of Students in Britain. In essence, the members are suggesting that the funding model for universities be changed entirely. They argue that when a student enters a university or technology institute he or she obviously does not have the resources to pay the fees and has to rely on the government or his or her parents, for a bursary or a personal load to enter the hallowed halls of tertiary education.

That's exactly what happens in this country too.

Then by the time the course is completed – which can take many years – the young graduate is lumbered with a large, interest-bearing loan that has to be paid-off before any other forms of wealth (such as housing, a car, furniture) can be acquired.

What British students suggest is that the pattern be turned on its head: instead of paying in advance for the studies, they say that students should receive 'free' education and repay the amount owed in the form of a special taxation based on a percentage of their earnings.

Moreover, the percentage would be based on the number of credits achieved and not on the final qualification.

So, if a student starts out doing science and then switches to medicine the credits he or she achieves for the initial science module and the medicine course are added together and the taxable amount calculated accordingly.

The immediate advantage of this system is that education is available to all and sundry who have attained the necessary grades to qualify for university or technikon admission. The successful students who graduate would pay the graduate tax and any students who drop out of university will be liable for taxation equivalent to the number of credit studied.

I believe that in a developing country such as South Africa this funding option should closely be examined and, if practical, implemented as soon as possible.

How many thousands of students do we have who simply cannot afford a tertiary education. Perhaps they are the head-of-the-household because the ravages of HIV and AIDS have taken away their parents and their infrastructure.

The predicament and the list of difficulties that face some students are insurmountable. At the same time, South Africa urgently needs to qualify thousands of new students – particularly in the scientific and engineering disciplines – not purely as graduates of a university, but as technologists, technicians and artisans.

In fact, in her address to the South Africa Institute of Electrical Engineers, new Science and Technology Minister, Naledi Pandor said that it was the government's goal to have 50 000 artisans trained by the end of 2010.

The figures she suggests are patently unachievable unless the standards of training are comprised to the point that artisans can qualify in under a year. However, the sentiment is absolutely correct – we need to have tens of thousands of newly qualified people to take up the many thousands of vacancies in every sector of the economy.

Perhaps by choosing to look at a different funding option for tertiary training – one such as the suggestion from Britain's National Union of Students, it may be possible to escalate the levels of training, increase the number of graduates that are coming through our institutes of technology and our universities and do so in a way that these bodies remain financially viable.

Of course there is the fundamental question of a bridging finance period (before the first graduates appear and start earning money to pay the tax they owe) but those questions can usually be quite easily overcome.

So perhaps it's time for the chancellors, the deans and the other governing bodies to consider new options for education – and not keep relying on government to provide a handout to keep them afloat.

Paddy Hartdegen - Editor
paddyh@crown.co.za

WATTnow

Editor
Paddy Hartdegen
paddyh@crown.co.za

Design & Layout
Adèl JvR Bothma

Creative Direction
Lesley Testa

Published monthly by
Crown Publications cc
2 Theunis Street
Bedford Gardens
Johannesburg
Tel: (011) 622-4770
Fax: (011) 615-6108
e-mail: crownmag@crown.co.za

Publisher
Jenny Warwick

Deputy Publisher
Karen Grant
crownmag@crown.co.za

Technical Advisor
Ian Jandrell, PrEng, PhD

Advertising Manager
Veronica Breedt
veronicab@crown.co.za

Merchandising
Norma Massey

Circulation and Subscriptions:
Norma Massey
normam@crown.co.za
R215 (incl. Vat) per annum
Postage extra outside RSA

All enquiries for WattNow:
P O Box 140
Bedfordview, 2008

All enquiries for SAIEE:
P O Box 751253
Gardenview, 2047
crouchm@saiee.org.za

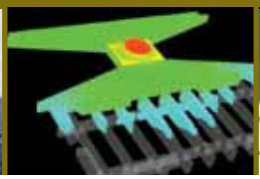
SAIEE 2008 Office Bearers
President: Du Toit Grobler
Deputy President: Angus Hay
Vice President: Andries Tshabalala
Past President : Victor Wilson
Honorary Treasurer: Les James

ISSN: 1991-0452

Printed by: CTP Web, Cape Town
Distributed by: RNA

WATT'S

WATT'S HAPPENING

4> WATT'S GOING ON?

Computer games may foster flexibility; Queen decides to "grow our own veggies"; Five storeys up and seven storeys down; New plan to pay for learning; Jo'burg's BRT delayed until August; A TV broadcast network for R3-million; Siemens cutting carbon emissions worldwide.

INSTITUTE PAGES

INSIDE

ABC Certified
Total Paid Circulation 607, Total Free 6145, Total Circulation 6752
Jan-Mar 2008

Computer games may foster flexibility

Raymond de Villiers, chief executive of Wisdom Games

There is an underground revolution sweeping the corporate sector. The Gamer generation is here and if they aren't already changing your organisation they may be doing so soon because this generation is the first to have grown up playing with computer games rather than board games.

There are numerous implications for business but they can be simplified into two generic areas; the impact on organisational structures and culture, and the impact on the way we lead, manage and train. Gamers bring critical skills and perspectives to companies that are operating in a quickly changing environment.

There is a common misconception that gamers are geeks with poor social and leadership skills but research has shown this is seldom the case. Gaming has become so pervasive that any young man or woman nearby probably falls into gamers group.

John Beck and Mitchell Wade wrote a book examining the impact of gamers within the business world and described the common traits that gamers share:

- Arrogance – gamers often project themselves as experts in whatever they do. This probably comes from saving the universe on a daily basis – albeit virtually.
- Sociability – gamers aren't alone when they sit at their computers playing multi-player games. They are interacting socially with thousands of other players at the same time. This dynamic has redefined sociability to mean that it is no longer necessary to have met someone, in person, to consider them a friend or acquaintance.
- Co-ordination – gamers are great multi-taskers. A recent study found gamers have the same mental agility as people who speak multiple languages. The theory is that gaming forces you to filter out the irrelevant when making decisions. This allows gamers to juggle several tasks and decisions at the same time.
- Flexibility – games always have more than one way to win, or complete a task. Gamers are consequently very flexible and creative in overcoming obstacles. They are analytical, strategic, and open-minded in approaching problems.
- Competitive team players – Gamers play to win, but rarely win by playing on their own. While there is an egotistical and personal ambition driving it, gamers know how to work effectively and efficiently in teams in order to achieve specific outcomes.
- Insubordinate – The only authority gamers experience online is that of other gamers. There is no hierarchy other than one that is earned by game play. Gamers do not take well to being led by someone because they have a title or position that gamers didn't see being earned. The most powerful group for criticising and disciplining gamers is their peers.

It is against this background that existing company leaders are faced with either fighting to obliterate gamers and force them to comply with traditional practices, or they can modify the organisation to bring out the best traits of these employees.

South African companies need to embrace unique, gamer-friendly work environments supported by companies such as Wisdom Games that develops, implements, and supports gaming-based business simulation environments within the corporate world.

An important area for growth of virtual corporate environments is staff training and the induction course processes. The use of computer-based company training material allows an organisation to achieve significant decreases in the cost of providing and supporting this training while still allowing the employee to complete the modules at his or her own pace.

Similarly, with induction courses, a computer simulation can be created of the actual office environment and new employees are then guided through this 'virtual' office so that they can immediately find their way to the different departments, the toilets or the canteen.

Training and induction programmes can be delivered directly into the person's working environment using existing internal network infrastructure and each person can work at a pace that is suitable for them.

Much of the technology in computer-based training has its origins in the gaming community where incredible strides in graphics and speed have been made over the years.

Queen decides to "grow our own veggies"

Britain's Queen Elizabeth has taken to growing her own vegetables in a patch at Buckingham Palace that will eventually supply the palace kitchen with fresh Stuttgarter onions, Musselburgh leeks, sweetcorn, Red Ace beetroot, Fly Away carrots and an endangered variety of climbing French beans known as the Blue Queen.

The Queen is a keen gardener but she is unlikely to do much more than potter around the gardens and observe the growing plants. She may also comment on the marvellous tastes and flavours that come from having home-grown vegetables being freshly picked from the Buckingham Palace vegetable garden.

No chemicals have been used to cultivate the plants. Liquid sea-weed – which stinks to high heaven – has been used to feed the seedlings and a mulch from the palace compost heap was used to bed down the plants. Garlic is liberally sprinkled around the vegetable patch to deter aphids and water from the palace borehole is used to irrigate the plants.

Food has been grown at Buckingham Palace before: in 1918 turnips were grown there and it's possible to view, on YouTube, historic footage of these turnips being harvested. Then, during the Second World War, vegetables were grown on the palace grounds and there are historic pictures of the then Princess Elizabeth participating in the *Dig for Victory* campaign.

Buckingham Palace has spectacular gardens that can easily accommodate up to 7 000 people in the immaculately groomed 16 hectare parkland that is home to more than 350 wild flowers and 30 species of bird.

Five storeys up and seven storeys down

Meissner has installed a large generator at Sechaba Medical Solutions' Johannesburg head office. This 1 MVA, 400 V three-phase Himoinsa generator ensures that Sechaba can continue to administer the Sizwe Medical Fund and Gen-health Medical Scheme when there is a power cut.

Sechaba runs a large data centre linked to a call centre that communicates with all major hospitals and medical service providers in the country. During installation Meissner had to ensure that the company had full power at all times and to achieve this a standby generator was installed while Sechaba's old generator was removed and the new, much larger, Himoinsa generator was installed.

Eric Rantsho, Sechaba's chief information officer says the company relies heavily on its information technology infrastructure and as such cannot be without power for protracted periods. Now that the new generator is in place he says the company is confident that its day to day operations can run even when the municipal feed is interrupted.

Meissner's project management team was responsible for the co-ordination of the project, which demanded meticulous planning at a time when the Sechaba administration system was undergoing a major upgrade.

In order for the installation to be carried out Meissner arranged that Johannesburg's City Power would switch off the transformer supplying the entire city block for a period of two days. The new generator, weighing 11 tons, was installed in the basement of Sechaba's offices. To move the generator it was necessary to lift it over the top of a five-storey building and then lower it down seven storeys through the centre of the building into the basement.

Meissner hired a 50 metre high, 440-ton crane that was assembled on site. A block in central Johannesburg had to be closed to traffic for the weekend when the generator was installed.

The Himoinsa generator is enclosed in a weatherproof, sound attenuated enclosure and its exhaust system is reticulated so that fumes can be filtered and catalysed before being safely expelled. The unit can run at full capacity for up to three days.

The Meissner generator is lifted off a flat-bed truck before being hauled over a five storey building and lowered into a basement where it will spend the rest of its days.

ENERGY 2010
solutions for africa
CONFERENCE & EXHIBITION
24 - 26 February 2010
Sandton Convention Centre, South Africa

ENERGY 2010 - ENERGY SOLUTIONS FOR AFRICA

Register to attend Africa's premier ENERGY Indaba!

Research has shown that Africa has availability of enormous energy resources which far exceed energy requirements of the regions, most of these resources are grossly underutilized, particularly natural gas and hydro resources. Africa's problem is not lack of energy resources but its development and utilization. The region will remain a major net exporter of energy for several decades to come. In dealing with its energy problems Africa faces a unique set of initial conditions, defined mainly by its level and pattern of economic growth, social and demographic characteristics, energy resource endowment, location distances between supply sources and consumption areas, technological underdevelopment, and poverty-driven energy-environment conflict. A key challenge is the optimal utilization of the region's energy resources to facilitate both individual country and regional energy and economic development. At present Africa is searching for solutions for the energy challenges facing the continent.

ENERGY Africa will become an annual event on the African business calendar with a specific focus on exploring solutions for a new energy future for Africa and will become the internationally recognized ENERGY event for Africa. The Energy Conference & Exhibition is a unique & focused business forum. This event provides the ideal networking climate for companies and individuals to interact with the latest technology trends available globally.

The event forms part of the African business calendar, which will promote sustainable energy development initiatives across the African continent.

To register to attend the conference or to exhibit at the exhibition, please visit the official event website or call +27 11 463-9184.

www.energyafricaexpo.com

New plan to pay for learning

The National Union of Students in Britain has called on the government to drop all tuition fees for a university education and replace these with a graduate tax in what is seen as a radical departure from decades of opposition to paying tuition fees.

Under the plan, tuition fees of up to £3 225 a year would be abolished and, instead, graduates would contribute between 0,3 percent and 2,5 percent of their salaries to a national trust over a 20 year period.

The actual contributions made to the trust would depend on a graduate's salary. So, for instance, a graduate earning say £40 000 would pay £125 a month whereas someone earning £16 000 a year would pay just £5 a month.

In terms of the plan the trust would remain an independent body and would distribute the money it received to universities through the Higher Education Funding Council for England.

Universities have been lobbying government for some time now in an effort to get the cap on tuition fees lifted so that they can meet the rising costs of providing higher education to students in Britain.

Vice-chancellors at various universities have urged the government to lift the maximum fee from £3 225 to £5 000 or more.

The National Union of Students condemns this plan saying that the richest students would be able to choose where they wanted to study while the poorer students would be unable to afford a spot at the more prestigious universities because of the higher costs of enrolling at these institutions.

Interestingly, under the NUS plan the contribution made to the trust by a student would be determined not by how much he or she earned but by how many credits of university study they had completed.

This, say the NUS, would enable students to move in and out of study modules, and alternate between full- and part-time courses too. Employers would be encouraged to make voluntary payments into the trust.

Under the existing legislation most students borrow money for their fees from the government through the Student Loans Company (SLC).

The NUS says that under its programme, the trust would raise at least £6,4-billion a year within the next 20 years. To set the programme up the NUS has urged government to take the £4,5-billion a year that it spends on student loans and put it into the new trust and then immediately drop the tuition fees until graduates start repaying their loans once qualified.

Jo'burg's BRT delayed until August

Johannesburg's Bus Rapid Transit (BRT) system will begin operating by the end of August after it was delayed by taxi drivers who held violent protests throughout the city and accused the city's planners of deliberately excluding them from the Rea Vaya project.

Taxis will not be allowed to use the dedicated median lanes and will not be allowed to have the same origin and destination as a BRT bus according to Rea Vaya project manager Bob Stanway. He says that about 575 taxis will be affected by the BRT system.

At this stage, 25 bus stations and a 25 kilometre section of the trunk route should have opened in June but now, with the delays, phase 1A of the project will start in September. The stations are currently being fitted with closed-circuit television cameras, variable message systems, public address facilities and global position systems.

Stanway says that taxis will not be permitted to use the centre lane of the highways or roads as this is reserved for the Rea Vaya system. He did not say how the centre lanes will be policed.

Apparently the BRT control room in central Johannesburg must still be completed and once this is finished Rea Vaya will have 143 buses available to commuters. The service will run from 05h00 until midnight daily.

SANEA

The South African National Energy Association

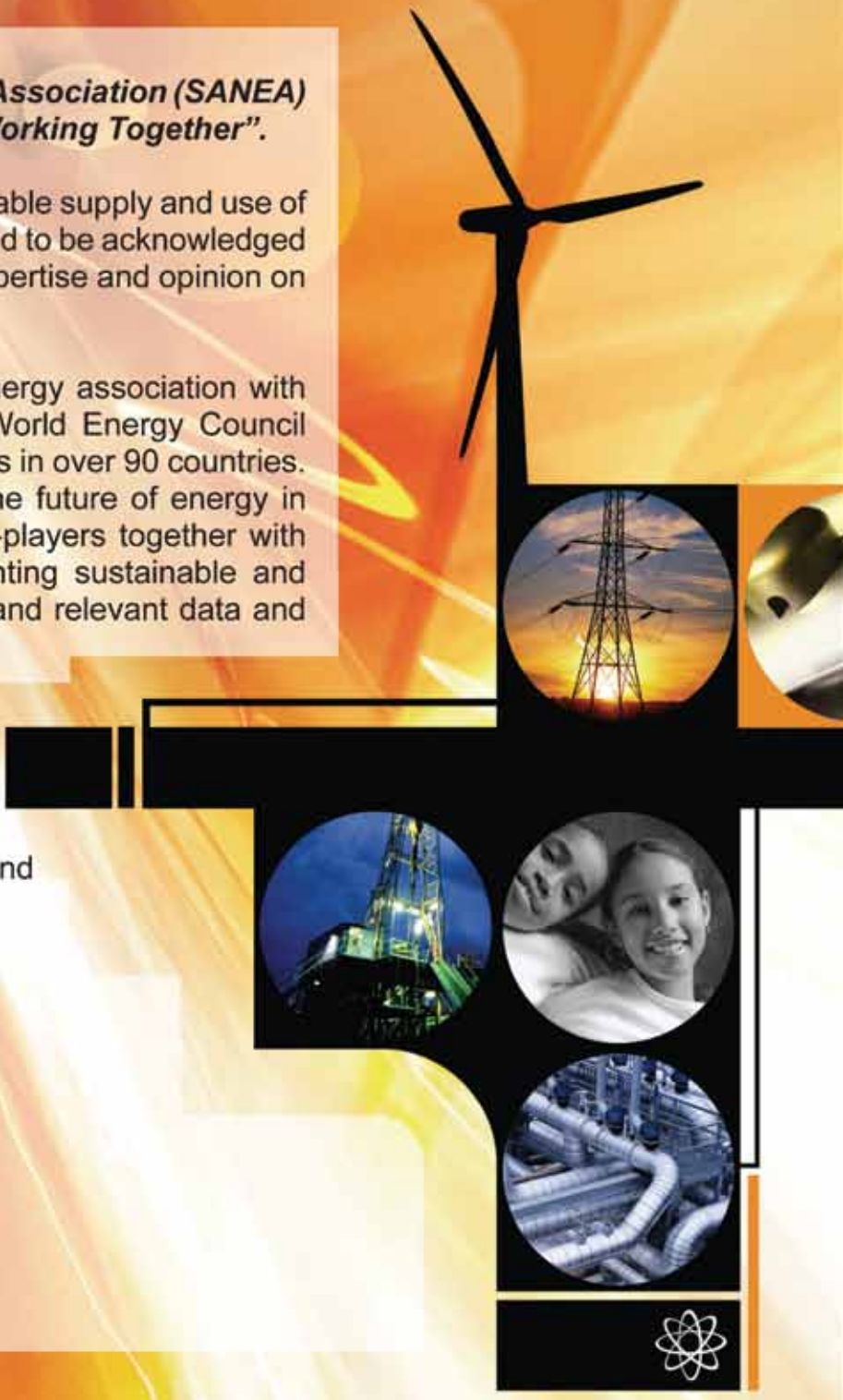
Energy People Working Together

The South African National Energy Association (SANEA) has as its vision "Energy People Working Together".

SANEA strives to promote the sustainable supply and use of energy for the greatest benefit of all and to be acknowledged as a credible centre of knowledge, expertise and opinion on energy matters.

SANEA is a non-partisan, diverse energy association with international networks through the World Energy Council (WEC). WEC has member committees in over 90 countries. SANEA is playing a pivotal part in the future of energy in South Africa, bringing influential role-players together with a view of identifying and implementing sustainable and effective solutions, providing factual and relevant data and knowledge,strengthening the energy network in South Africa and globally, and enhancing awareness of energy issues in South Africa.

We want you to partner with us – Join SANEA as a member and let your voice be heard!



Chairman: Brian A Statham
Mobile: +27 (0)82 652 7580
Email: brian.statham@eskom.co.za

Marketing Manager: Sarita Cronjé
Mobile: +27 (0)83 325 6716
Email: saritac@mweb.co.za

SANEA Website: www.sanea.org.za

A TV broadcast network for R3-million?

Community television stations may become as widespread as the community radio stations now that the broadcasting licence terms have been relaxed and, with the introduction of the new digital terrestrial television transmissions it seems likely that the demand for community television services may increase sharply.

However, television is an expensive business and setting up a new broadcast facility can cost tens of millions of rands, perhaps more. So with this in mind, Spescom has set up a television in a box package that is said to be ideal for the smaller community television services.

As Sean du Toit, managing director of Spescom Media IT says, the biggest barrier to entry is the cost of establishing a broadcast operation costing up to R30-million, which for a small community service is a lot of money to invest in a new business that has no guarantee of survival.

The television-in-a-box concept costs just R3-million to set up an provides a new community television service with a complete solution that includes three Sony XDCam EX high definition cameras, a Ross CrossOver HD studio mixer, Miller camera pedestals and PlayBox Technology's playout solution.

Du Toit says that a news studio needs to have at least three cameras, video editing and audio final mix facilities, a server transmission system.

To meet this increased demand, Spescom Media IT has in conjunction with various overseas suppliers, designed an integrated low-cost solution will not compromise quality or impede future scalability of the broadcasting operation.

Du Toit says the technologies used provide tightly integrated solution that should provide start-up organisations with a real solution that includes a stable, reliable technology platform. He says that it will take just six weeks for a community station using the television-in-a-box solution to be up and running within six weeks – and this includes training the staff on how to use the equipment.

Small raindrops fall quicker than big ones

It's not necessarily true that scientists are boring – it's just that they seem to get bored more quickly than others. Why else would a researcher wonder why people got wetter in a drizzle than in a downpour. Then the researchers set about trying to find the answer.

Apparently it didn't take them long. You see meteorologists assumed that the bigger, heavy raindrops that occur during a downpour will be falling at a great speed than the small, more frail little drops that characterise drizzling rain.

Guess what? They were wrong. The smaller drops actually fall faster than the big drops. In fact the researchers can prove this because their three-year study of 64 000 rain drops have determined that the small drops are quick little blighters – more like sprinters than heavy-weight plodders.

The team of physicists from Michigan Technological University and the National University of Mexico say their findings prove the weather forecasters have been using the wrong formula to predict rainfall and have also been over-estimating the amount of rain that will fall.

They accept that the small raindrops cannot actually fall faster than their "terminal speed", which is the speed when the downward force of gravity is the same as the upward air resistance.

The puzzling finding, though, was that small raindrops are falling faster than they should be able to, based on their weight and size. Using highly sophisticated measuring equipment the researchers found clusters of raindrops that were falling at a faster rate than the terminal speed predicted.

The scientists believe these super-terminal drops stem from the breaking-up of larger drops and it's the fragments of these that continue at a higher speed. The data was gathered during natural rainfalls at the Mexico City campus of the National University of Mexico.

The researchers say that their findings will allow meteorologists to more accurately predict weather and rainfall patterns and considering that about 30 percent of the economy (including agriculture, construction and aviation) in Mexico is directly influenced by accurate rainfall predictions it is an important finding.

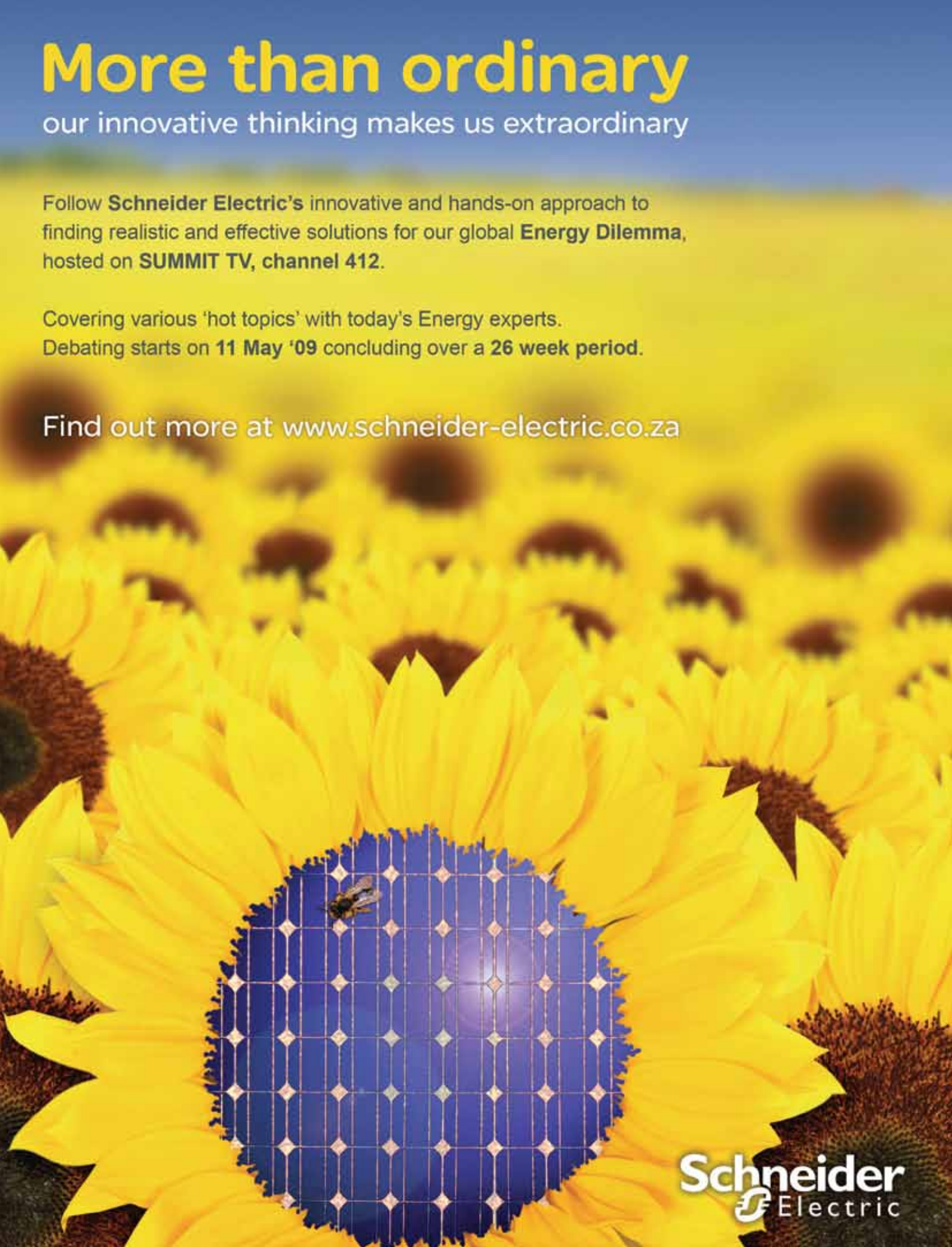
More than ordinary

our innovative thinking makes us extraordinary

Follow **Schneider Electric's** innovative and hands-on approach to finding realistic and effective solutions for our global **Energy Dilemma**, hosted on **SUMMIT TV, channel 412**.

Covering various 'hot topics' with today's Energy experts.
Debating starts on **11 May '09** concluding over a **26 week period**.

Find out more at www.schneider-electric.co.za



Schneider Electric

Siemens cutting carbon emissions worldwide

Siemens, aware of the challenges that companies and individuals face due to global climate change, is working on a number of solutions that will make a contribution to creating sustainable energy solutions throughout the world and claims that it is in a position to provide solutions to some of the immediate threats.

Andrew Hall, acting chief executive of Siemens, says the company has created an environmental portfolio with products that can help to save vast amounts of unwanted carbon-dioxide emissions annually.

"The environmental portfolio embraces nearly all relevant areas involving the generation, transmission, distribution and use of energy as well as other environmental technologies, covering nearly all divisions in the company's industry, energy and healthcare sectors," he says.

"To qualify for inclusion in the environmental portfolio calculations, a product must reduce greenhouse gas emissions or, as an environmental technology, help combat water and air pollution. In this respect, our gas turbines, energy-efficient lighting, wind turbines and eco-friendly trains make the biggest contribution towards reducing carbon dioxide emissions."

In 2008, Siemens generated revenue of just under €19-billion – around a quarter of its total revenue – with products and solutions from its environmental portfolio.

"For Siemens, environmental protection has two key aspects. Firstly, we take product stewardship seriously and place great importance on product-based environmental protection, with products, systems and services that are designed to achieve high standards in terms of environmental compatibility," he says.

"Secondly, we implement measures to ensure that, at facilities where our company is located, we maximise resource efficiency and keep emissions as low as possible."

Siemens consolidated its products and solutions for environmental and climate protection into its environmental portfolio and had independent auditors review the portfolio and the methodology used.

Then, those products and solutions were used to reduce reduced customers' carbon dioxide emissions by about 34-million tons. With the savings achieved by products and solutions installed in previous years, emissions were reduced by a total of 148-million tons.

"This equates to the amount generated by three megacities together – New York, London and Hong Kong," says Hall. "By 2011, these annual carbon dioxide savings are projected to total about 275 million tons, an amount equal to the current emissions of London, New York, Tokyo, Singapore, Hong Kong and Rome."

"For us, sustainable development in environmental protection implies the responsible and careful use of natural resources, which is one of the reasons why we assess the environmental impact in the early stages of product and process development," he says.

As power generation and energy transmission lie at the heart of economic growth and prosperity, Hall says Siemens believes energy must be generated and used in a manner that is friendly to the environment and helps advance the cause of climate protection.

"To this end, Siemens has devoted millions of Euros and dedicated a global team of tens of thousands of employees to researching and developing technological innovations that will play a key role in increasing the efficiency of power generation, transmission and consumption while avoiding damage to the environment," he says,

"The advances in technology centre on higher efficiency, meaning at one end of the cycle, less fuel is used in the generation of power while fewer pollutants are emitted at the other," he says.

As an example of this efficiency, Siemens says its combined cycle power plants will soon achieve efficiencies of 60 percent, while combined heat and power can achieve overall efficiency factors of over 90 percent.

According to Siemens more than 6 400 of the company's wind turbines have been installed with a peak performance of 5,700 MW, while high-voltage direct current transmission technology enables electricity to be transmitted over distances of up to 2 000 kilometres with minimum loss.

Products and solutions installed by Siemens for customers between 2002 and 2007 that are still in use today reduce carbon dioxide emissions by 114-million tons per year.

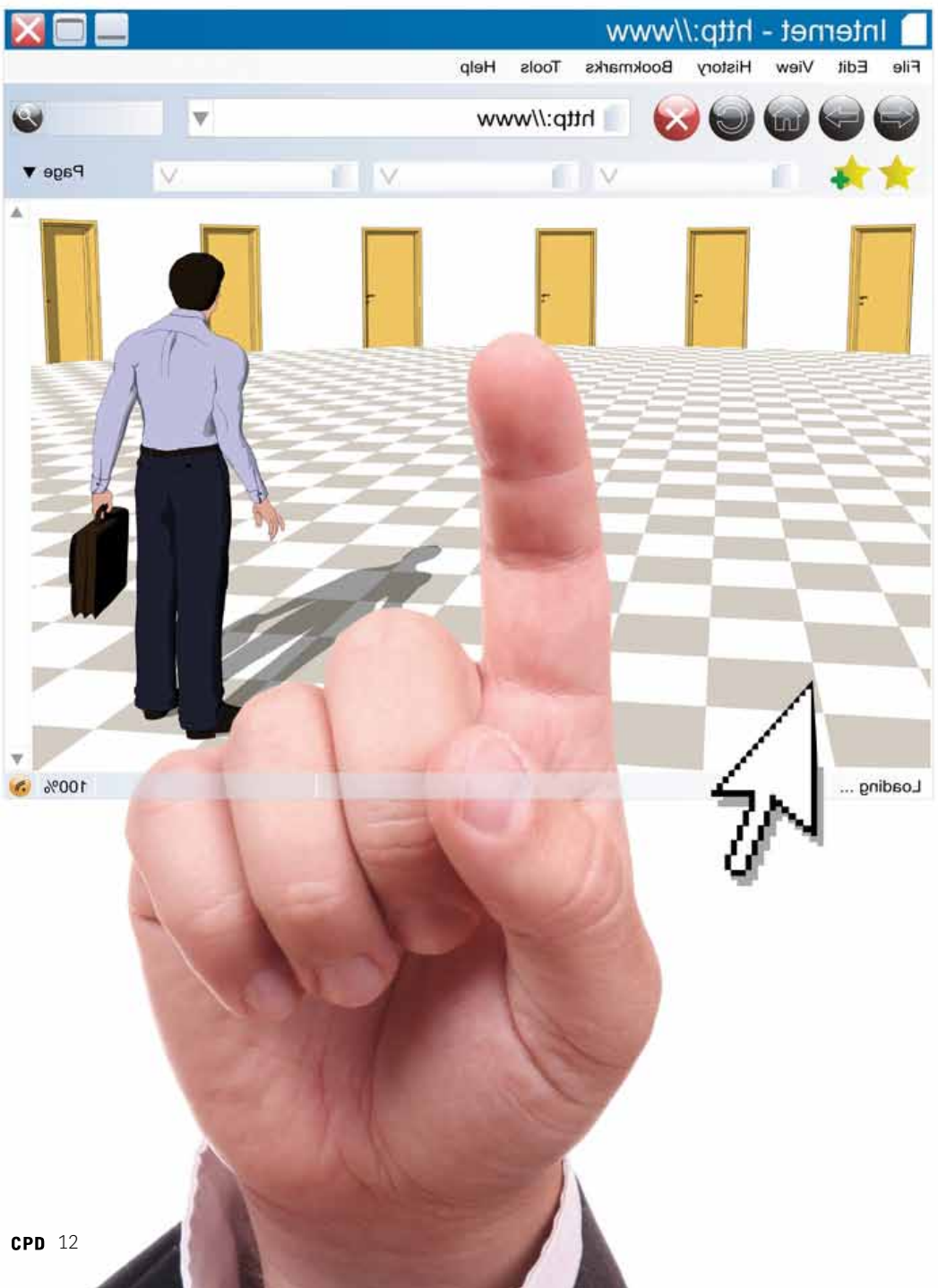
Siemens says it aims to reduce its own carbon dioxide emissions by 20 percent (in relation to revenue) by 2011 compared with its 2006 figures.

It is also involved in various international climate protection initiatives, including *Business for Climate Protection*, the *US Climate Action Partnership* and the *Clinton Climate Initiative.*

Siemens is working on a number of new technologies aimed at reducing pollution.

New technologies – are the opportunities real?

By former SAIEE President, David H Jacobson and Victoria Cooper of PricewaterhouseCoopers



Over the past six years PricewaterhouseCoopers' (PwC) has surveyed and reported on challenges and opportunities such as growing revenues, raising capital, and intellectual property (IP) management for CEOs of emerging software companies. In this year's Survey and Report, PwC examined the roles that search, discovery and social networking technology and applications are playing and will play in the future of marketing and purchasing products and services in consumer and business communities.

‘Selfsumers’ seem self-obsessed

By former SAIEE President, David H Jacobson and Victoria Cooper of PricewaterhouseCoopers

With the rapid increase of blended or multimedia search results, which include video, images and blog posts, as well as personalisation searches, business is well and truly headed into a new era. The emergent Selfsumer trend is stimulating a number of activities and innovative applications in society and business. This will transform how companies obtain the most benefit from new media advertising, both online and offline.

We examined the effectiveness of collaboration systems for product innovation and development as important business tools for the second decade of the 21st century and how companies are exploring how to gather and use unstructured information and tacit knowledge.

PwC believes that the so called *prosumer*, who shopped online, helped design products and enjoyed targeted, personalized advertising is now become the *Selfsumer*, who searches for and discovers bits and pieces of offerings and advertising of products from multiple sources.

This emerging trend is another fundamental change for advertising agencies and retailers to contend with, and will require them to think more creatively about the development of new product, promotional content and e-commerce channels to service the Selfsumer. Advertisers will have to adapt more and more to purchasers’ new online skills and tastes enabled by search, discovery and social networking technology.

Those who advertise will have to make the content ingredients available in new ways and new forms including creative video, allowing Selfsumers to assemble their own selection of possible purchases, in other words, their own, self-created advertisements, product selections and reviews. This will completely change the nature and structure of online marketing, advertising and sales, not only on the Internet, but also on TV, which is becoming more and more interactive and personaliaed. Both conventional and recently emerged personalised advertising is going to be largely ignored by Selfsumers who will prefer to assemble their own bouquet of information, comparative advertising knowledge and product selection, thereby enabling truly personalized e-commerce.

The effect on mobile commerce will be enormous. Up to now, mobile commerce has been adapted to fit a mobile platform, but with the emergence of powerful smartphones, this is changing drastically as consumers can personalise their products and choices.

The Selfsumer will use powerful, easy-to-use, adaptive software mashups tools (web applications that adaptively combine data and functionality from more than one source) to decide on the fly when to buy, what to buy, what combinations to buy, and where to buy it. Selfsumers will not work alone and will collaborate to seek out and decide on their own purchasing preferences through social networking, brand and product awareness reinforced by advertainment, rather than commercials as we know them today.

Our survey respondents clearly appreciated the importance of these consumer and business trends, and 98% recognised that Selfsumer behaviour is becoming a major driver of changes to online search, discovery, and associated consumer and business software applications.

Blended results are also being provided by search engines at a rapid rate. These include video, images and blog posts, along with more traditional forms of information such as articles. Of these varied formats, video is of particular importance. ComScore data from November 2008 showed that YouTube accounted for 25% of all Google searches in the US. If YouTube were a standalone site, it would be the second-largest search engine after Google, larger than Yahoo. Interestingly, among blog readers (who are exhibiting Selfsumer behaviour), blogs have become a more important tool for identifying new content than search engines. For frequent readers, 38% said blog links were the top tool for discovering new blog content as compared with 34% who voted for Web search. Blogs also have more impact than social networks, with frequent blog readers saying they trust relevant blog content for purchasing decisions more than content from social networking sites.

Personalisation is also going mainstream. Google is leading the way with applications like SearchWiki and Preferred Sites, with the search engine including the user’s location, recent searches, and which data-centre his/her search is sent to when determining the top ten results for a search.

Perhaps most important, is the growing awareness of the authority of a site, determined in part, by the number of links to a site and buzz about it, garnered from social networking sites.

The Semantic Web, long predicted as the holy grail of the Internet, is finally taking shape as a significant factor in online search. These technologies let computers process the meaning of web pages instead of simply downloading or serving them up blindly. Indicative of the rising importance of the semantic web is Microsoft’s acquisition of semantic search engine Powerset in 2008, and Twine, a web organizer, based on semantic technology, launched publicly in October 2008.

On its website, Twine describes itself as a “new way for you to collect online content – videos, photos, articles, web pages and products – and bring it all together by topic, so you can have it all in one place and share it with anyone you want.” Twine is “powered by semantic understanding, which means Twine gets to know you.

It automatically learns about your interests and makes connections

continued on page 15

Social MEDIA IQ

Connect ♦ Evolve ♦ Reinvent

The evolving web - are you keeping up?

"We are just beginning to scratch the surface of integrating many social media tools into our core business processes. However, one thing is clear: in today's highly competitive world, integration with valuable resources such as Facebook & Twitter is an important part of your overall social media strategy." **Joel Comm**

Facebook has now reached a staggering 200 million users currently growing by about 20 million users every 20 days.

Twitter is also experiencing explosive growth, growing 38% from March to April '09 to 20 million users.

The Web has altered how we as a society consume information. Now we see the emergence of what is called the real-time web! The way we communicate, the way we do business is changing rapidly. Be ahead of the curve and learn everything you can about the immense power of social media and the real-time web.

Join our fanpage on Facebook:
http://bit.ly/socialmediaiq

Special offer for SAIEE members only!

Attend a complimentary 1-hour live TeleSeminar.
During this presentation you will receive an overview of the new business landscape and especially how YOU can ensure that your business is not left behind! We will cover:

1. *What Social Media is*
2. *Social Media best practices*
3. *How to measure your success*
4. *Where to start*

To book SMS* your name & email address to
082 218 9486
(*SMS charged at normal rates)

© **Social Media IQ** ♦ **Tel:** (012) 654 2638 ♦ **Cell:** 082 218 9486 ♦ **Email:** socialmediaiq@gmail.com
♦ **Web:** http://bit.ly/socialmediaiq ♦ **Twitter:** http://twitter.com/peterdtza & http://twitter.com/lisabreedt

continued from page 13

and recommendations tailored to you." Search has come of age and is now enabling true discovery.

Customer-focus in business and marketing

It is both interesting and significant that survey respondents unequivocally saw that the rise of the Selfsumer would change the ways in which companies reach and convince their customers and clients to purchase their goods. In recognising that Selfsumer behaviour worldwide would have a high impact on companies' marketing and sales strategies, PwC published two reports emphasising themes of special importance during 2008: How the Consumer Conversation Will Transform Business and Navigating the Era of the Empowered Consumer. "Consumers are leading a massive, global conversation about products, services and companies... Consumers use online media, phone calls, emails, chats, and text messages to discuss what, when, and how they buy. And consumers, not marketers, lead the discussion."

"With consumers undoubtedly in control, companies need to step away from traditional business models and collaborate in new ways both with each other and directly with their customers. ... Listening to the wide variety of digital consumer conversations underway today – about your customers, your company and your competitors – and incorporating their perspectives into your organisation's day-to-day operations can help illuminate the path forward."

"Consumers are leading a massive, global conversation about products, services and companies... Consumers use online media, phone calls, emails, chats, and text messages to discuss what, when, and how they buy. And consumers, not marketers, lead the discussion."

In *How consumer conversation will transform business*, PwC notes that "there is a great deal of investment and innovation occurring in technologies that translate vast amounts of free-form, 'unstructured' consumer conversation into metrics and indicators. This activity verifies that the technical functionality necessary for analysing consumer conversation is a rapidly maturing business, and will continue to fuel even greater capabilities leading to better insight and decision-making."

The number of US patents for customer analytics/customer-centric technology has increased sevenfold over the past nine years, and 125 percent over the past four years. This compares to a gradual decline of 13.9% in the overall number of patents during the same period. In Canada, one start-up in this area is Sysomos.

Sysomos mines information from social media sites such as Twitter and Facebook and close to 30 million blogs. Findings are graphed by time, sentiment and demographics to provide a full picture of the buzz around products, brands, public figures or issues. Co-creator Nilesh Bansal says, while other companies already monitor web conversations, they generally only track how often a brand or product is mentioned. Sysomos' offering is unique in that it captures what is being said, who said it, and the sentiment.

Companies recogniae the importance of being online in order to promote their products and brand. Almost half of online adults read ratings and reviews at least once a month, and 19% post them. Statistics show that nearly twice as many read reviews in 2008, compared to 2007. One in three online adults now read blogs at least once a month, while 18 percent comment on them. Blog readers as a group grew by nearly 50 percent over 2007.

Social networks have also taken off in 2008, with 24 percent of those online now visiting a social network at least once a month. Correspondingly, online advertising spending is forecast to grow from $23,6-billion in 2008 to $42-billion in 2013. Online video, in particular, will see high growth, as spending in this area is forecast to grow to $4,6-billion in 2013. This represents a sevenfold increase from the $587-million spent on the same format in 2008. Experts predict that, by 2012 more than four out of five Internet users will watch online video ads, an increase of two thirds from 2008.

Companies are also relying on less direct approaches, such as social influence marketing. This allows online users to provide positive social influence, by word-of-mouth marketing for a product, company or website. In his article about the persuasive consumer, Josh Bernoff notes that just fewer than 50% of US adults currently online are classified as "persuaders". He describes these as "Those who tell others about products that interest them. They're brand-motivated, open to ads, and highly active in social applications. To energise persuasive customers, marketers should listen and respond to their feedback, give them content to pass around, and appoint them as product ambassadors."

The Coca-Cola Company has used the analysis of consumer conversation, in combination with traditional market research, to create and market new products for changing taste profiles. By analysing consumer conversation, the company realised that words such as 'diet' and 'light produced a markedly negative reaction among certain demographics. By understanding the nuances of words in conversations (and the behaviour that necessarily stood behind

continued on page 16

continued from page 15

them), Coca-Cola was able to recognise that there was a portion of the population that would in fact want a diet beverage if it wasn't labelled as such. Hence the birth of Coke Zero.

Hewlett-Packard (HP) is one company paving the way of social influence marketing. Over the past year it has undertaken some campaigns with social media elements. The company's slogan is, The Computer is Personal Again, and initiatives included a contest in partnership with MTV inviting participants to submit designs for a special edition HP laptop. Called Take Action, Make Art, the winner was rewarded with the design featured on an HP laptop. The event drew 8 500 submissions from youth across the world with regional winners being selected by popular vote, and the final winner being chosen by a panel of judges. The site drew five million hits.

HP has also launched a line of computers, in partnership with Vivienne Tam, targeted at fashion-conscious buyers. The line includes matching clothes and a virtual catwalk, and the initiative has attracted a lot more attention in the blogosphere than one might expect.

This demonstrates that women in particular seem to be targets for social influence marketing; this was reinforced in a New York Times article that discussed a subset of affluent women dubbed 'marketing multipliers'.

The label refers to women who spend twice as much as other affluent women on technology and fashion, and use dramatically more online and offline word of mouth to increase purchases. The study labels the subset 'powerful catalysts for purchase behaviour and brand influence.'

It goes on to say, "Marketing Multipliers have different media behaviour, especially, online, and are active contributors to the virtual world, not just passive readers.

They are twice as likely to post to blogs or to publish their own web pages, compared to other women. . . Marketing Multipliers are more likely to seek out in-depth information on products."

In the investment category, for example, 45 percent follow up on new investment products they see advertised, and 53 percent of Marketing Multipliers in the automotive category "follow information related to new safety features."

In his article on social influence marketing, Shiv Singh takes a different stance. He differentiates between brand advocates who focus on gathering product information and purchasing them, rather than spreading the word through social media sites and influencers, who are "the people who are solicited for advice while a consumer is in the consideration phase of a purchasing decision."

Singh maintains that retailers can't reach influencers because they cannot know who they are; they vary according to the purchaser. Instead, he suggests that businesses need to be more deeply integrated within social networks in order to make it easier for consumers to solicit feedback from peers.

He also suggests linking to third party review sites, leveraging employees to build online communities. Connect more directly with the offline shopping experience, and perhaps most importantly, make the product a discussion point so that it will naturally attract the attention of online conversations.

Consumerisation of technology now enhancing companies

Companies are experiencing the 'consumerisation' of technology, where consumer technologies are increasingly being adopted by companies and used to improve productivity, develop software faster, share knowledge, track projects, and make information systems more accessible to employees.

The trend is being driven in part by the entry of 'digital natives' to the workforce. Gartner analyst, Steve Prentice says, "Innovation is now coming from consumers and their favourite technologies. Consumers are increasingly in charge. They are driving the specifications of technology. They are driving disruption and changing the balance of power." Apple is one company that is looking to benefit from this trend; it is taking a 'skim and penetrate' strategy, in which it 'skims' a group of early consumer adopters, and later hopes that these adopters will evangelise the product and help it reach broader adoption."

This has also extended to social networking technology. Forrester found that 56 percent of North American and European businesses considered Web 2.0 a priority in 2008. The adoption of Web 2.0 technologies is expected to grow at a healthy rate through 2013, from US$455-million in 2007 to US$4,646-million in 2013, with social networking accounting for nearly half of spending through the forecast period.

Businesses generally are becoming adventurous in using technologies to accelerate their successes and are introducing novel approaches beyond merely adopting technologies driven by consumers. Life science companies, for instance, anticipate being able to shorten research and development processes by as much as two thirds by 2020, using virtualisation technology to predict the effects of new drug candidates before they enter human beings. Other benefits include reduced clinical trial costs.

Virtual man could ultimately evolve from the deployment of existing technologies that are connected in a new way. Models of the heart, organ, cell systems and musculoskeletal architecture are already being developed by academics around the world. Such technologies

can be used to simulate the physiological effects of interacting with specific drugs, and identify which drugs have a bearing on the course of a disease. Some companies using virtual technology have reduced clinical trial times by 40 percent, and reduced the number of patients required by two thirds.

Collaboration in product innovation

There is increasing realisation among business executives, designers, researchers, developers and manufacturers that we now are well and truly in the age of collaboration.

With geographical separation between teams, and even between team members a reality, the need for effective collaboration tools and systems has been heightened during the past year. The drive toward effective collaboration systems is being strengthened by the fact that product innovation is increasingly taking place outside of companies.

Open innovation is about how you get to ideas faster and more efficiently. It's recognising that a good idea can come from anywhere, and creating structures that can recognise good ideas more efficiently. With technology facilitating and reducing the cost of collaboration, open-source innovation offers tremendous new efficiencies to companies around the world. PwC believes that collaborative systems will be the core tool of innovation in businesses of all kinds, and that software companies in Canada have good opportunities to enhance the effectiveness of clients' collaborative efforts by supplying them with collaborative tools, products and/or Software as a Service (SaaS) solutions. Collaborative techniques are evolving rapidly as new ideas emerge from online experiences.

Wharton uses the term crowdsourcing, which it defines as open innovation allowing collaboration with partners to solve business problems. The archetype of that model is Waltham, Mass.-based InnoCentive. It matches corporate 'seekers who have science, engineering and business problems with amateur 'solvers' worldwide. The 'solvers' then compete for bragging rights and, often, token rewards, to provide the best answers to the corporate problems. "Most companies are not looking for a big innovation they can knock out of the ballpark. Rather, they want a relatively quick fix for a specific piece of a larger puzzle."

The four most widely accepted core requirements for an effective collaborative system in PwC's view are:

- A single database storing all content, enabling easy access to stored multimedia by members of the collaborating team.
- The ability to keep communication between members of the collaborative team entirely within the collaborative system and not have to use external mechanisms (e.g. conventional email, which entails leaving the confines of a collaborative system).
- Enabling secure communication with allowed parties outside the enterprise's firewall.
- The ability to store, work on and mine multimedia or 'unstructured information' rather than only conventional text and numbers.

Using consumers as innovators is another area of collaboration being explored by companies. It has the customer needs, greater loyalty and, potentially, reduced costs for customer acquisition and product development. As noted above, involving consumers in

continued on page 19

iPhone 3G

The iPhone you've been waiting for.

Now available.

DRAFTFCB/VODA105720/WATTNOW/E

The new iPhone is here. Widescreen iPod, Internet and phone. All in one super-fast 3G device.

Some features and services are not available in all areas. See your service provider for more details.

Available at participating Vodacom outlets!

vodacom
SOUTH AFRICA'S LEADING CELLULAR NETWORK

continued from page 17

product development helps to engage the Selfsumer and increase a company's visibility in online communities. Some recent examples include the shirt retailer Threadless, which sells merchandise online and now in a physical store in Chicago that is designed interactively with the company's customer base.

Peugeot invited people to submit car designs online, and attracted four million page views on its site. The company built a demonstration model of the winning design to exhibit at automotive marketing events, and partnered with software developers to get it included in a video game.

Even business-to-business companies are starting to co-create with customers. Corporate users of SugarCRM's customer relationship management software customise it to meet the specific needs of their customers' industries.

Video communications in business

Video in business is another effect of the commoditisation of technology. The consumer who uses technology has become the driver of applications of that technology in business.

Already, it is possible to search pictures and videos not only using textual 'tags,' but also by direct comparisons of faces and places. Companies providing application software and services include, Idee Inc. in Canada, VideoSurf and Digitalsmiths.

Already, webcams inbuilt into laptop computers enable inexpensive video conference calls, anytime, from anywhere. And it is not only tiny cameras embedded in smartphones and other hand-held devices that will be responsible for the emergence of video in everything.

Unstructured information and tacit knowledge

The tacit aspects of knowledge are those that cannot be codified, but can only be transmitted via training or gained through personal experience. Keys to successful real-time collaboration include:

- A single database for documents of all types;
- A single database for information of all types, "unstructured information";
- Discovery going beyond search;
- Social networking, and;
- Ease of use.

Companies remain challenged to capture unstructured and tacit knowledge. For example, traditional search and find does not always yield the desired results. Unified communications and collaboration tools integrated into social networking platforms make information and knowledge available anytime, anywhere, via any device. This is achieved by allowing users to click-to-call, click-to-chat or click-to-conference (audio, web and video) an expert or group of experts. Enterprises can facilitate the transfer of tacit knowledge. In addition, users can record the interaction, and transform it into a new document containing the knowledge of all participants. This can in turn be made available to other people.

PwC's Winter 2009 Technology Forecast notes that the current challenge facing organizations is not just to capture and mine unstructured information, but to combine it with structured data. Unstructured information is typically associated with strategic functions and tends to be captured by content management systems rather than relational databases, while structured tends to be more operational.

The empowered consumer

'Net generation' panelists who participated in PwC's day-long summit on evolving technologies and changing consumer behaviour noted the following:

Pull, don't push: While they may skip ads on their Digital Video Recorders (DVR), the Net generation says they still receive plenty of marketing, on their terms. As one Net Generation panelist noted, "It's the responsibility of advertising executives to get us to want to be involved in their marketing." The best advertising for her generation, "is not pushed on us ... be interesting," she says, "and you'll draw us in."

Be transparent: The Net generation appreciates efforts to leverage their personal information to deliver more relevant content and advertising, but companies must be upfront about how and when they use this data. "If you try and hide it, someone will find out. Who do you want your consumers to hear it from?"

Offer choice and a deal: If you want to experiment with close monitoring and use of online behaviour, allow consumers a choice of whether or not they want to participate. Better yet, give them incentives, such as discounts or free add-on services.

Make information easily accessible: Young consumers say they hear about products and services primarily through word of mouth. Once they hear about your brand, make sure it's easy for them to get information.

Incorporate the net generation's viewpoints into your operations: As one panellist aptly put it, "We all need mentors twice our age and half our age."

PwC's *2009 Technology Forecast* notes that organisations need to capture and mine unstructured information and combine it with structured data. The unstructured data is typically associated with strategic functions and tends to be captured by content management systems rather than relational databases, while structured information tends to be more operational. Software companies are using a combination of structured and unstructured information to create strategy management tools that assist modern-day management.

Watt Says

Dear Paddy,
Letter on page 43, Wattnow, May 2009, refers.

An alternative cause of global warming can be found in the book entitled T*he Chilling Stars; A Cosmic View of Climate Change*, by Henrik Svensmark and Nigel Calder, published by Icon Books, UK, 2007. The author's theory seems scientifically based (at least to the layman on the subject.) He has done experiments to prove his theory, and has much supporting evidence from a variety of scientific diciplines. He also claims that the CERN accelerator authority has agreed to carry out his experiment on a much larger scale in a year or two. Definitely worth reading (as is your magazine)!

Regards,
Austen Williams.

Dear Paddy,

Sitting with another power failure and watching the flickering candlelight playing with the shadows of the dark, the windmills of my mind started turning. . . what follows is a bit tongue in cheek, but then many a truth is spoken in jest.

Let's look at the transport scene, and, yes, the figures are all approximate but reasonably typical.

Coal is used to fire boilers to make steam to power turbines to rotate alternators to generate electricity. The overall efficiency input to output with the thermal, mechanical, electrical conversions is around 35%.

Electrical transformation and distribution efficiency is around 98%.

The AC to DC conversion efficiency to charge a storage device (battery) is around 90%.

The DC to chemical conversion efficiency in one of the best power to weight batteries like, lithium, is around 99 percent.

The battery is now used to drive an electric car, that's chemical, to electric conversion with efficiency around 95 percent and an Electric motor efficiency of around 90 percent.

So the overall input to output efficiency would be a maximum of;

100 X 35/100 X 98/100 X 90/100 X 99/100 X 95/100 X 90/100 = 26.13 percent.

An internal combustion (IC) engine has an efficiency of a maximum of around 30% while the overall for a car fitted with the IC engine could be as low as 15 percent (It all depends on what you include in the measurement process).

The thought comes to mind that electric cars are still problematic because of batteries, the Eskom woes and coal fired power stations, so perhaps we should be looking at a steam-engined car!

The efficiency could be around 35 percent and it is an ideal traction motor! It does not have to look like the century old Stanley Steamer. It could have a flash boiler, which means no large volumes of steam stored so it could be as safe as a hot lithium battery or a tank of petrol. It could be around the same size as the much-vaunted Toyota Prius. Condensing the steam back to water pushes the water usage down dramatically.

Oh and fuel, well, why not powdered or pelleted coal with an electric auto feed system.

As for smoke and fumes it might be less than all the taxis and heavy vehicles that pass me everyday.

This could be an interesting project for mechanical engineering students.

It all goes to show that while the electric vehicle has its place, the internal combustion engine is probably going to be around for quite a long time yet (even if it's powered by green fuels and not petrol). Certainly, if as much funding as is going to the South African Joule car (which is going to depend on scarce lithium for its battery) was pushed into this or some method of turning kikuyu grass into fuel we could just have a winner!

This might get some debate going!

Hopefully its positive and not just criticism.

Regards,
Viv Nel

The article on a new pipeline from Mozambique refers.

In view of the educated audience that your magazine addresses it is fairly important to perform a cross check on the claims made by Mr Matues Kathupa of PetroMoc.

The reason why it is disputable is that, until now, the landowners of the Lowveld (Mpumalanga) have not been in agreement with the project and added to this, all of the EIA regulations are not in place, rendering the target dates extremely optimistic.

Bottom line, either somebody is working from the wrong assumptions or shenanigans abound.

For feedback from the landowners you can contact their spokesperson, Stephan Schoeman. But to spare the public unnecessary emotions, can you please review your article.

Regards
Theunis Steyn

Dear Theunis,

I do not determine other people's opinions and I certainly don't dictate what they should be either. Kathupa expressed his opinions and views. He has that right. The landowners, or their spokesman, are welcome to contact me, or write to me with a rebuttal if they so choose - Paddy.

Dear Paddy

Your editorial about fostering an interest in science and technology is very significant. Since it was established in 1997, Scifest Africa, South Africa's National Science Festival sponsored by Old Mutual and SASOL Ltd, has been very successful in changing popular misconceptions and attitudes of the general public, particularly learners, towards science, technology, engineering and mathematics (STEM).

During our annual seven day festival hosted in Grahamstown, we showcase STEM through an assortment of practical activities ranging from lectures, workshops, talkshops and exhibitions presented by experts in their field. Through these we create that 'whoaE factor and ignite an awareness of and interest in the importance of science in our daily lives. At the 2009 festival, which was held in March, more than 68 000 visitors were recorded.

The challenge for South Africa is clearly manifested in our skills shortage, and the adequate range of mechanisms currently available to address these shortages effectively. In addition to the Science Festival we have various outreach programmes where we take science on-the-road. Usually to schools in rural areas of the Eastern Cape where we present science shows using common household things to show teachers that you do not need a laboratory to do science.

The fact that most of the schools we visited last year made an effort to attend the National festival this year, is testament that we are raising an awareness and sparking an interest in both learners and teachers. Scifest Africa also hosts a three day regional science festival, modelled on our national festival, in Mthatha. This is funded by the Embassy of Finland.

There is an increasing awareness of the duty and responsibility of publicly funded scientists to make their work more accessible to the general public. Public engagement and communication may not come naturally to scientists, and although most are willing to get involved, they need some assistance. The media, on the other hand, are often intimidated by science and do not know where to find credible stories, how to communicate science and how to find media friendly scientists.

Scifest Africa engages in several innovative ways to promote effective public engagement of science to place emphasis on the benefits of science, but also on areas that affect the general public and are of concern to them. These events include community picnics and science cafes. We are in the fortunate position in that we can connect all (scientists, journalists and the public) and create opportunities for all to interact. By doing so, Scifest Africa continues to grow the public's awareness and involvement with science thus fulfilling our mission to create an interest in STEM.

Regards
Vera Adams (Director)

Dear Paddy

I have been endeavouring to make up a list of "The Seven Modern Wonders of The Scientific World" with the selection criteria covering the fact that the 'wonder' could not have been foreseen at the birth of the last century and should preferably be usable by the average person. Some ideas include:

1. The Jumbo jet aircraft
2. The World Wide Web
3. The cell phone
4. Moon landing and Space exploration (reaching the moon was an impossible dream then).
5. GPS navigation (even on your golf cart).
6. Oil tankers as the behemoths of the oceans .
7. Satellite viewing of the earth via Google Earth.

Perhaps you could refine the selection criteria and then invite readers to contribute to that list.

More power to your pen; you have consistently shown that you are your own man.

Jim Kearney
Cape Town

I think this might be an excellent idea and our readers are invited to make their own submissions. We will then compile a list of the most popular submissions for a final selection from our readers. Please mail your ideas to paddyh@crown.co.za

Are you struggling to find directions and purpose?

Are you not sure what you want to do when school is over or what careers are out there?

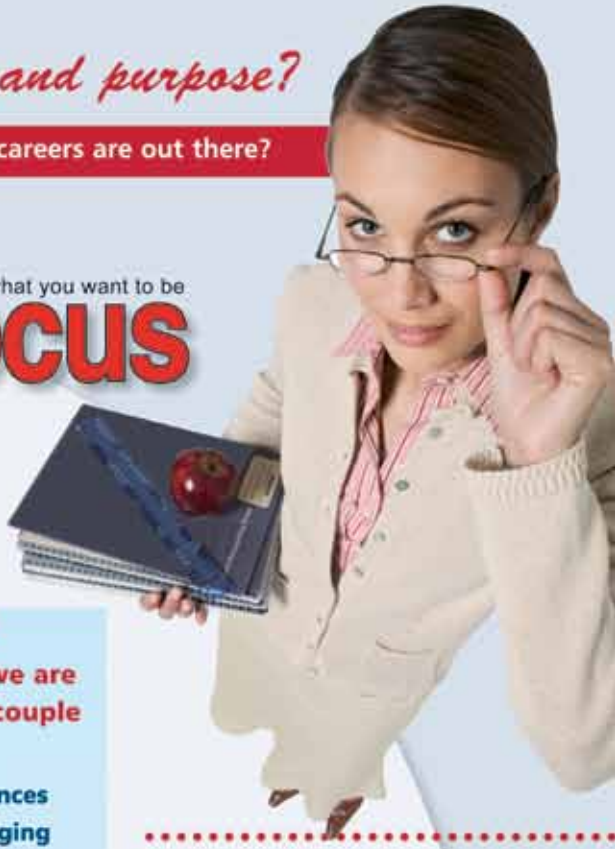
The answer is here!

Sturdy file available!

SA Career Focus

Be what you want to be

- Book & CD reviews
- Job info from people in the industry
- Start your own business - full guide
- Sports, Hobbies & Part-time Jobs
- Why subjects are important, etc.



SUBSCRIPTION FORM

10 ISSUES AND A FILE FOR ONLY R 300.00 (SOUTH AFRICA)

SUBSCRIBER'S POSTAL ADDRESS:

NAME **TITLE**

ADDRESS

CODE

TEL (08h00 - 16h30) ( ) MOBILE

E-MAIL

GIFT SUBSCRIPTION POSTAL ADDRESS:

NAME TITLE

ADDRESS

CODE

TEL (08h00 - 16h30) ( ) MOBILE

E-MAIL

PAYMENT Banking Details: Standard Bank, Lyttelton
Branch Code 010945, Acc No 011731621

☐ FILE + ONE YEAR SUBSCRIPTION R 300.00 ☐ New

☐ ONE YEAR SUBSCRIPTION ONLY R 250.00 ☐ Renewal

Cheques payable to: SA Career Focus

EFT ☐ MASTER CARD ☐ VISA ☐ CASH ☐ CHEQUE ☐

CARD NUMBER

EXPIRY DATE M M D D CVC

I authorise a deduction of R _____
from my credit card

SIGNATURE

ISSUE CALENDAR
(mark only 1 issue as start issue)

Back issues available from September 2006
Contact our office on 012 664 3264

Jun/Jul 2007	☐	Aug 2007	☐
Sept 2007	☐	Oct 2007	☐
Nov/Dec 2007	☐	Jan 2008	☐
Feb 2008	☐	Mar 2008	☐
Apr 2008	☐	May 2008	☐

10 successive issues from earliest issue marked will be posted

FOR OFFICE USE ONLY

Date received	D	D	M	M	M	M	Y	Y
Date posted	D	D	M	M	M	M	Y	Y
Subscriber no.								

POST TO: P.O. BOX 14138, LYTTELTON, CENTURION, 0140
WEB www.sacareerfocus.co.za
PHONE 012 664 3264 / 086 MY WORK FAX TO: 086 615 9279

Just a little sneak preview of what we are up to in the next couple of months...

- **Biology & Life Sciences**
- **Printing and Packaging**
- **Beauty & Hairdressing**
- **Business & Management**
- **Retailing**
- **Foreign Services**
- **Aviation**
- **Medical**
- **Technology@work**
- **Running your own Business**
- **Hobbies**

Whether you've made up your mind, still looking or still learning, SA Career Focus is the ultimate guide!

Valuable career guide for teachers, learners and school leavers!

From crystal receivers to high definition TV

As world attention focuses on South Africa for results from the Confederation's Cup – a precursor to the 2010 FIFA World Cup – the pressure on the South African Broadcasting Corporation and its associated organisation, Sentech, responsible for the broadcast signals, is going to increase steadily.

To provide a world class broadcast signal, Sentech has spent hundreds of millions of rands upgrading its equipment so that when the opening game of the 2010 World Cup is televised live to millions of viewers around the world they will receive great pictures and great sound too.

But the televisions services and the radio signals that emanate from the stadia around the country are a far cry from the first broadcasts made in this country. For it was in 1923 that General Jan Smuts, Prime Minister of South Africa at the time, spoke from the Johannesburg studio in his high-pitched, squeaky voice, to an audience in Cape Town via a 500 W medium wave, amplitude modulated transmitter. The people heard what he was saying and the radio broadcasts had begun.

Of course, at the time there was no broadcasting corporation, there were no masts, transmitters or advanced, transistorised equipment. You see the broadcasts actually started with music concerts that were organised by the Broadcasting Committee of the South African Railways.

Exactly why the South African Railways was chosen to broadcast music concerts to hundreds of people remains a mystery but the broadcasts went ahead, nevertheless, from the old headquarters of the Railways in Rissik Street, Johannesburg where, for years, the famous Blue Room restaurant was housed.

In those days – and for years afterwards, the railways was an enterprising and technologically advanced organisation, which, as it grew in size and stature developed a great sense of history and that history was encapsulated in the Blue Room, with solid silver cutlery, fine china and, surprisingly the entire collection of one of South Africa's greatest artists, JH Pierneef.

As the music concerts grew in popularity and more people tuned in with their crystal receivers, the Post Master General was authorised to provide a broadcasting licence to anyone who wished to operate what was then called a radio telephone service.

The fact that the Postmaster-General was chosen for this task is perhaps not as much of a mystery because the Department of Posts and Telegraphs was responsible for the transmission of telegrams and telegraphy services throughout the country and also controlled the use of telephones. So to include radio telephone services in its portfolio made sense.

The first regular broadcasts were undertaken by a broadcasting company that was owned by Associated Scientific and Technical Societies of South Africa (AS&TS), which was housed in Kelvin House in central Johannesburg. The South African Institute of Electrical Engineers was one of the organisations that belonged to the AS&TS.

The fledgling broadcasting company, AS&TS Broadcasting, began transmitting in July 1924 and it was followed, soon after, by localised broadcasts from the Cape Peninsula Publicity Broadcasting Association in Cape Town and then by broadcasts from the Durban Municipality.

Durban began transmitting radio signals in December of 1924 and it was the very first municipally-controlled radio station in the world. The three companies, in Durban, Cape Town and Johannesburg were authorised to collect licence fees from listeners within a specified radius from the broadcasting stations – and so three new businesses were born.

continued on page 25

Vulnerability Management

Intrusion Prevention

E-Mail & Web Security

Anti-Spam

Anti-Spyware

Anti-Virus

Accurately identifying and prioritizing vulnerabilities is critical to staying secure. Even more important is knowing how a security weakness will impact your business. Which is why you want McAfee®. Our proven, comprehensive solutions, including McAfee Foundstone Enterprise, help prioritize and eliminate business-critical vulnerabilities across your entire global network. Backed by more than 15 years of experience protecting and supporting our customers, McAfee can secure your business with the same expertise that has made us the leading private security partner to the U.S. military. Discover why McAfee's software, hardware, and services are a proven way to secure your business at www.mcafee.com/enterprise

McAfee®
Proven Security™

continued from page 23

A typical saellite teleport.

The receiving sets were unwieldy, large and often unreliable but as soon as the broadcasts began, pirate listeners – who had naturally not paid any fees at all – sprang up all over the country. One by one the companies failed as they couldn't collect enough money to keep the services running and advertising on radio was still unheard of.

At this stage top South African businessman, John Schlesinger was watching the development of radio with interest. Radio tweaked his interest and his business acumen recognised that the growth potential was enormous. So he applied to the government for a ten-year concession to operate a broadcasting service under the name of African Broadcasting Company.

At the time, South Africa's Prime Minister, General JBM Hertzog, was always watching the development of radio with interest. However, he wanted specialised knowledge and advice so he was he invited Sir John Reith (later Lord Reith) to visit South Africa and to advise him on broadcasting matters.

At the time, Reith was the director general of the British Broadcasting Corporation, which was established an international reputation for quality broadcasts or relevant content that would appeal to anyone with a radio set.

Reith agreed to visit South Africa and assist Hertzog. He made a thorough study of the situation in the country before recommending to Hertzog that the South African government not renew Schlesinger's ten year concession and instead set up its own public utility corporation to control radio broadcasts.

That's precisely what Hertzog did and the South African Broadcasting Corporation was formed in terms of the Broadcasting Act (No 22 of 1936). It was mandated to take over the broadcasts from Schlesinger's African Broadcasting Company and in August 1939 the SABC broadcast its first programmes to listeners in various centres around the country.

Because of the importance of broadcasting the Minister of Posts and Telegraphs, Mr T Boydell had established the first Broadcasting Board in 1924. It was this board's role to act as the liaison body for all matters relating to broadcasting and among its first rulings was the fact that anyone who possessed a receiving set that enabled them to tune-in to a transmission would have to pay an annual fee of £2,00 to the broadcasting company and a fee of five shillings to the Department of Posts and Telegraphs.

This provision remains in force today, although it's no longer necessary to pay a supplementary fee to the Department of Posts and Telegraphs or any other government department. In terms of the Act, a licence fee must be paid for any television set or device (including a computer card) that is capable of receiving a transmission signal. Moreover, the fees are considerably higher than the paltry £2,00 charged at the time.

Announcers who were used on the early broadcasts were destined to become celebrities and household names, much like the announcers of today and some of the pioneering broadcasters included Gordon Bird of Cape Town, Buster Brown who worked in Johannesburg and Peter Parker, the voice of Durban.

It was several years before Afrikaans speaking people were able to listen to broadcasts in their own language and several more years before the various black languages were broadcast too. On the musical side, Theo Wendt and Jeremy Schulman were among the first regular broadcasters of music programmes from the SABC and they were both, successively, appointed as the conductors of the SABC Symphony Orchestra, which remained in existence for years and was led by such famous musicians as Edgar Cree, Leo Quayle and Francesco Mander.

Rapid progress was made both in terms of technological improvements to the transmission equipment and in terms of the receivers, which were getting better and better and smaller and smaller.

continued on page 27

NEW ENGINEERING CONTRACT (NEC) TRAINING FOR EMPLOYERS, CONSULTANTS, CONTRACTORS AND SUB-CONTRACTORS

- Engineering and Construction Short Contract
- Engineering and Construction Contract
- Professional Services Contract
- Term Services Contract

chris@tcq.co.za wanda@tcq.co.za

www.tcq.co.za

TCQ Strategies cc
Tel: 011 475 2501
Fax: 011 675 0491

ENGINEERING COUNCIL OF SOUTH AFRICA ACCREDITED
SERVICES SETA ACCREDITATION: RECORDED

continued from page 23

Satellite uplink and downlink equipment.

In the late 1950s, shortly before South Africa was granted its independence from Britain the SABC was broadcasting in English, Afrikaans and 11 black languages, but it was still dissatisfied with the fact that it was not broadcasting nationally. So, in 1960, a £17-million scheme was announced that would see 100 transmitting masts and 500 transmitters using the VHF/FM signal being set up at various sites so that a radio signal could be received anywhere in the country.

It also created its own external service and was broadcasting on short-wave using powerful short-wave transmitters that had a total strength of 1 000 kW. By 1966, a special, powerful short-wave transmitting station came into being at Bloemendal, near Johannesburg, to enable broadcasts from Johannesburg to reach Namibia (then South West Africa), which had repeatedly been unable to receive a clear signal.

Shortly after, one of the highest masts in Africa, the Albert Hertzog Tower in Auckland Park was erected and programmes were beamed across the nation from there – just as they are to this day.

Nearly all the studio equipment used by the SABC was manufactured in its own workshops and it was one of the first broadcasting organisations to use completely transistorised equipment that it had made itself. The SABC built its own tape recorders, turntables and studio control desks.

It was here, in these workshops, that hundreds of young radio engineers and technicians received the essential training that would equip them to work in broadcasting organisations anywhere in the world.

By 1969, the SABC was broadcasting 15 separate stations, 14 of these for internal services and one external service. It was at that time the legendary Springbok Radio service was at its peak, broadcasting for 132 hours a week and attracting advertising from a wide cross section of manufacturers and retailers around the country.

The SABC had also set up its own news-gathering service and was producing 166 news bulletins a day in the various different languages.

Because of the importance of radio transmissions, Prime Minister B J Vorster announced that the Broadcasting Act – administered by the Minister of Posts and Telegraphs – was henceforth the responsibility of the Minister of National Education. Clearly Vorster realised the propaganda value of the radio services and wanted to control their content even more tightly.

South Africa was probably the very last country in the world to start broadcasting television signals and it was only in January 1976 that South Africans were able to watch television. When the transmissions started there was a single channel divided into English and Afrikaans. By the end of that year there were two television stations and 19 radio services.

Of course progress since then has been rapid and varied. There are three television channels run the SABC, an independent channel from E-TV and a plethora of local, independent radio stations to choose from. The liberalisation of the broadcasting means that a range of radio services are available via Internet and, once South Africa's bandwidth improves, there will be innumerable overseas television channels to choose from too.

Broadcasting in South Africa has come a long way since the first, crackling transmission was undertaken in 1923. And, of course, it's South Africa's engineers, many of them members of the SAIEE who have made a significant contribution to the development of this fundamental broadcasting medium.

Today, we have one of the biggest sports broadcasters in the world and we have an existing Pay-TV channel that beams its signals all over Africa. Yes, in some respects broadcasting has come of age and yet, in the years ahead even more sophisticated advances will be made.

The beauty of versatility




We are proud of our history in lighting, but prouder still of our future. Today we are leading in most of our businesses on most continents. As market leader we want to be recognized by all our stakeholders as setting the pace in the industry. We want to be recognized as the best partner to do business with, the best company to work for and to invest in, and as a responsible citizen contributing to sustainability of the society at large. We are excited by the changes happening in the lighting industry, giving us ample opportunities to shape our own future by showing leadership. We will witness a transformation from conventional light sources to solidstate lighting. Following recent acquisitions, we are very strongly positioned right across the solid-state lighting value chain. To take full advantage of the changing landscape we are actively moving closer to the end-user application by increasing our presence in professional and consumer luminaire systems.

Old technologies are being banned for their nuisance on the environment while new ones offer great opportunities. Urban lighting is one of the areas where many energy-saving options can be uncovered. The needs of urban lighting are changing. It is no longer simply a matter of providing enough light in our towns and cities to ensure visibility and security. Today, lighting is increasingly being used to create a nocturnal environment in which the city takes on a new identity, making it more appealing to and redefining the relationship it has with its inhabitants.

Save the night

A civic awakening can be seen on pure lighting topics, like night preservation and light nuisance on facades. Because of its careful optical engineering, CitySpirit limits or suppresses the upward spill light, and helps to protect the night skies. But sometimes the best lighting installation can be felt obtrusive by citizens, especially when light from the street enters their baby's bedroom. For these cases Philips has developed a range of light trespasses, that can be freely fitted inside the luminaire after it has been installed, preserving its looks, while reduce the light level on facades up to 50%. CitySpirit therefore means quiet nights.

LEDs provide an unparalleled way of illuminating our urban environment in an exciting and practical manner. They are highly adaptable, allowing designers to move away from the static lighting of the past and venture into creating flexible ambiances that could, for example, change with the weather or the season, and provide an extra festive colour on public holidays. And all this with energy consumption that is only a fraction of conventional lighting techniques.

CitySpirit range has been designed to create unobtrusive luminaires. Transparent materials lighten the daytime appearance of the luminaire whilst the inner components, pole mounts and covers are made of aluminum to ensure they are sufficiently robust. The new lighting system is extremely energy efficient and uses the revolutionary new Philips Cosmpolis lamps and control gear. These offer energy savings of up to 50% compared to older street lighting solutions whilst also offering a very high quality of white light.

Daytime appearance, night time effects

CitySpirit's innovative design was conceived to discretely blend into the urban environment. The transparent housing reveals honestly the optical engine and limits the visual impact. Its stylish look conceals a rugged, high-strength aluminum construction that guarantees protection for the optic, lamp and gear, resulting in a total IP65 rating. CitySpirit comes in several designs, along with a wall-mounted version and a dedicated bollard.

CitySpirit Street Color

CitySpirit Street Color is a high-performance luminaire designed for city centres and shopping streets. It combines a high-performance reflector for efficient street lighting with a translucent diffusing housing
that creates a friendly, colorful lighting effect. CitySpirit Street Color is available in two versions. The Ambient Light Effect version provides soft guidance thanks to the perforated optic, while the LED models either static (8 colours0 or dynamic (4 preset cycles) can be used to create an attractive ambience that brings the street to life.

Philips CitySpirit Cone

Designed for pedestrian zones and parks, Philips CitySpirit Cone features a geometrical design and transparent day-time appearance. It offers a choice of optics including innovative indirect optics for use with compact lamps for symmetrical, asymmetrical or bi-directional light distribution.

Philips CitySpirit Modern Lantern

Philips CitySpirit is a range of urban-lighting luminaires incorporating environmentally friendly technologies that deliver excellent lighting without compromising on architectural appearance. Designed for residential streets, Philips CitySpirit Modern Lantern casts a traditional design in a new form, which includes a diffusing top reflector and a wide choice of lamps and optics.

Philips CitySpirit Bollard

Philips CitySpirit Bollard is part of the range of urban-lighting luminaires incorporating environmentally friendly technologies that deliver excellent lighting. In green areas or at the entrance to a building, bollards can add the finishing touch to an installation whilst also providing guidance. Offering a choice of lamps and optics, including the dedicated Light Trespass accessory, this bollard makes lighting designs possible and completes the family.

Application areas

Because every application deserves to be illuminated adequately, we have created several new optical concepts which address issues like spacing, night preservation, comfort and light trespass and are suitable for any application.

Green Flagship

The MASTER CosmoPolis lamp and its electronic gear make it possible to increase spacings by up to +15%, while enabling a 50% reduction in CO^2 emissions. Combined with highly efficient optical systems, benchmark energy consumption can be achieved. Assembled without glue, with all plastic parts coded for traceability, CitySpirit is easily recycled, complying with RoHS and ready for WEEE. On the basis of its environmental performance, CitySoul is being presented as candidate for a Philips 'Green Flagship'.

For more information, contact: Deborah Mamabolo at Philips Lighting Southern Africa on 011 471-5000. Or visit our website: www.lighting.philips.com

www.asimpleswitch.com

Simplicity is re-humanising the urban environment.

Cities and towns should be warm, inviting places that people enjoy living in and visiting. Philips CitySpirit Street Color, combine high-quality lighting with outstanding energy efficiency. Installation is quick and straightforward.

The V shape of this mast makes its perception vary, depending on the perspective and light conditions. They can be freely fitted inside the luminaire after it has been installed, preserving its looks, and reducing the light level on facades up to 50% - resulting in lighting levels below 25 lux.

PHILIPS
sense and simplicity

www.lighting.philips.com

Microsystems:
design automation and affordable fabrication

A CSIR President's lecture was delivered in March this year by South African-born Professor Jan Korvink, now at the Freiburg Institute in Germany, Department of Microsystems Engineering. Peter Middleton reports.

Germany is probably one of the most advanced industrialised countries in the world and it certainly has a roads infrastructure that is more sophisticated than almost any other country in the world too. Its autobahns are legendary and while not all of them are free of speed restrictions, there are large swathes of highway that criss-cross the country allowing motorists to blast along at speeds of more than 250 km/h.

Yet, as Korvink points out, the country actually has a 'remarkably low number of deaths' from traffic accidents on autobahns through the country. Surprisingly, there has been a 2,5 fold increase in the number of cars on the 'speed limit free' German roads, but there has been no increase in the number of fatal accidents.

What are the reasons for this? Korvick points to the strict enforcement of safety belts law, firstly, followed by other measures to protect human life such as airbags, anti-locking brakes, tyre sensors and a plethora of microsystems that have "rendered cars – despite increases in power and speed –extremely safe." Each one of the safety sensors and devices in a modern car contains a microsystem or a micro-electro-mechanical system (MEMS).

MEMS is the result of electro-mechanical systems having got smaller and smaller over the years. The reason? "Smaller systems, of course, consume less power and become more reliable, but more importantly, they work and respond better and you can pack an enormous amount of functionality into these systems."

Korvink clarifies the size difference between micro and nanotechnology as larger than and less than the wavelength of visible light, ie, 400–700 nm, so in principle, he tells us, micro-devices are not invisible.

Niche markets

"Building a microsystem is an expensive business and it only makes sense if you make many of them, and keeping costs down is imperative. If millions of a part are needed per year, then you can go to factories, like CMOS and get them made," explains Korvink. "But if you are in a niche market, then you need to do something else, and it is these markets that I intend to focus on today," he says. "You need components, good design tools, good quality manufacturing processes and you need resources, human resources and well equipped laboratories."

Design methodologies and the particle models

"I am very much convinced, that particle models pose very interesting alternatives to finite element models, and that these may eventually be merged with finite element methods to produce a completely new way of looking at simulation," says Korvink introducing his design topic. "From a microsystems point of view, we can very naturally handle fluids with free surfaces, complex reologies and confined fluid dynamics – and also make the jump from macro- to micro- to nano-scale simulation. He shows a dynamic model of a water droplet modelled using 200 particles. "This is quite a simple model but you can already see both the dynamics and the natural droplet formation," he points out.

At Freiberg, Korvink and his team have been using particle modelling to investigate injection moulding for ceramic micro fabrication processes to make very small parts – an alternative to the silicon manufacturing processes. "Binder, plastic and powder feedstock is injected into a mould of around 100 µm. These are then taken out and sintered to give hard metal or ceramic parts," Korvink explains. "The process is different from silicon in that you can use very hard materials like tungsten or zirconium oxide as a ceramic for high temperature applications.

"Particles not only carry themselves They can also carry energy, powder and plastic separately," explains Korvink. By using particle modelling techniques, Freiberg has been able to redesign moulds for this process to get good parts and avoid problems caused by string formation.

Particle modelling methods can be applied to injection moulding, casting and electro-wetting, ink-jetting and nano-tubes and can possibly be extended to fluid structure interaction, ie, droplets interacting with a polymer film. Adoption barriers include computational time, interaction force problems – how to form the interaction forces and course grain theory. "But these I see as mandates for research."

Topology optimisation in design

"It is perhaps impossible to automate design, but we can support design with powerful tools. Topology optimisation typically runs cyclic simulations, finite element analysis and sensitivity analysis to find out where best to put the material in the design of structures – size shape and topology."

Korvink describes its use on electrically activated grippers – thermal, electrical and mechanical devices made to move because a change of thickness causes differential heating when a current is passed through them. The polyoptimisation technique can give you the final layout of the micro-device to use.

This design procedure can mix topology, shape and size optimisation, can deal with multiple materials, is already compatible with commercial tools and has been tested and compared with real designs, so it is fairly robust. On the down side however, "it is not simple to apply and you need to be an expert user," warns Korvink. Also the definition of the model constraints makes the process very time consuming.

The fabrication of wire coils.

Coils in the micro domain are wound into inductors, transformers, motors, and springs. Korvink shows video images of an automatic wire bonder, which is able to make 31 wire connections every second. This is an established technology but Freiburg has modified a commercial machine to make 20 magnetic resonance coils per second using gold wire – for magnetic resonance imaging machines. This technology has tremendous features, Korvink tells us, and is already mass production compatible.

Inkjet printing: A low-cost factory technology

Typically, this involves using cartridge printers with functional fluids instead of ink. "We have also just received a new machine from a Dutch company that can modify the atmosphere of printing and allow us to work with ultraviolet," Korvink tells us. On the microscopic scale, surface tension completely dominates over gravitational effects. The first challenge is to produce reliable droplets – of exact size, moving in a straight line at a reliable velocity towards the substrate. Secondly, droplet behaviour on the substrate needs to be controlled. "Solvent evaporates faster at the edge of a droplet, so particles move towards that edge and away from the centre. During fabrication, you want to be able to print discs rather than rings," he explains.

"We are currently using the process to print conductive tracts (silver) with high conductivities, for rapid prototyping. There are a huge number of materials that you can deposit with fine resolution, perhaps fine enough for most microtechnology applications. Also, you only deposit material where you need it and you are mask free.

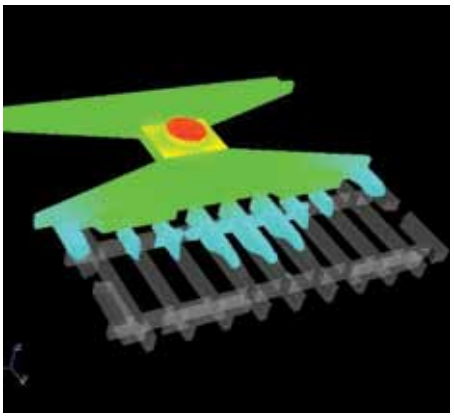
MEMS resources

"Laboratories seed new ideas and new ventures – and to start up new ventures we need people, people doing research," says Korvink in his conclusion. "Good equipment is essential and the resolution of equipment needs to be kept up to date with the resolution demanded by industry.

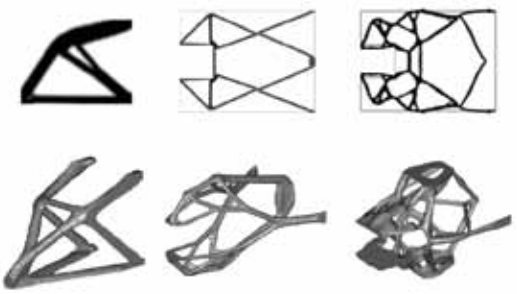
"Applications ultimately define where we want to go, fabrication governs how we do it and design helps to make the best out of it. To do any of this, we need people and an education system that will constantly supply us with well qualified people."

Korvink concluded by thanking his colleagues, his research group and students, the CSIR and its Material Science and Manufacturing unit.

The CSIR has organised a microsystems conference for later this year, with Professor Jan Korvink as a key international speaker.



A particle model of the injection moulding process. Microgears are at end of mould tree. The material entry point is red with the colours represent pressure.



Topology optimised microgripper shapes showing 2D and 3D freeforms during optimisation.

Jan Korvink – professor in the department of Microsystems Engineering (IMTEK) and co-director of the school for Soft Matter Research, Freiburg Institute for Advanced Studies (FRIAS) – delivers the CSIR President's address.

Pipelines — Gauteng's fuel life-line for 2010

With millions of new vehicles on South Africa's roads, the inland regions are expected to face fuel shortages from 2010 unless a new pipeline from Durban to Johannesburg is fully operational and is pumping different petroleum products to storage farms along the route.

This pipeline – along with a second pipeline — running from Matolo Harbour in Mozambique to Kendal in Mpumalanga – are at the heart of a number of disputes between the National Energy Regulator of South Africa (Nersa), state-owned Transnet Pipelines, the Ipayipi consortium, independent pipeline company, Petroline and other independent oil producers.

The Durban-to-Johannesburg pipeline has been designed to carry a number of different petroleum-based products including diesel, high and low octane petrol, and aviation fuel, among others in 'slugs' along the entire distance of the 700 kilometre pipeline. It will cost about R12-billion to complete.

Competing bidder, black economic empowerment firm Ipayipi was refused a licence by Nersa for this pipeline amid allegations that the process adopted by Nersa for awarding the licence to Transnet Pipelines was flawed and discouraged competition.

Nersa says that the new 24-inch pipeline (incidentally, pipelines sizes are globally referred to in the imperial measurement rather than the metric measurement although it's obviously possible to convert the figures) will be operational by the third quarter of 2010 when fuel shortages are likely to arise in inland areas.

The existing 12 inch pipeline is able to carry a maximum of 74-million litres of refined petrol products a week, well below the inland requirement for fuel.

Industry analysts say that demand for petroleum products is expected to reach 17-billion litres by 2010, up from the current average of about 14-billion litres. By 2030, in just 20 years times, demand for petroleum products is projected to reach a staggering 40-billion litres a year.

Referring to the awarding of the licence for construction and operation of the New Multi-Product Pipeline (NMPP), Ipayipi spokesman, Clifford Elk accused Nersa of bias claiming that the Ipayipi project was cheaper than the Transet Pipeline bid and, by awarding the contract to an independent company, Nersa would have fostered competition in what is a tightly controlled, highly regulated, petroleum industry.

Elk says that there are many unanswered anomalies in the Transnet bid and the most important of these, he says, is how Transnet intends to finance construction of the pipeline itself. Elk also accused Transnet of making "substantial changes" to its initial bid and says that these changes have yet to be exposed for public scrutiny.

Of course the funding of the new pipeline is at the heart of a dispute between Nersa and Transnet Pipelines anyway. In November last year, Transnet Pipelines submitted its 2009/2010 tariff application for the existing petroleum pipeline, the new pipeline and the storage depots run by the organisation.

Transnet Pipelines initially asked for an 82,5 percent increase for the coming year, followed by a 73,5 percent rise in 2010/11 and then a decrease in tariffs of about 13 percent for the year after that. It also asked Nersa to approve a 5,32-cents-a-litre storage charge for petroleum products stored at the Tarlton facility west of Johannesburg.

In February this year, Transnet Pipelines revised its construction schedule for the NMPP and submitted a revised application for an increase of 74,42 percent.

Transnet's reasoning for the tariff hikes is that for the two years it will take to complete the pipeline (the current phase) the NMPP

represents a huge financial risk for Transnet Pipelines and holding company, Transnet itself.

Transnet Pipelines says that the shortfall of funds generated after the proposed tariff increases cumulatively amounts to R9,4-billion and this shortfall in cash will have to be funded in debt capital markets where borrowing, in the current world economic crises, is difficult and expensive.

Transnet Pipelines, in its applications, warned Nersa that failure to grant the tariff increases would cause "significant financial prejudice" to Transnet itself.

According to the company, tariffs will need to rise by 156 percent over the next four years to cover the costs of building the NMPP. The increase means a 12 cents-a-litre rise in 2009/10 and 23-cents-a-litre hike for five years after that.

Transnet contends that the NMPP will remain the most economical way to transport refined petroleum products to inland areas.

Despite Transnet's appeals and its wordy justification for the tariff hikes, Nersa was not persuaded by the arguments and threw out the application in its entirety as it promptly reduced tariffs by 10,38 percent for the 2010 financial year.

This amounts to a decrease of 1,37 cents-a-litre for petroleum products bought in Gauteng and other inland regions. Nersa says that it is not responsible for helping Transnet to recover the costs of its investments.

Until the new pipeline is operational, Nersa is not prepared to consider any tariff applications from Transnet Pipelines (or any other entity for that matter). Nersa contends that Transnet should not be allowed to use tariff increases on its existing infrastructure to finance expansion of its asset base.

Dr Rob Crompton, Nersa's member responsible for pipeline construction, says that Transnet was trying to justify the tariff application on the basis that it needed cash to complete the new R12-billion NMPP.

Other inland refiners who objected to the tariff application claimed, in their representations to Nersa, that more than 60 percent of any tariff hike would benefit the inland refineries Natref and Secunda and would provide a windfall of about R1,75-billion a year for these operations.

Crompton (and Nersa for that matter) are quite categoric about turning down the application because, in terms of the existing law, Nersa is only able to set tariffs for existing pipelines that are fully operational.

The pipeline charges vary considerably in different parts of the country but in essence the route from Durban via Coalbrook to Tarlton will attract a levy of 11,67 cents-a-litre and the same route to Waltloo outside Pretoria will cost 11,880 cents.

Transnet Pipelines controls a rather complex network of existing pipelines broken down as follows:

- The liquid fuels network with 32 pump stations and depots in KwaZulu-Natal, Free State, Gauteng, North West and Mpumalanga.
- Petroleum products are injected into the pipeline at Sapref and Enref, the inland crude refinery at Coalbrook run by Natref and at the synthetic fuels plants of Sasol I and II at Secunda.
- A gas pipeline from Secunda to Durban via Empangeni with offtake facilities at Newcastle, Richards Bay and Empangeni.
- The pipelines range in size from six inches to 20 inches and each one complies with the American Code ASME B31.4 for liquid fuels and B31.8 for gas. The maximum allowable pressure is up to 100 Bar for petroleum and 59 Bar for gas.

The pipelines are monitored for 24 hours a day from the Master Control Centre at Transnet Pipelines' head office in Durban. The organisation uses remarkable inspection tools known as intelligent pigs to check the internal integrity of the pipeline.

Currently Transnet Pipelines carries about 77 percent of all petroleum products from coast and inland refineries to independently-operated depots around the country. A secondary network of road and rail transportation carries the product from the pipeline endpoint to its final destination.

Transnet's Tarlton depot provides petrol to Botswana whereas the Waltloo depot is responsible petrol distribution to Zimbabwe and other African countries. Transnet has conceptual plans for extending its existing pipeline from Pretoria to Zimbabwe at some time in the future.

The NMPP trunkline will start in Durban and cover about 700 kilometres to Jameson Park in Gauteng following much the same route as the existing pipeline. The pipeline starts at the Durban harbour, heads south towards Amanzimtoti before turning and starting the inland journey, skirting Pietermaritzburg on the eastern side of the city.

Its route takes it via Howick and Estcourt towards the Drakensberg, which it crosses at Van Reenen before heading across the flatter Free State via Warden, Vrede and Villiers, bypassing Balfour and Heidelberg to reach the Jameson Park inland terminal.

A coastal fuel terminal in Durban accumulates the fuel, which is pumped via eight pump stations to the inland fuel terminal from where it is distributed to depots using the inland pipelines.

An extensive dossier of comments from public participants, landowners, consulting engineers and other skilled professionals has meant that minor changes to the route have been undertaken at different times to, for instance, preserve some historical site, to minimise fragmentation of existing farmlands or to ensure that dams, rivers or natural wetlands are protected.

From the Jameson Park terminal, fuel is distributed along a new pipeline that runs via Alrode to Langlaagte in Johannesburg, a distance of about 70 kilometres.

While Transnet Pipelines is pressing ahead with plans to complete the pipeline on schedule there has been no further indication of how or where it will raise the funds needed

continued on page 35

Endorsed by

the dme
Department:
Minerals and Energy
REPUBLIC OF SOUTH AFRICA

Eskom
www.eskom.co.za

etaAWARDS
TURNING IDEAS INTO ENERGY

DR ANTHONY KEEN – 2008 WINNER OF THE eta AWARDS: RESIDENTIAL CATEGORY

A whole year of living on a small yacht on the ocean is enough to teach a man the difference between a whale and a shark. But that he could learn, out of the experience, how to conserve electrical power and come out to demonstrate the possibilities on land is even more impressive.

Dr Anthony Keen's laudable scheme, which earned him a prize as the winner of the ***eta*** Awards' 2008 residential category, was born during a 12-month period living on the open-seas where he had minimal electricity and fresh water.

The ***eta*** Awards is an annual event sponsored by Eskom. It has been running for the past 20 years. Its objective is to promote and reward the more efficient use of energy.

Since 1982, Dr Keen, a retired medical doctor and former academic at the University of Cape Town, has been on a mission to prove that it is possible to reduce energy consumption in an ordinary suburban household without impacting significantly on his lifestyle. He has demonstrated the measures in his own five-bedroom home in Rondebosch, Cape Town.

"The 26-year programme of gradual electrical power saving in my home was to show that it is possible, by simple measures, to reduce energy consumption down to a level at which renewable forms of energy generation might become feasible", Dr Keen said.

Dr. Steve Lennon, MD of Eskom Corporate Services Division; Dr. Anthony Keen and Ms Thandeka Zungu, Deputy Director General for Corporate Services, Department of Minerals and Energy.

The first milestone was achieved in 1984 with the installation of a solar water-heating system. "This was by far the most significant step in reducing energy consumption. It proved an efficient means to supply a family of two adults and four children," he said.

Dr Keen gradually introduced a variety of further smaller energy saving measures between 1986 and 2006. These include an additional insulation to the hot water system and piping, glass wool and spun polyester insulation above the ceilings of the living rooms. Draughts were reduced from ill-fitting doors, normal bulbs were replaced with compact fluorescent lamps and energy efficient household appliances replaced high electricity consuming ones.

Dr Keen believes what he has done in his home is achievable and can, in fact, be easily replicated in other South African households. "Many of my projects were DIY and so I saved on labour expenses. But the principles are applicable to every household. South Africa is blessed with abundant solar energy. Use it!

To those who believe energy efficiency gets in the way of a modern lifestyle, Dr Keen had this to say: "You are ignorant. Energy efficiency requires a change of attitude more than a change of lifestyle."

Energy efficiency is part of Eskom's drive to ensure sustainable electricity supply into the future and is the core focus for this year's ***eta*** Awards. There are eight categories which one can enter: Industry; Commercial; Residential; Women in Industry; Woman in Community; Power Fitness, Innovation and a prize for Young Designers.
Each category winner receives R30 000.
The two runners-up get R5 000 each.

Eskom encourages those who have exciting and innovative projects in any of the categories mentioned to enter them for the 2009 ***eta*** Awards.

For more information on the *eta* Awards and how you or your company can enter, please visit www.eta-awards.co.za or email Anna-Marie Roux on amroux@mweb.co.za.

continued from page 33

to pay for the construction work that is already underway.

However, as the government is the sole shareholder in this organisation, the likelihood is that, if necessary, the government itself will step in to keep Transnet afloat and petrol flowing to the inland refineries and depots.

On the eastern side of South Africa, construction of another new pipeline is soon to get underway if the Mozambican and South African participants are to be believed. This pipeline will be used mainly to carry gas from the Matola Harbour in Mozambique to Kendal in Mpumalanga.

Interestingly, though, Transnet Pipelines is in the process of linking its Waltloo depot, east of Pretoria with the Kendal depot so that extra fuel can be supplied to the Greater Johannesburg area or to countries north of South Africa's borders.

An irate reader of WATTnow, Theunis Steyn, sent me a letter refuting an article recently published about the new pipeline that will be built. He claims that the spokesman quoted in the article, Matues Kathupa, is "extremely optimistic" because the final environmental impact assessments have not been completed.

He sent me supporting documentation in the form of a Letter of Intent from the Crocodile River Alliance that alleges fatal environmental flaws that will threaten the water security of Mbombela amid claims that the project developers are manipulating the presentations made to the public.

The alliance is apparently dismayed with the decision to grant permission as a site earmarked for the development of housing is now going to become a petrol depot.

PetroLine, the company that's building and operating the new pipeline has, on numerous occasions, published documents that state the Mbombela stage of the pipeline development is the subject of an independent environmental impact assessment and, as a result, the final route has not been decided.

SRK Consulting was commissioned to hand the EIA and produce the final scoping report, which was published in December 2007. In this report, SRK Consulting states: "The proposed Matola-Kendal liquid petroleum pipeline, with off-take points at the Nelspruit Depot (the focus of a separate EIA) and the end of the pipeline at Kendal aims to increase the availability of fuel to South Africa's inland regions."

The pipeline will run below the ground for a distance of about 448 km and 384 km of this pipeline runs through Mpumalanga. It will have seven automated pump stations along the route requiring either 3,3kV or 6,6 kV to pump fuel along the 12 inch pipeline.

Intelligent Pigs will be used to monitor and maintain the pipeline along with routine patrols that will seek out any other possible disturbances. A full range of electronic checks will be used to ensure the pipeline keeps operating efficiently.

The selection of the route for this pipeline was, according to SKR Consulting, chosen on the basis of:

- The shortest distance between the Matola and Kendal.
- Avoiding hazards such as the area around Witbank, which has been undermined because of the coal mining activity there.
- Minimising traverses over steep terrain.
- Using existing and compatible servitudes.
- Hydraulic gradient and construction feasibility.

Construction of the pipeline was supposed to start in July 2008 and Petroline estimated that it would take about 18 months to complete in the following phases:

- Matola Harbour to Komatipoort border post – 64 km.
- Komatipoort to Nelspruit depot – 135 km.
- Nelspruit to Kendal – 249 km.

Work has yet to start on the project even though the licence for the pipeline has been granted to Petroline by Nersa and apparently exhaustive independent assessments have been undertaken.

It has a capacity to supply about 3,5-million cubic metres of fuel when fully operational with an anticipated off-take in Nelspruit of between 500 000 and 1,5-million cubic metres. The balance of the fuel is due to be transported to Kendal where it will potentially connect to the inland pipeline network.

Construction costs are expected to top R5,6-billion. However, if the company expects to start pumping petrol before the end of next year considerable construction work will have to be completed in record time to make this possible.

While it has allowed for an 18 month construction period, Petroline believes that this could be shortened to just six months so that the company could start earning revenue estimated to be worth about R7,5-billion annually.

While there are claims from Petroline that all the environmental impact assessments have been completed and approved, this has yet to be confirmed.

Given the communication from Theunis Steyn it would seem this is not the case. However, Petroline asserts that it is due to start work later this year.

PneuDrive Challenge 2009

We are very excited about the number of quality entries received to date,
and look forward to exploring your projects in detail.
Don't forget entries must reach us no later than end of June.
Keep a look out for the winners announcement, your team could be the lucky winner!

Participating Universities: University of Witwatersrand • University of Pretoria
University of KwaZulu Natal • University of the North West
Nelson Mandela Metropolitan University • Cape Peninsula University of Technology
Stellenbosch University • University of Johannesburg

For further information or queries please contact

SEW EURODRIVE pneudrive@sew.co.za
www.sew.co.za

FESTO pneu_drive@festo.co.za
www.festo.co.za

Use a hammer to protect your data

It's a relatively well-known fact that when it comes to computers and computer technology a great many people are idiots.

So it's hardly surprising that researchers in Britain were able to find detailed personal data, test-launch data for the THAAD ground-to-air defence missiles, medical records from hospitals, social security numbers and proprietary commercial documents such as detailed business plans.

This information was contained on personal computers that had been disposed of by various companies and institutions.

Researchers bought 300 used computers from several different sources including online auctioneering company E-Bay.

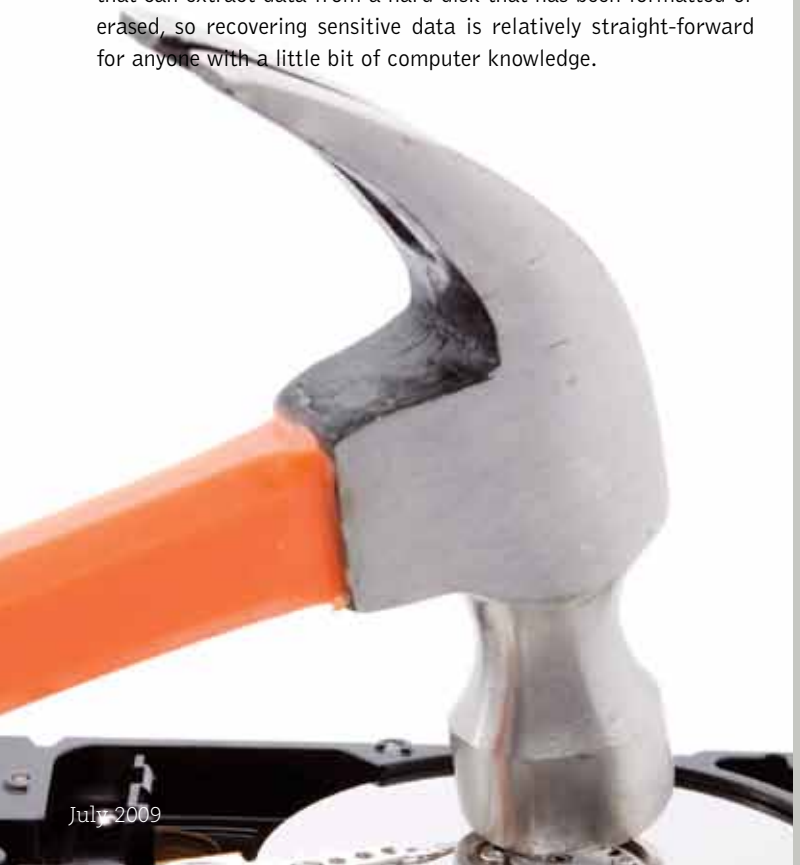
According to Michael Helander, a spokesman for the Swedish company Lavasoft that conducted the research, computer users make the common mistake of believing that if they discard a document using the trash icon on the desktop, that the information has gone forever.

He says the correct method of erasing a computer is to use some of the free programs that are available to wipe the disk itself. Formatting the computer or partioning the hard drive will not prevent personal data from being recovered.

Alternatively, says Helander, open the computer and remove the hard disk. Then smash it vigorously with a hammer as this will ensure that no data can ever be recovered from the drive.

Perhaps the simplest method is to remove the drive and keep it in a safe place just in case you need to find the data and use it at a later stage.

Helander says that there are a number of free computer programs that can extract data from a hard disk that has been formatted or erased, so recovering sensitive data is relatively straight-forward for anyone with a little bit of computer knowledge.



Three strikes law may halt piracy

Tough new rules aimed at curbing Internet piracy may be introduced soon and United States Senator, Orrin Hatch has praised French authorities for implementing a three-strikes-and-you're out policy to halt the proliferation of software, video and music piracy around the world.

Hatch recently addressed 500 delegates from 55 different countries who were attending the second World Copyright Summit in Washington. France is one of the first countries to impose tough laws aimed at halting Internet piracy.

In terms of these laws, illegal downloaders of music, film or software receive an e-mail warning to halt their illegal activities. This is followed by a letter and if they continue to download pirated material they lose their Internet access for up to a year.

Hatch says that while this may be a workable solution, he believes there must be a partnership between copyright owners and Internet Service Providers to stop the proliferation of piracy in the fast-paced electronic world.

The Recording Industry Association of America has already agreed to stop prosecuting people who download music illegally and concentrate on the service providers who allow these downloads to occur.

Delegates who attended the conference hoped to formulate a united approach to combatting illegal downloading of material but so far have been unable to reach consensus on the measures that need to be implemented globally.

Internet piracy of movies, music, business and entertainment software and video games is costing the United States economy about $58-billion a year.

Computers can accidentally hurt younger children

Computers are causing thousands of injuries to children every year and a report compiled by a United States research group says that computer-related head injuries are common in children under ten.

Using statistics from the National Electronic Injury Surveillance System – which has been recording computer-related injuries since 1994 – more than 93 percent of injuries, occurred at home.

Computer use in the US has increased fourfold between 1994 and 2006 and yet the number of injuries to young children in particular, has grown by 732 percent during that time. Common injuries are caused by hitting a computer or its peripheral equipment or by equipment falling onto the victim.

The computer monitor is the largest cause of injuries and between 1994 and 2003 they accounted for 37 percent of injuries. However, there has been a decline in these types of injuries in recent years, which researchers say is probably because the monitors are lighter, smaller or may be flat-screen LCD panels.

According to Lara McKenzie of the Nationwide Children's Hospital Centre for Injury Research and Policy in Columbus, Ohio, children under five were most at risk of tripping or falling while carrying computer equipment.

Apart from head injuries, muscle strains or damage-to-joints were common among children. Statistics on computer-related injuries in Britain are less comprehensive and show that 2 100 people were injured in that country in 2002.

Of course, what the research does not tell us is how many injuries are caused by a furious child who is frustrated after with losing another character in Mario Brothers, punches the computer monitor, hops around the room, clutching his hand, falls over the dog and breaks his only good arm.

I guess that is a computer related injury. . . .

iPhone 3GS, smaller MacBook and Snow Leopard

Apple has launched its new iPhone 3GS, and says that its latest operating system software software, OS-X Snow Leopard will outperform Windows 7 in terms of speed, installation time and ease-of-use.

These claims were made at the Worldwide Developers Conference held in San Francisco in June.

The new iPhone 3GS is available in Britain, Europe and America but there is no indication of when it will be available in South Africa. It has an upgraded processor with a 32 GB drive, a digital compass and can record videos.

The larger memory means the iPhone can store up to 7 000 songs or 40 hours of video. It has included a number of features that have been available on other mobile phones for some time such as allowing a laptop computer to piggyback on the phone's connection to the Internet.

The iPhone is about twice as fast as the current model, has better battery life and comes with the new 3.0 operating system software, which can be downloaded from Apple's Internet site and installed on existing iPhones.

It also has built in tracking software that allows iPhone owners to pinpoint the location of a lost or stolen handset and to remotely wipe all information from the device. A message can be sent to the iPhone so that it emits a screeching 'homing' sound to attract passers-by.

Apple has introduced the 13-inch MacBook Pro with upgraded memory and a faster processor. It will boast up to seven hours of battery life, has an SD card slot so that memory cards can be inserted into the computer and digital information (such as photographs or videos) can be imported and edited.

The smallest MacBook Pro has a 2,26 GHz processor, 2 GB of memory and a 160 GB drive and it retails (on the US market anyway) for $1 199 (about R9 500). Unfortunately South Africa's prices are considerably higher than the dollar equivalent.

The new operating system will be available from September and an upgrade from the existing OS-X Leopard will cost $29.

Data retrieval may be 100 000 times faster

A team of physicists has developed ultra-fast lasers that can retrieve or store data on a computer hard disk 100 000 faster than current technology allows. The physicists, Albert Fert of France and Peter Gruenberg of Germany have refined their miniaturisation technology that won them the Nobel Prize for Physics in 2007.

The scientists found that tiny changes in magnetic fields can yield a large electrical output, which causes changes to the current in the read-out head that scans a hard disk for the stored binary data.

Their discoveries paved the way for a new field known as spintronics that uses not only an electrical charge but also the spin of electrons in individual atoms to provide a more compact means of storing or retrieving data from a hard disk.

By using a femtosecond laser, which provides ultra-fast bursts of laser light, they were able to alter the electron spin, speeding up data retrieval. The new method is referred to as the photonics of spin because it is the particles of light, or photons, that modify the state of magnetisation in the electrons on the storage surface.

The data is retrieved with bursts of light that last for just a millionth of a billionth of a second. While the femtosecond lasers are still quite large, measuring 300 by 100 millimetres, the researchers are confident that they will be able to reduce the size of these components making them suitable for consumer electronic devices.

300 000 people die because of climate change

More than 300 000 people are dying every year as a direct result of climate change and global warming according to figures contained in a report commissioned by the Global Humanitarian Forum, a group set up by the former United Nations Secretary General, Kofi Annan.

The group found that 325-million people around the world are affected by climate change through damage to crops, homes and farms. The total economic costs of these losses are estimated at $125-billion a year.

According to the report, heatwaves, floods and forest fires caused by rising temperatures will be the direct cause of about half-a-million deaths each year by 2030

Annan says that most of the deaths are likely to occur in developing countries such as Bangladesh and the Sudan but warned that residents all over the world will be vulnerable to incidents of flooding, prolonged drought or changes in other weather patterns.

Annan says that climate change is a "silent human crisis" and represents the greatest emerging humanitarian challenge of all time.

The report was compiled by a panel of leading international experts including Rajendra Pachauri of the Intergovermental Panel on Climate Change, Jeffrey Sachs of Columbia University and Barbara Stocking of Oxfam.

It estimates that the economic losses of $125-billion a year are equivalent to the individual gross domestic product of 73 percent of the world's countries and are greater than the total amount of aid that flows from industrialised countries to developing nations.

The report was developed by the Dalberg Global Development Advisers Group based on relevant information and currently-available statistics on the human impact of climate change.

$5-billion to come from Africa's poor?

Financial services aimed at poor people living in developing countries could generate income of more than $5-billion by 2012 according to a United States-based micro-finance policy and research centre.

The organisation, CGAP says that mobile money offers huge potential for growth but so far the services have largely been limited to a few emerging economies. In developed markets such as Europe and the US, the use of mobile money services has been limited because of the popularity of online banking.

However, this is apparently not the case in emerging markets where, for instance, Safaricom's M-PESA in Kenya attracted 6,5-million customers in its first year. This is equivalent to one-in-six Kenyans using the mobile money service.

CGAP estimates that by the end of this year there will be more than 120 mobile money implementations in emerging markets. The research company says that over and above the $5-billion revenue stream, telecommunications network operators could save up to $2-billion from lower customer turnover while the average monthly revenue per user was expected to increase by $1,10.

In Africa only one-in-five people operate a bank account mainly because of the prohibitively high cost to banks of opening branches in distant parts of the continent. There are almost a billion people living on a few dollars in Africa.

However, in Africa mobile phone usage has soared. By 2007 there were 270-million cellular phones in use in Africa up from just 50-million in 2003.

The scope for mobile financial services has grown dramatically in the past year as the mobile phone is used for simple cash transfers by text message to payments for everything from a taxi ride to an electricity bill.

Of course one of the problems is that the poor people of Africa have very little money anyway and I'm sure that they will be pretty miffed if they have to pay bank charges from their meagre income.

Branded Internet domains up for grabs next year

Almost 70 percent of companies around the world are not aware that, from next year, they will be able to use their company name as a domain suffix when the Internet's rules are liberalised next year.

This means that they will be able to use .wattnow, .nike or.microsoft in place of the more common .com, .org or .net. The change will mean that companies and organisations can control their own domain and exploit their brands.

According to the Internet Corporation for Assigned Names and Numbers (ICANN) companies will be able to create brand-specific Websites such as 'running.nike' or 'runcomrades.nike'.

The organisation is likely to start accepting applications for new top-level domains from early 2010. Future Laboratory – which conducted a research exercise to establish whether companies were aware of the changes – said that the new domain name rules have not permeated into any of the top companies around the world.

However, the domain names do not come cheaply. It will cost $185 000 to register the domain but despite the high price, there are expected to be at least 500 applications lodged with ICANN when it starts accepting applications early next year.

Branded Internet has been on the cards for a number of years ever since various new categories were allowed within the Internet domain such as, .biz.

Internet gurus seem to believe that by adding the .brandname to an Internet address will improve the company's visibility.

I much more cynical than that - to me it just sounds like a huge money-making scheme. I guess that's why I'm a writer and not a marketer.

I wonder how many South African companies will be prepared to cough up $185 000 just so they can drop in a .sasol, a .eskom or a .anc behind their names. Personally I'd rather live with .co.za than spend R1,5-million for a .wattnow domain.

Faster than a fighter jet ... it's a hummingbird

Anna's Hummingbird – a tiny, fragile creature that's just ten centimetres long – is the fastest creature on Earth according to scientists who carried out a series of experiments on various species to determine which one reaches the highest speeds.

Anna's Hummingbird dives, during a mating ritual to impress females, from about 30 metres and at the bottom of its dive reaches a speed of 93,3 kilometres an hour before pulling out of the dive and exerting the equivalent of about 10 Gs on its fragile little body.

In order to have a fair test the scientists determined the speed on the basis of body-length and Anna's Hummingbird was plunging to the ground in its ritual dive at an astonishing 385 body-lengths-per-second, considerably faster than the peregrine falcon.

To put this into perspective, the United States Space Shuttle is travelling at about 207 body-lengths-per-second when it re-enters the Earth's atmosphere while a fighter jet with both after-burners on full blast is travelling at about 150 body-lengths-per-second.

Anna's Hummingbird was named after Anna Massena, the Duchess of Rivoli and was discovered in the 19th Century. It weighs less than five grams and normally flies at about 53 km/h.

Beehive fence keeps everyone away

African farmers have fenced their properties with beehives in an effort to prevent elephants from raiding their crops and, to their amazement, the bees are able to stop marauding elephants in their tracks.

For decades, elephants in Kenya have plagued local farmers by walking straight through fences set up on the perimeter of the ploughed fields and helping themselves to the young crops as they grow.

Increasingly the wild elephant population has come under threat because the farmers are forced to shoot the marauders. A pilot study by researchers from Oxford University and the *Save the Elephants* charity realised that elephants are naturally cautious when they encounter bees in the wild and decided to try using the bees to prevent crop raids.

The researchers built a simple fence of sturdy gum poles with wire between each pole and then suspended beehives on the wires around the growing crops. The elephants cautiously approach the suspended beehives and then walk off in the opposite direction to avoid them.

However, if they push against the wire to get to the crops, the beehives start swinging violently, triggering a mass attack of the bees and this promptly drives away the elephants.

Elephants, it seems, are scared of bees.

According to Lucy King of Oxford University's Department of Zoology, even if the hives are empty, the elephants see them hanging suspended between the poles and avoid the area entirely.

Her statistics show that a farm protected by a beehive fence had 86 percent fewer crop raids and 150 percent fewer raiding elephants in a herd when compared with an unfenced control farm in the same area.

She says that the bees help to stop cattle rustlers from raiding stock and, most importantly, the farmers with the beehive fences can harvest honey for sale locally at least two or three times a year.

WATTnow

– a magazine to keep you enlightened, informed and intrigued

WATTnow is the published monthly by Crown Publications and the South African Institute of Electrical Engineers and it provides a fascinating insight into:

- Technology
- Energy and Electronics
- Science and Research & Development
- New products and interesting gadgets

In addition, WATTnow gives its readers in-depth, topical coverage of many different issues that have a direct bearing on the engineering industries on which so much of the country's future development depends.
It is the official magazine of the South African Institute of Electrical Engineers and is distributed to members throughout the country.
It has also developed a Continuing Professional Development programme for all engineers and is the only publication able to provide Category One credits who are part of the WATTnow CPD Programme.

WATTnow also offers its readers a monthly in-depth article on the many fascinating aspects of engineering ranging from the development of South Africa's nuclear energy capacity to the use of coloured lenses to correct dyslexia.

It is the official magazine of the South African Institute of Electrical Engineers and is distributed to all members of the Institute. It is also sold by retail outlets in all nine provinces.

Please book me a one-year subscription to WattNow.
R215 per annum inc. VAT in RSA. Postage extra outside RSA.

Title _____ Initials _____ Name _____
Surname _____
Company _____ Department _____
Position _____ E-mail _____
Postal Adress _____
_____ Postal Code ____
Province _____ Country _____
Phone Code _____ Number _____
Fax Code _____ Number _____
Signature _____

☐ New subscriber ☐ Renewal ☐ Tax invoice required

Contact Norma Massey
Tel: +27 (11) 622 4770
Fax: +27 (11) 615 6108

Rare stars have a billion-year orbit

Scientists have recently discovered a new family of wandering stars that may include lonely wanderers from other distant galaxies. The small stars are described as being ultracool sub-dwarfs that give off light that is up to ten thousand times fainter than our Sun.

While the light emitted is extremely faint, the ultracool sub-dwarfs are rocketing around the universe at speeds of up to 160-million kilometres an hour.

Some of these stars also seem to have bizarre, haphazard orbits, plunging to the centre of the Milky Way on eccentric, comet-like tracks while others make slow, swooping loops that stretch way beyond the Sun's orbit.

Professor Adam Burgasser of the Massachusetts Institute of Technology says at least one of the stars, designated 2MASS 1227-0447 in the constellation Virgo, has an orbit that indicates it may actually have originated in another galaxy.

Calculations show that these ultracool sub-dwarfs travel up to 200 000 light years away from the centre of the galaxy. A single orbit of this particular sub-dwarf would take about a billion years to complete.

So far only a handful of ultracool sub-dwarfs have been identified. Astronomists are studying these tiny stars in an effort understand where they originated and how they maintain their orbit, which can actually take them out of the Milky Way galaxy entirely and then bring them back into it again.

Ultracool sub-dwarfs are characterised by their extremely low temperatures and their low concentrations of elements other than hydrogen and helium. They are at the bottom end of the size range for stars and some of them are so small they could actually be classified as planets.

Bigger, better Loch Ness monster found

The remains of what looks remarkably like a Loch Ness monster have been found on a beach in the English Channel. The 200-million year old plesiosaur's skeleton is 70 percent complete.

The creature had a long, thin neck, a long tail, four large flippers and razor-sharp teeth. Plesiosaurs lived during the Jurassic period between 150- and 200-million years ago when the English Channel was a shallow, tropical sea.

Teeth marks found on the fossil indicate that a predatory creature killed and feasted on it. According to Richard Edmonds, science manager for the Jurassic Coast World Heritage site, plesiosaurs are rare with just ten known examples of complete or partial skeletons of the species being found.

Scientists dispute the notion that the renowned Loch Ness monster is a plesiosaur because the water in Loch Ness would not support the biological activity needed to feed such a creature.

More convincingly, scientists say that plesiosaurs died out about 65-million years ago whereas Loch Ness was only formed about 10 000 years ago and because of this it could not possibly have been home to a plesiosaur's descendant.

Tracey Marler found the remains of the plesiosaur under rocks on Monmouth Beach near Lyme Regis in Dorset. The skeleton comprised 150 vertebrae bones, part of the skull and the jaw, which had a single tooth left in it.

The likely predator that feasted on the Plesiosaur was the Ichthyosaur a carnivorous creature that swam around in the Mesozoic ocean and grew to a length of about 15 metres.

The Ichthyosaur's name indicates it probably looked like a 'fish-lizard' that migrated back into the water from land during the middle of the Triassic period.

Boy survives after being struck by meteorite

A 14-year-old schoolboy was walking home from school – probably filled with guilty teenage thoughts like so many 14-year-olds – when he was zapped by a ball of light that gouged a 76 millimetre wound into his hand before it hit the ground beneath his feet and exploded.

He'd been hit by a tiny meteorite travelling at almost 50 000 kilometres an hour that had bounced off his hand and smashed into the ground, leaving a 300 mm crater in its wake.

All guilty thoughts were now gone, but Gerrit Blank, still had a nasty scar on his hand as a reminder for the rest of time. He says that he spotted a large ball of light coming towards him, then felt a pain in his hand and heard an enormous bang that sounded like a huge clap of thunder.

"The noise was so loud that my ears just kept ringing and ringing for hours afterwards," he says.

Blank, who lives in Essen, Germany, admits that when the red-hot pea thundered into his hand it knocked him flying but, even then, it was still going fast enough to carve a crater into the road.

The chances of being hit by a meteorite (even one the size of a pea) are about one in a million. Scientists are now studying the pea (that Blank was sufficiently bright to recover) and chemical tests have already proved that it had fallen from space.

The only other known case of a human surviving a strike by a meteorite was in 1954 in Alabama in the United States when a grapefruit-sized fragment crashed through the roof of a house, bounced around the furniture in the room and landed on a woman who was peacefully sleeping.

Super-atom that can mimic another atom

Researchers working at the Virginia Commonwealth University have discovered a magnetic super-atom – a stable cluster of atoms that mimic different elements in the Periodic Table – and they are hoping to use these to create molecular electronic devices for the next generation of super computers equipped with larger memory banks.

The new cluster, comprising one vanadium and eight cesium atoms, acts like a minute magnet that can mimic a single manganese atom in magnetic strength while preferentially allowing electrons to flow through the surrounding cesium atoms.

Lead researcher, Professor Shiv Khanna, and his colleagues examined the electronic and magnetic properties of clusters from a vanadium atom and multiple cesium atoms.

When the cluster had eight cesium atoms it gained extra stability because it was in a filled electronic state – that is when the outermost shell is full. When an atom combines with other atoms it tends to lose or gain valence electrons to obtain a stable configuration.

Khanna says the experiments showed the new cluster had a magnetic moment – the measure of internal magnetism – of five Bohr magnetons, which is more than twice the value of an iron atom in a solid iron magnet.

According to Khanna the discovery of the super-atom may lead to significant development in molecular electronics that may lead to molecular devices that can provide non-volatile data storage, more densely integrated devices and higher data processing speeds.

The researchers believe that by combining gold and manganese it will be possible to create a super-atom that will have a magnetic moment but will not conduct electricity. Such super-atoms may have potential applications in the medical sector for devices used for imaging or drug delivery.

Spring water in plastic bottles could cause heart disease

All those people who drink expensive bottled water in plastic bottles could inadvertently be inflicting hormone damage on themselves according to new research from the Endocrine Society.

A chemical called bisphenol A, used to stiffen plastic bottles, is thought to damage the hearts of women, can permanently disrupt the DNA of mice and appear to be pouring into human beings from a wide number of sources.

The Endocrine Society is sufficiently concerned to have issued a scientific statement about bisphenol A and the United States Food and Drug Administration is currently examining the safety of plastic bottles although it has admitted that there is not much evidence to prove that bisphenol A poses a threat to human health.

Dr Robert Carey of the University of Virginia, who is also president of the Endocrine Society, says that there is evidence that bisphenol A contains endocrine disruptors that effect male and female development and may lead to prostate cancer, thyroid disease and cardiovascular disease.

Various universities in the US have been studying the effects of bisphenol A on mice and Dr Scott Belcher of the University of Cincinnati, Ohio, says that the compound created arrhythmia in female mice. This is because bisphenol A interacts with oestrogen in women.

Bisphenol A is used in many different applications including lining aluminium cans and making a smooth paper to print receipts.

The Endocrine Society admits that most people have some bisphenol A in their blood but the society's concern is that widespread exposure to the compound will boost levels of the chemical to such an extent that human health may, in time, be damaged.

New super-heavy element for Periodic Table

A new super-heavy element is to be included in the Periodic Table and will be known as Ununbium – the Latin name for 112. The new element, the heaviest element in the Periodic Table is approximately 277 times heavier than hydrogen.

Researchers working at the Helmholtz Centre in the south-western town of Darmstadt in Germany first produced the element in 1996 by firing charged zinc atoms through a 120-metre-long accelerator to hit a lead target. The zinc and lead nuclei fused to form the nucleus of Ununbium.

The International Union of Pure and Applied Chemistry confirmed the discovery of the new element and asked the scientists to name it.

According to the union's executive director, John Jost, creating new elements helps researchers and scientists to understand how nuclear power plants and atomic bombs function.

The atomic number 112 refers to the sum of the atomic numbers of zinc, which has 30 and lead, which has 82. Atomic numbers denote how many protons are found in the atom's nucleus.

The Helmholtz Centre has been responsible for discovering six chemical elements – from numbers 107 to 112 – since 1981. It was in 1925 that scientists discovered the last naturally occurring element on the Periodic Table and since then researchers have sought to create new, heavier elements.

Super-heavy elements exist for tiny fractions of a second and then radioactively decay into other elements.

Subscribe to WATTnow's exclusive CPD Programme and you could WIN a David Coultard Edifice Watch by CASIO valued at R5000

- Alarm
- Stainless steel
- 5 independent motors for amazingly fast function switching
- Perpetual calendar
- World/home time swapping
- 100m water resistant

www.jamesralph.com • 011 413-8888
0861 CASIO1 • 0861 318 888

Hassle-Free

CATEGORY ONE CPD Credits

Special rates for members of the SAIEE or members of voluntary associations approved by SAIEE

The WATTnow CPD Programme gives its members CATEGORY ONE CPD Credits:

- Monthly articles, published in WATTnow and validated by the SAIEE for self-study credits by answering appropriate questions;
- At least six live video recordings of important conferences held throughout South Africa in the course of a calendar year;
- Appropriate questions based on pre-sentations made at each one of these events;
- A simple, quick and efficient response mechanism using e-mail or fax to sub-mit answers to all CPD questions;
- A comprehensive administration system to ensure that every credit achieved is correctly recorded at the Engineering Council of South Africa.

Open to all engineers who wish to maintain professional registration whether resident in South Africa or living overseas.

Enrol now for the WATTnow CPD Programme by filling in the form below. Closing date 8 August 2009. Winner to be announced in September issue.

SAIEE members pay just R1000 annual subscription fee

First Name: ..... Surname: .....

Physical Address: Postal Address (if different):

.....

.....

.....

.....

E-mail Address: .....

SAIEE Membership Number: .....

Preferred Payment Method:

Amount due: R1 000 for SAIEE members
R2 400 annual subscription (non-SAIEE members)

Electronic Funds Transfer to
Crown Publications
Standard Bank
Bedford Gardens Branch Code: 018305
Account Number: 22-607-7357

Please fax completed form to Crown Publications on 011 615-6108 or e-mail this form to cpd@crown.co.za

Note: Voluntary associations registered with ECSA can apply to the SAIEE to allow their members to gain credits at the reduced rate.

A begging bowl for another R300-billion

It's sometimes very difficult to fathom exactly what Eskom is planning or doing. For instance, in June, Eskom pitched up the National Energy Regulator of South Africa's (Nersa) offices clutching a begging bowl in the guise of an application for a 34 percent tariff increase for electricity.

The justification is that Eskom needs to raise money to continue with its ambitious schemes to electrify southern Africa. It is spending vast quantities of money with R343-billion already earmarked to pay for projects that will come on stream in the next few years.

Just a few weeks before visiting Nersa, Eskom confirmed that it intends going ahead with its nuclear programme and has asked environmental authorities to combine the necessary authorisations so the utility can build three new power stations at each of the coastal sites chosen as suitable for nuclear development.

In December last year, Eskom said that it would no longer embark on any nuclear power projects because these were way too expensive costing, in current terms, at least R100-billion each.

Bantamsklip near Pearly Beach and Dynefontein near Koeberg outside Cape Town are two of the sites earmarked for future nuclear power stations along with Thyspunt near Oyster Bay in the Eastern Cape.

Because of looming changes to the existing environmental legislation, Eskom has asked for permission to "sequentially construct" the power stations. Site preparation for a nuclear power station at Dynefontein is due to get underway early next year and it will take until 2018 to complete the plant.

In January 2013, site preparation is due at Bantamsklip and Eskom will wait until 2020 before the new facility starts generating power. Finally, at Thyspunt in the Eastern Cape, site clearing will start in 2015 with the power station coming on stream in 2022.

So where does Eskom expect to find the money to finance this R300-billion plus expansion. The only realistic answer is from higher tariffs levied on the individual users of electricity and that, in turn, reassures everyone that electricity price rises in South Africa will keep coming for as long as the Earth keeps spinning around the sun.

Volvo's the greenest small family car

The Swedish-built Volvo S40 diesel has been classified as the greenest car on the planet, beating rival hybrids and futuristic electric vehicles in the process. The Volvo's carbon emissions are apparently on a par with the Toyota Prius, which is currently not yet available in Britain.

The green car awards were presented to the manufacturers by Britain's *What Car* magazine at a special ceremony held in London in June.

The magazine chose the Volvo because while its emissions levels are really low, at just 104 grams per kilometre (g/km) it remains a fun, family car that is safe and cheap. Volvo is owned by Ford.

In the Supermini category, Fiat's 500 was the winner with emissions of 113 g/kg and an average fuel consumption of 3,9 litres per 100 km (l/100 km) followed by the Volvo as a small family car with a consumption of 3,2 l/100km.

The Toyota Avensis two-litre diesel was classified as the best family car with emissions of 135 g/km and fuel consumption of 4,2 l/100 km while in the executive car category the BMW 318i diesel returned impressive figures of123 g/km while using a frugal 3,9 l/100 km.

A special technical award was presented to Vauxhall for its electric Ampera vehicle, which is only expected to debut in the United States next year as the GM Volt and will be available in Britain from 2012.

Apparently this car with a top speed of more than 160 km/h, uses an electric engine that is able to drive at 75 km/h and has a range of more than 200 kilometres.

There were two notable omissions from the winners' list: the Honda hybrid Insight and the next generation Prius both of which will go on sale later this year.

Are oceans creating the Earth's magnetosphere?

Scientists still do not know what it is that creates the Earth's magnetic field or the magnetosphere, which acts as a buffer between the Earth and the deadly solar winds that contain charged particles of electrons and protons and yet do not enter the Earth's atmosphere.

However, new research by Professor Gregory Ryskin of the McCormick School of Engineering and Applied Science at North-Western University in Illinois defies the long-standing convention of applying equations from magneto-hydro-dynamics to the oceans' salt water (which conducts electricity) and he found that long-term changes in the Earth's main magnetic field may be induced by the circulating water in the oceans.

Calculations have confirmed Ryskin's suspicion that there is an integral relationship between the oceans and the magnetospheric buffer. He says, for example, that researchers recorded changes in the intensity of current circulation in the northern Atlantic Ocean and Ryskin showed that these changes correlated with sharp changes in the rate of geomagnetic secular variations.

Ryskin is the first to admit that his calculations do not constitute proof of the theory but do suggest that further research into the connection between ocean flow and the secular variation of the geomagnetic field should be undertaken.

A number of theories have been postulated over the years, with suggestions in the 1920s that the Earth's magnetic field could be the result of the flow of electrically-conducting fluid deep inside the Earth's core acting as a dynamo.

Later suggestions used the dynamo theory to explain how hot iron in the outer core of the Earth could create a magnetosphere through a rotating, convecting and electrically conducting fluid. Ryskin's research may disprove this if he can show that magnetosphere is created by the flow of the oceans.

He says that if secular variation is caused by the ocean flow then the entire concept of the dynamo operating in the Earth must be called into question. His paper, entitled *Secular Variation of the Earth's Magnetic Field induced by Ocean Flow?* will certainly generate controversy within the scientific community.

3-D X-rays may soon be used for accurate diagnosis

It may soon be possible to generate three dimensional X-rays in real time, thanks to experiments by Professor Anthony Starace and his colleagues who use high-harmonic generation to produce the X-ray.

X-ray radiation can be created by focusing an optical laser into atoms of gaseous elements – usually low-electron types such as hydrogen, helium or neon. When the laser light interacts with those atoms' electrons, it makes them vibrate rapidly and this vibration emits an X-ray.

The problem is that the high-harmonic generation X-ray light is extremely weak and in an effort to make the X-rays more powerful, scientists have tried using higher-powered lasers on the electrons. However, their success has been limited.

Using longer wavelengths is a way to increase the energy output of the atoms but Starace says the problem is that the intensity of radiation produced drops very quickly. So instead of focusing on low-electron atoms like hydrogen and helium, Starace and his team used heavier gaseous atoms with many electrons such as xenon, argon and krypton.

They discovered that this process would unleash high-energy X-rays with relatively high intensity by using longer wavelength lasers that drive collective electron oscillations.

He says that if rare gases are used and a laser shines on them, they emit X-rays with an intensity that is much, much stronger than low-electron atoms.

Starace believes that, in theory, doctors could scan a patient's heart and create a three dimensional hologram as it is beating.

Project halted – but another one's started

Mozambique's new 300 000 barrel-a-day oil refinery project has been halted because lead investor, Ayr Logistics of Texas, has pulled out of the project. Apparently it had not been possible for Ayr Logistics to raise the $5-billion needed to complete the project.

South African company, Group Five International has also withdrawn from the project.

Mozambique's only oil refinery closed down more than 20 years ago and since then the country has depended on fuel imports to satisfy local demand. Earlier this year, a local company Oilmoz announced that it had received funds to allow it to complete a feasibility study for another oil refinery.

This facility will be situated south of Maputo and if it gets the go-ahead will be built in partnership with Shell Global Solutions, a part of the Royal Dutch Shell group.

Meanwhile, South Africa is pressing ahead with plans to build a new 400 000 barrels-a-day oil refinery at Coega in the Eastern Cape and the environmental impact assessment for this project will be completed by September this year.

The Mthombo refinery is likely to start producing fuels from 2014. Funding for the project has not yet been finalised but PetroSA's commercial manager, Vukani Khulu says the National Treasury "seems quite keen on this project".

PetroSA is believed to be consulting with crude oil producers and other stakeholders within the refining industry in an effort to finalise a partnership build, commission and maintain the new oil refinery.

The final cost estimate for the new refinery will emerge once the detailed feasibility study has been completed later this year.

Please sir, can Chrysler have some more...

Bankrupt American car manufacturer, Chrysler, has submitted a plan to the United States Department of Energy requested $448-million to research and develop electric vehicles and plug-in hybrid models.

Chrysler and its partners (including the Department of Energy) would each pay $224-million into a fund that would be used to develop new technology. At least $83-million is needed to construct a new technology and manufacturing plant in Michigan that can be purposed built to develop and assemble vehicles.

Chrysler says the new plant will be functional within a year and will be capable of building 20 000 hybrid and electric models by the end of 2010.

The request for funds comes at a time when Chrysler is negotiating to sell its most valuable assets to a new company comprising the US and Canadian governments, Chrysler's union and Italian car manufacturing company Fiat SpA.

Chrysler says the new hybrid and electric vehicles planned for sale within a year include a Dodge Ram 1 500 plug-in hybrid, the Chrysler Town & Country plug-in hybrid and the Town & Country electric vehicle.

Chrysler plans to create a national demonstration fleet of 365 vehicles that will be provided to selected customers and partners for test purposes. Chrysler's executive vice president for product development, Frank Klegon, says the demonstration fleet will accelerate the company efforts in developing and perfecting plug-in hybrids and electric cars.

The request for funds from Chrysler comes shortly after US President Barack Obama introduced tough new fuel economy standards for all US car manufacturers.

Business to Business is OUR BUSINESS

Chemical Technology, Electricity+Control and WATTnow each received a Siemens Profile Award for Journalism in Africa.

CROWN PUBLICATIONS

Tel: 27 11 622-4770 Fax: 2711 615-6108 crownmag@crown.co.za www.crown.co.za

Gamma-rays – a bandage for black holes?

Gamma-ray bursts occur regularly and remain one of the most mysterious and most massive explosions in the universe. Yet scientists know very little about what causes them. Now, new research suggests that these bursts actually stop black holes from forming.

Based on current thinking in scientific circles, any star that is about three times the size of the Sun will eventually collapse into a black hole. However, scientist Ilya Rozen of the PN Lebedev Physical Institute of the Russian Academy of Sciences in Moscow says the phase change of matter into a different form creates a vacuum in an imploding star.

This vacuum results in what he calls a 'burning wall' that stops a black hole from forming and emits the powerful gamma-ray bursts.

So far no true gamma-ray bursts have been detected in the Milky Way galaxy and scientists theorise that these bursts are so huge that they release more energy than the Sun will emit in its entire lifetime.

Scientists have been studying gamma-ray bursts like the one first detected by telescopes on board the NASA's Swift satellite and from the Keck telescope in Hawaii.

The bursts are so powerful that they produce enough light for ground-based telescopes to detect them and yet, for more than a decade, astronomers have been puzzled by the nature of the dark bursts that produce gamma-rays and X-rays.

Surveying the 'dark' gamma-ray bursts – which are visible in gamma- and X-ray emissions but with little or no visible light – has proved difficult because, scientists say, the bursts are shielded by dust in galaxies that do not appear to be dusty.

Star formations occur in dense clouds that quickly fill with dust as the stars age and explode, spewing newly created elements into the universe to form new stars.

The long-duration gamma-ray bursts are thought to originate from a massive star as it explodes, creating two pencil-like beams of light that extend in opposite directions much like the beam from a lighthouse.

These bursts are bright enough to be seen from 13-billion light years away, which is close to the observable limits of the universe. Some of the bursts shine brightly for hours after the emission while others have little or no detectable afterglow.

It is hoped that gamma-ray bursts will help to track the rate at which stars form and die.

Less platinum needed in fuel cells

Researchers at the Arizona State University, led by engineering technology professor Arunachalanadar Madakannan (Kannan), have been studying different methods of making proton exchange membrane fuel cells (PEMFC) and they have found that carbon nanotube-based catalysts and electrodes may hold the key.

Fuel cells, which generate electric power by passing fuel such as hydrogen over one electrode while passing air over a second electrode, have been around for more than a hundred years but the combination of high costs and serious safety concerns have plagued this technology.

A PEMFC is made using a hydrogen-based anode (positive) terminal and an oxygen-based cathode (negative) terminal. Carbon-particle-supported platinum acts as the catalyst (electrode) to produce power.

Kannan says that while platinum has been proved to be the most effective electro-catalyst and an excellent conductor of electricity in fuel cells, the cost of making these cells remains prohibitive.

To overcome the cost issue, Kannan and his team have been growing carbon nanotubes on carbon paper substrates, known as the gas diffusion layer, rather than making spherical carbon particles that deposit platinum onto the surface of the nanotubes.

This approach maintains a high level of energy efficiency using less platinum to generate power. Kannan estimates that the new production methods will save between ten and 15 percent in production costs.

The team of researchers found that apart from saving costs, the electrodes perform extremely well under lower relative humidity and this ultimately means that less complex fuel cells can be made.

Kannan says the next step in the research is to make the development of the gas diffusion layer a continuous rather than a batch process. If this is successful the PEM fuel cells will be commercially viable.

SEW EURODRIVE

A frequency inverter that delivers just what you require... And that's what makes it so affordable!

The new exceptionally compact MOVITRAC® LT frequency inverter is now available. It offers an ideal and uncomplicated form of motor control. Effective and reliable! You can use MOVITRAC® LT to realise a number of applications quickly, easily, and in a cost effective way. The MOVITRAC® LT is suitable for applications including fan and ventilation systems (HVAC), pumps, as well as motor control in tool manufacturing and metalworking, conveying, machining and materials handling systems.

Available in two sizes, MOVITRAC® LT covers a power range from 0.37 to 2.2 kW and for operation on 1-phase (220 - 240 V), 50/60 Hz power supply systems. MOVITRAC® LT offers the perfect balance between functionality and cost-effectiveness. With its 14 standard parameters and user-friendly interface, MOVITRAC® LT can be started up quickly and easily on-site. "Plug in and drive": Startup doesn't require cost-intensive and time-consuming support services.

SEW-Eurodrive with leading, innovative drive solutions for all industries and each application.

Johannesburg:	**Tel (011) 248-7000**
Nelspruit:	**Tel (013) 752-8007**
Cape Town:	**Tel (021) 552-9820**
Port Elizabeth:	**Tel (041) 453-0303**
Pinetown:	**Tel (031) 700-3451**
Richards Bay:	**Tel (035) 797-3805**

www.sew.co.za

Death-knell for LDV in Birmingham?

A small British van manufacturing company – that has invested more than £600-million in developing its electric Maxus – is on the brink of bankruptcy and has appealled to the British government to provide it with £60-million to keep it out of its creditors' tentacles.

The company, LDV, is based in Birmingham and currently employs about 3 000 people at dealerships throughout the country. PricewaterhouseCoopers has been appointed as the administrator for the troubled organisation.

LDV applied to go under administration in April after the current economic recession saw sales of new vehicles plummet but this application was withdrawn when a Malaysian company, Weststar, put in a bid to buy the company.

However, Weststar was unable to raise the necessary cash to keep the company afloat and cancelled the purchase agreement. Last year LDV produced 10 000 vans that were sold for about £150-million and still managed to make a loss of £54-million.

LDV is owned by Russian van manufacturer, Gaz, which is controlled by the Russian tycoon Oleg Deripaska. It began as the truck division of British Leyland but a management buyout in 1993 led to the formation of LDV.

Analysts claim that the vast investment of more than £600-million made by LDV in developing its range of electric vans will be wasted unless a buyout arrangement can be made to keep the company afloat in Britain.

PwC says it is currently looking for buyers and at least three international companies are believed to have expressed an interest in taking over the business.

Move over silicon, here come the spinning electrons

A newly discovered material, bismuth telluride, may replace silicon in computers as it allows electrons on its surface to travel with no loss of energy at room temperatures and can be fabricated using existing semiconductor technologies.

The material would provide a leap in microchip speeds and may even become the foundation of an entirely new computer technology based on spintronics.

Physicists, Yulin Chen, Zhi-Xun Shen and colleagues tested the behaviour of the electrons in a compound of bismuth telluride and these tests showed evidence of a topological insulator that allowed the free flow of electrons across the surface with no loss in energy.

Theoretical and experimental physicists at the Stanford Institute for Materials & Energy Science predicted that several bismuth and antimony compounds would act as topological insulators at room temperature, confirming the prediction that was shown in bismuth telluride.

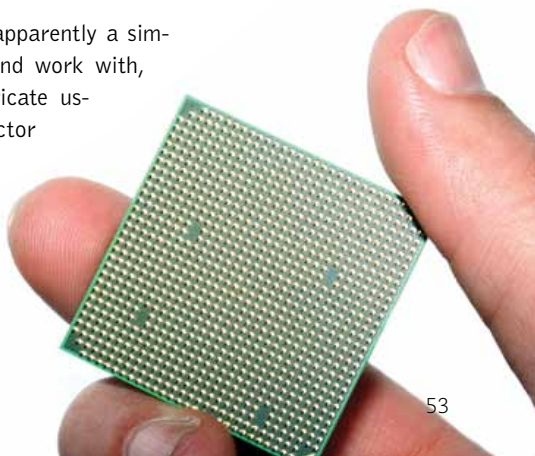
The bismuth telluride samples were examined using X-rays and the electrons' behaviour confirmed that the reality of topological insulators was even better than the theory.

According to Chen, the electrons are "surprisingly well-behaved" and allow for a quantum spin of each electron to align with the electron's motion. The alignment is a key component in creating spintronics devices that are well advanced in terms of current electronics.

Chen says that when one electron hits something there is usually a scattering or a possibility of bouncing back. But when using the spintronics with the quantum spin Hall effect you can't reflect to the exact reverse path. This means that electrons flow without resistance.

More importantly, put a voltage on a topological insulator and the special spin current will flow without heating the material or dissipating it. The problem is that topological insulators can only carry tiny amounts of current, making them unsuitable for replacing conventional super-conductors or super-efficient power lines.

Bismuth telluride is apparently a simple material to grow and work with, making it easy to fabricate using existing semiconductor technology. The bismuth telluride samples were grown at the Standford Institute for Materials & Energy Science.



Highland View

Kensington, Johannesburg

Executive Accommodation and Conference facility for Companies & their staff

A distinctive contemporary Guesthouse & Conference centre offering double en-suites and self contained apartments, comfortable queen size beds dressed in percale cotton linen, each with its own spa bath and shower. All suites enjoy private entrances opening onto the patio, set in a lush, peaceful landscaped garden. With a warm ambience and spacious interiors, Highland View offers restful lodgings. Refined comforts with thoughtful conveniences is standard service.

Relax and soak up the sunshine around a heated pool whilst being kind to yourself in a tranquil environment.

An open plan lounge surrounding a fireplace with folding doors allowing for panoramic views.

Two sophisticated designer apartments, architecturally set into the original quartz rock, first built in 1903.

Each with own spa bathroom complete with heated towel rails, carved into solid rock, allows for elevated self indulgence while mesmerizing yourself into the healing energies of quartz crystal rock.

Scrumptious breakfasts are included, with light lunches and dinners by arrangement.

There are a number of good restaurants within close proximity, should you wish to dine out.

Breakfast is served in our dinning room and atrium between 07h00 and 09h00.

Restful Lodgings

Facilities and Services:

- Early Morning Tea/Coffee with the Business Day served at your convenience in your suite or on your patio.
- Tranquil fountain garden courtyards.
- Heated swimming pool.
- Outdoor shower.
- Atrium relaxation areas.
- Residents lounge.
- Bar & Alcohol beverages.
- Secure parking is provided with 24/7 CCTV surveillance.
- WiFi enabled.
- Conference facilities *(enquire)*.
- Outstanding Service Levels.

164 Highland Road
Kensington
Johannesburg

SPECIAL TO ALL SAIEE MEMBERS

30% DISCOUNT

ON OUR STANDARD RATES IN RESPONSE TO THIS ADVERT

Reservations / Enquiries
+27 (0)11 615 9001
www.highlandview.co.za

50 000 artisans by 2010 is a tall order

At least 50 000 artisans will be in formal training programmes before the end of next year if the new Science and Technology Minister, Naledi Pandor has her way. She told delegates at a garden party in Observatory that the government is committed to increasing the number of learners who are enrolling for engineering qualifications.

The garden party, held at Innes House in June was one of the official commemorative events being held to celebrate the 100th anniversary of the South African Institute of Electrical Engineers, which was formed in June 1909.

Pandor paid tribute to the SAIEE and its members for playing a pivotal role in the development of South Africa and said that the SAIEE – along with other engineering associations – were the drivers of progress and development in South Africa.

"There are no projects that can reach fruition without a contribution from the engineering fraternity and when you look around South Africa, at its infrastructure, its development, its prowess in technology and science then you can bear witness to the real contribution that engineers have made to this country," she said.

"The SAIEE has already expressed an interest in partnering with the government in some of its planned projects, particularly the formation of the National Space Agency and the Square Kilometre Array. We, as government, welcome this kind of co-operation from a voluntary association," she added.

Pandor, who was recently appointed Minister of Science and Technology has an impressive record within government and spent several years running the Department of Education prior to President Jacob Zuma's cabinet reshuffle.

"When I moved into the new department and discovered the size of the budget that we had to work with for the year, I wondered whether it was even necessary to do an annual audit because the amount of money we have at our disposal is so small," she said jokingly.

"While we may not have a lot of money we certainly do have a lot on our agenda because the science, engineering and technology fields are fundamental for the future development of the country," she said.

She said that over the next three years there would be more money available from government for training and she urged the SAIEE, and other institutions, to work closely with the department so that the training efforts are galvanised into more qualifications at all levels.

Referring to the government's Dinaledi schools initiative, she praised the SAIEE for the work it was doing in training people and teachers from disadvantaged communities but added that each institution –and the branches – should work with government to adopt one of the Dinaledi schools.

Minister of Science and Technology , Naledi Pandor.

Naledi Pandor and Du Toit Grobler looking through WATTnow.

Tea-party guests listen to Naledi Pandor's address to theSAIEE.

"By adopting a school the individual branches of the SAIEE can provide additional training and assistance to Dinaledi schools on a localised basis where assistance is needed and really matters to the community.

"Assistance in the form of money, improved facilities, such as classroom or science laboratories and, most importantly, a better quality of training for learners are imperative if we are to meet the goals of more artisans and engineers coming through our education system," she said.

Referring to the engineers employed by municipalities around the country, Pandor said that it was evident that because there is a shortage of skills at this level many of the fundamental management and maintenance tasks are not being competently completed.

"The shortage of engineers is an underlying reason for so many municipalities around the country under-performing and not providing services to the people who need them. This results in the residents of that community become frustrated and protesting to government that there is a lack of service delivery.

"One of the problems is that we don't have enough engineers and technicians working in these organisations and as a result, service delivery fails," she said.

Her open and frank discussions with the delegates were welcomed and praised by SAIEE President, Du Toit Grobler, who paid tribute to the work being done by Pandor and her team at the Department of Science and Technology.

In a vote of thanks Andries Tshabala, vice president of the SIAEE heaped praise on the minister for her recognition of the problems facing the engineering sector and for the commitment that she has made to improve training and encourage new learners into the engineering sector in its broadest form.

Once the speeches were done and dusted, Du Toit Grobler called the assembled delegates to order (within a tent, surrounded by cups of tea, sweet and savoury snacks and even some sparkling wine) so that the SAIEE could hold a commemorative, but formal meeting in June 2009.

It was probably the shortest meeting that has ever been held. No waffling from delegates eager to make a point, no disputing the minutes or arguing over semantics of the carefully chosen words recorded in those minutes.

There was a short list of apologies (so many council members had taken this garden party seriously enough to attend) and that was disposed of in record time by SAIEE's Gerda Geyer who had organised the event anyway.

Then, Du Toit Grobler thanked everyone for attending the council meeting and formally bought it to an end. The meeting – largely for posterity – was over. Pandor was taken on a brief tour of Innes House and the SAIEE's museum-in-a-container before heading back through the streets of Johannesburg to her Pretoria office without the fanfare of a blue-light cavalcade.

And now, the SAIEE is really 100 years old.

SAIEE President, Du Toit Grobler, with the plaque that commemmorates 100 years of the Institute.

Naledi Pandor, in a serious mood, talks about the 50 000 artisans needed by next year.

Dr Angus Hay, SAIEE Vice President and Master of Ceremonies at the commemmorative tea party at Innes House.

Invitation

Convention Centre Cape Town, South Africa, 24-28 August 2009
Organised by: University of KwaZulu-Natal, University of Stellenbosch, University of Cape Town, University of the Witwatersrand, Johannesburg
Endorsed by the South African Institute of Electrical Engineers

Dear Colleagues and Friends,

The prevailing economic climate and the daunting environmental pressures we face challenges engineers and decision-makers in the electrical power industry to be innovative and to lead the industry in to a new paradigm. It is important that current research is understood, developed and integrated into refurbishment and new work.

In South Africa we have a unique opportunity to come abreast with current research in the field of high voltage engineering – the technology influencing the design and operation of transmission and distribution systems, and of all insulation diagnostics. The International Symposium on High Voltage Engineering (ISH2009) is taking place in South Africa, at the Cape Town International Convention Centre, from 24-28 August 2009.

This is the premier, biennial, international event for the dissemination of current research in high voltage engineering. And it is in South Africa in 2009! Just over 300 papers, with authors coming from 30 countries around the world, will be presented in the space of five days.

The papers have all been peer-reviewed and represent a show-case of current research and development. In addition to the published papers, there is a significant technical exhibition with some twenty industrial organisations displaying current technology.

This exhibition offers the possibility of coming abreast with new and innovative products available in the marketplace.

I invite you to take this opportunity to interact with your peers in the vital field of high voltage engineering.

Jan Reynders
Chairman of the Organising Committee of ISH 2009.

International Steering Committee

Chairman: Babuder, M. (Slovenia)
Fröhlich, K. (Switzerland)
Jacob, P. (USA)
Kärner, H. C. (Germany)
Kawamura, T. (Japan)
Mosch, W. (Germany)
Muhr, M. (Austria)
Nagabhushana, G. R. (India)
Reynders, J. P. (South Africa)
Rizk, F. A. M. (Canada)
Smit, J. J. (Holland)
Waters, R. T. (UK)
Zaengl, W. (Switzerland)
Zicheng, G. (China)
Zingales, G. (Italy)

Exhibition Opportunities

There will be an exhibition held in conjunction with the conference. Organisations who wish to exhibit their products and services, should contact the ISH 2009 secretariat.

CPD Points

Attendance at the ISH 2009 conference is validated for five CPD points. The ECSA CPD validation number for the conference is: SAIEE-0354

Topic Areas

Topics of interest include, but are not restricted to the following areas of high voltage engineering:

- Electromagnetic Fields: EMC, Computation, Measurement, Environmental Effects, Corona
- Transients, Lightning, Switching & Repetitive Transients Emerging HV Technologies, Advanced Materials and Interface Phenomena
- Outdoor Insulation, Ceramic and Composite Insulators and Pollution Performance
- Intelligent Systems in HV Engineering; Data Mining and Knowledge Rules, Power System Applications
- Asset Management of HV Equipment: Strategies and Tools, Preventative Maintenance
- Diagnostics and Online Monitoring for CBM; Automated Conditions; Assessment of Remote Monitoring
- High Voltage Insulation Systems for AC and DC; Gas Insulation Systems, Liquid and Solid Dielectrics
- High Voltage Measurements, Testing Techniques and Quality Assurance, Ageing, Space Charge and Dielectric Measurements
- Live Line Technology & Practices
- Insulation Coordination & Practices (HVAC & HVDC)
- Modelling of HV Phenomena: Long Sparks & Floating Objects, Systems Aspects, Studies

FEE CATEGORIES

	Full Delegate	Students	Accompanying Person
Early (Before 30/06/2009)	R6 900	R6 100	R2 700
Late (After 1/07/2009)	R7 200	R6 350	R2 700
Technical Tours	R300	R300	R300

Secretariat

Email: secretariat@ish2009.org

Sponsorship & Advertising Opportunities

There are various sponsorship options available to organisations who would like to support ISH 2009 and promote their products and activities.

The ISH proceedings, exhibition and banquet venues will have space available for promotional material. All enquiries should be addressed to the ISH 2009 secretariat.

FOR INFORMATION AND REGISTRATION GO TO: www.ish2009.org

OMICRON · CBI electric · Eskom · 100 Years SAIEE

TELECOMMUNICATIONS RESEARCH GROUP

POWER LINE COMMUNICATIONS:
University of Johannesburg

Our Research Interests

Powerline Communications
Digital Communications
Coding Techniques
Information Theory
Video Communications
Networks

Our Research Partners

University of Duisburg-Essen, Germany
Technical University - Delft
University of California (Davis)
Walter Sisulu University
North-West University
University of Witwatersrand
Chinese University of Hong Kong
NRF, THRIP
Protoclea Advanced Image Engineering
Hysignal, Los Angelos

Telecommunications Research Group
Electrical and Electronic Engineering Sciences
Faculty of Engineering and the Built Environment
University of Johannesburg
P.O. Box 524
Auckland Park
2006

Phone: +27 (0)11 559 2147
Fax: +27 (0)11 559 2357
E-mail: hcferreira@uj.ac.za
pvanren@wsu.ac.za
tgswart@postgrad.uj.ac.za
ktouahada@postgrad.uj.ac.za

UNIVERSITY OF JOHANNESBURG