WATnow

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Shocking lack of service delivery

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October 2009

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

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Service delivery – what now?

While I cannot condone the violence that has accompanied so many of the service delivery protests that have sporadically broken out in different regions around the country, I can certainly share the dissatisfaction and disgruntlement that millions of people constantly complain about when it comes to local services or government departments.

In major metropolitan areas such as Johannesburg, Tshwane, Cape Town, Durban and Bloemfontein it would seem that most residents are spared the inconvenience of being without electricity, sanitation or clean water for days or months on end.

At least that's the picture painted in the leafy suburbs of the more wealthy communities. It's certainly not the case in the informal slums that surround these cities and is also not the case in the degraded formal areas of Malvern, Hillbrow, or central Pretoria.

On the surface some of the bigger councils do seem to be working but if you dig beneath the superficial picture you quickly find that the degradation is everywhere – not just in some places.

For instance, look at our suburban road infrastructure with its potholes, unfilled trenches and missing manhole covers. Look at the parks in their unkempt, littered and unsavoury surroundings. Count, on your way to work, the number of broken street lights, robots that aren't working or street signs that have been defaced.

Then look a little deeper still, to the complete collapse of the public health infrastructure where hospitals have run out of medication (even paracetamol) and have medical equipment worth millions that cannot be used because it is never maintained or there are no funds to buy replacement parts.

Keep scratching and you will find that mass sanitation problems are rife throughout the country and gradually the entire water system in water-scarce South Africa is being irreparably damaged. Not just by the sewerage that flows from broken down water purification works, but from the mine acids leeched from the ground or from the excessive industrial effluent that flows unchecked into tributaries.

"Please stop scratching, the picture you paint is just too depressing," you might say to me.

In reply, let me say that unless we all start doing something to change the government's attitude – from the top down – towards addressing and resolving the infrastructural problems that we face then we are in grave danger of slowly destroying everything that has been built in this country.

An AA report into the rural and provincial road infrastructure estimates that because of a lack of maintenance, the country will have to spend about R480-billion on repairs alone. The government, with its incapacitated public health care service, is now closely examining plans to create National Health Insurance schemes.

Put plainly, government is looking at ways it can use the undamaged private sector's health care facilities and it seems willing to pass legislation to get its hands on these assets. What should happen, of course, is the public care facilities should be restored to a working, fully functional state.

The existing police force has, so far anyway, been unable to provide adequate protection for its citizens. So the wealthy few effectively have employed their own police force (dubbed as ADT, Chubb or whatever) to protect them. That's not community policing, that's private policing.

And if we then look up and down across the many government departments, the many local authorities and the individual municipalities, we see they have one thing in common: A shortage of skills.

And you tell me where all those skills have gone?

And tell me too, what our government, our local authority or our municipality is doing to resolve that most basic problem? The evidence clearly points to a widespread and specific failure to deliver services: Nothing more and nothing less—comprehensive failure.

Sure, the R25-billion plus being spent on Gauteng's Freeway Improvement Plan (remember it will be a toll road so Gauteng's effectively providing bridging finance only) or the Rea Vaya bus rapid transit system may makes some people in Johannesburg, Tshwane and, Ekurhuleni feel a little bit better but that's just on the surface.

Dig deeper and then start worrying.

Because if you do, I'm pretty sure you'll mobilise your own community to join millions of others protesting against government's failure to deliver to South Africans.

My personal opinion is that every government employee should be deeply ashamed of him or her self.

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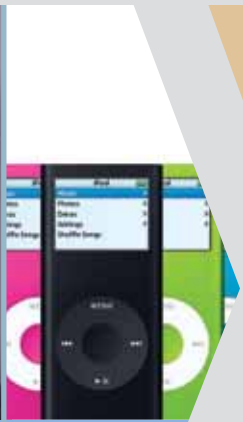

5> WATT'S GOING ON?

Fantastic phone – but not one for engineers; Philips has new LED on the market; Girls take the lead in Johannesburg's search for the brightest young scientists; In search of my published article; Nerds behaving badly; Apple launches new iPod Nano; Get down to Earth guidance in a flash; Cape Town to host 2010 communications conference; Sun spots suffer from 'depression'.



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Fantastic phone
– but maybe not the one for engineers

I've just spent a little more than a month with Apple's iPhone and let me tell you it's a fantastic phone – and the millions of people who have bought it around the world will certainly attest to that fact.

It is so simple to use, so easy to navigate and it just never lets you down.

It's got the gadgets (camera, iTunes for music, messaging and all the other standards) and, of course, it's got the application store where thousands of different and specially tailored applications are available to individual users.

It's got the connectivity – whether you're using Mac, Windows or Linux – and that connectivity is seamless. It's got the storage space (16GB) and the array of widgets for e-mail, social network sites or web browsing. And each one of these elements works flawlessly and easily.

Would I buy one?

As an editor and a writer I most certainly would, but as an engineer, probably not.

What, for me were the issues?

First of all, I'm lucky enough to have fairly slim fingers (the artist in me I'm told, although I believe it's more likely a lack of nourishment) so I was able to use the touchpad QWERTY keyboard with relative ease. However, put this keyboard in the hands of a practical, down-to-earth engineer (with fingers more like sausages) and I reckon he'd be tossing it into the dam he was building fairly quickly.

The external, push-button keyboard is so much more practical and, when engineers come into the picture, practicality is paramount. Alternatively, a stylus (as used on the Treo or Palm) is also quicker and more accurate but the iPhone won't work with a stylus. It needs the 'human' touch.

The other point is that you need to be a magician to use two fingers on the touch screen keyboard. I'm told it can be done but I found that it was quicker (although still pretty slow) to use my index finger and 'peck' at the keys like a pigeon eating bread crumbs.

Forget about using two thumbs to type your SMS messages or your e-mails unless you have the type of dexterity that Paul Adams demonstrates in his bowling action.

I certainly couldn't be bothered writing a lengthy e-mail on an iPhone.

I would imagine that this irritation translates into working with spreadsheets as well, where the individual figures would have to plugged in using a pecking technique whereas, with an external keyboard this is not the case.

Like much of Apple's early philosophy, the iPhone seems more geared to the creative industry (ponytails creatives working in advertising agencies) than the engineering profession, so I would be interested to find out how many electrical engineers in South Africa are using these phones.

Secondly, while there is an array of applications available for download (at modest cost or, in some cases free) there didn't appear to be many geared for engineers.

The ability to make movies, edit graphics and pictures, network socially are, not my mind anyway, not primary goals of the engineering profession and not something that is foremost in their minds when they finally arrive on site having trekked through the bushes to a remote substation in the bushes.

So, I have my doubts that the iPhone would add much to their lives or provide them with the indispensable tool that a cellular phone should represent.

That said, I couldn't fault the iPhone. It works. It works extremely well and it does so at all levels. For instance, it found my Nokia Bluetooth hands-free kit in my car, connected to and memorised the link so that every time I got into the car the phone was immediately active.

If I switched applications from a PC to a Mac, the iPhone knew the machine's configuration and just picked itself up and was ready to work, accept movie downloads or process (and let me listen too) music or audio files.

It's a flawless machine that, in my view anyway, needs to have an external keyboard to make it the best cellular phone anywhere in the world. With the touch screen keyboard it's just one of the very good ones on the market.

There are one or two other minor irritations:

- It has no means of removing the battery to reset it. It does have special commands that allow you to do this but, in essence, if your battery falls over for one or other reason the unit has to go in to a service agent to have the battery replaced.
- The phone is awkward to use in 'one-hand mode' because it is relatively bulky. Answering a call while walking, for instance, means that you must use the slider while holding the phone, making it a two-handed process. (There may be advanced features that overcome this but I had the phone for just a couple of weeks and didn't master any advanced features).
- The screen has a tendency to become really mucky (after all it is a touch screen) and I'm not sure that this can be overcome. I found I spent some time every day polishing the screen to stop it looking smudged. So can you imagine what the screen would like in the hands of an engineer working on site, surround by grime and grit of unspeakable proportions? Engineering sites are not for sissies or surgeons.

In simple terms, the iPhone is a wonderful unit and Apple is still producing some of the world's best computers, software, music players and phones; and the iPhone is one of the best available. Subjectively though, I don't think it's the best choice of phone for an engineer.

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SOUTH AFRICA'S LEADING CELLULAR NETWORK

Philips has a new LED on the market

Philips has launched its new Master LED lamp range featuring Luxeon Rebel LED technology, claimed to be a quality alternative for incandescent, halogen and CFL lamps in general lighting applications. The bulbs apparently reduce energy consumption without compromising on the quality or perception of light.

Compared with standard dichroic low wattage halogen lamps and incandescent spot lamps, the energy saving of these new bulbs is up to 80 percent while the bulb life is about 45 000 hours using solid-state technology.

Philips claims that its Lumileds brand is the global market leader in LEDs and the 7W Rebel is the smallest surface mountable power LED available. The claimed benefits are long life, a cool beam with no ultra-violet light or infrared radiation and low light spillage so the light is directed to where it is needed.

These new lamps start-up instantly much like incandescent bulbs.

Girls take the lead in Johannesburg's search for South Africa's brightest young scientists

Johannesburg is full of potential young scientists, and the news is that most of them are girls, says Dr Steve Lennon managing director; Eskom corporate services division.

"The 2009 Eskom Expo for Young Scientists got off to a cracking start at the University of the Witwatersrand in July, where young scientists from 48 schools showed just what they could do," said Lennon, who champions the project across South Africa.

"The bad news for boys is that girls have taken an early lead for honours by making up 57 percent of 839 participants. A total of 552 projects were exhibited, which is a positive sign, indicating that South Africa has a great depth of potential scientific talent. The interest in the competition is pleasing as it proves that there are children with potential who could, at a later stage, consider entering the technical, engineering and scientific fields.

"It is the purpose of the Eskom Expo for Young Scientists to encourage those with an interest in the science, technology, engineering and mathematics fields, to test their skills and become aware of what other learners with potential are undertaking in schools across the country. We are delighted with the interest shown by learners in Johannesburg and believe that the national finals of the Eskom Expo for Young Scientists to be held at the University of Pretoria later this year will reflect a high standard of work," Lennon said.

Winners of the gold awards in each of the 26 regions competing for honours will go forward to the national finals at the University of Pretoria in October.

For Johannesburg, this means that nine primary school projects (from seven schools) and 26 high school projects (from 14 schools) that have gold winners will go forward to display their projects at the national finals.

"It is gratifying to see that the winning projects have not only come from schools in urban areas, where all the necessary support facilities are available, but also from peri-urban schools, which have limited access to labs or other supporting material," Lennon said.

"What they all have in common, however, is high levels of ingenuity and the ability to look at their local environment for project inspiration. This is exciting for the country's future," he added.

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In search of my published article

Derek R. Woodburn. Pr. Eng. FSAIEE

Soon after WATTnow started, I sent into the Editor an article I had written on colour-changing Silica Gel, thinking it that would be of interest to other electrical engineers.

Some time later, I contacted the Editor to find out whether the article was either of no interest at all, or perhaps needed to be heavily altered to be usable. The reason I had written the article was that I considered the material to be really fascinating. It was widely used in the electrical, and many other industries, and yet nobody I asked knew why it works the way it does.

The Editor said he felt the article had been of more interest to chemical engineers. He had passed it on to the editor of Chemical Technology, and it had been published in an issue of a few months previously.

However, he was not able to get hold of an archived copy, and understood that the only available copy would be in the British Library. One of my favourite places to visit in London is the British Library. My chest almost bursts with delight and pride! There, under glass, some fifteen centimetres from your nose you can see the original pencil-written Alice-in-Wonderland, hand written original Mozart scores, portions of the Bible written in the first century on pieces of parchment, and original copies of the Beatles songs.

During the Easter school break this year I took my eldest grandson to London to meet his cousins, and to show him something of the wonders that London has to offer.

When he and they were exhausted from our visits to see some of the treasures of the British Museum, the Science Museum (and Aeronautical Museum), Buckingham Palace, The Tower of London, the Thames Barrier, Greenwich Observatory, Harry Potter's platform 9+3/4 (for the train departing for Hogwarts from St. Pancrass Station), doing Brass-rubbings, and the Victoria and Albert Museum, I left the cousins to play games in the local park.

I then went off on my own to see if I could possibly view my own article in the British Library. By the time I got there, I was told that the lady who would extract the magazine from their archives had already gone off for the afternoon, and that my request might take a few days in the queue to retrieve the copy of the specific Journal.

Since we would be flying home to Johannesburg the following day, that put paid to that idea. Although I have not yet seen my published article, I glow with joy that a copy of it, together with thirteen million other books and journals, lives in the British Library.

Left: Roman Salary coin
Derek hold's a Roman salary coin that is left on show at the British Museum for anyone to touch or hold.

Middle: British Museum
The entrance to the British Museum in London

Right: Inside the British Museum
Totem poles in the foyer of the British Museum with a coffee bar and restaurant on the right.

Nerds behaving badly?

By Reggie Dlamini – Associate at Bowman Gilfillan Inc

In terms of Section 21(1)(a) of the Copyright Act 98 of 1978, the ownership of the copyright in a work vests in the author of the work. One exception, which applies to computer programs, among others, is that where a work is made in the course of the author's employment by another person under a contract of service or apprenticeship, that other person (the employer) is the owner of any copyright subsisting in the work.

In a recent judgment, King v The South African Weather Service 2009 (3) SA 13 (SCA) dealing with the ownership of copyright in certain computer programs, alleged by the Weather Service to have been created by King in the course of his employment, the Supreme Court of Appeal had occasion to pronounce on the meaning of the phrase 'in the course of employment'. It held that "the term is unambiguous and does not require anything by way of extensive or restrictive interpretation. A practical and common-sense approach directed at the facts will usually produce the correct result."

Writing on behalf of a unanimous bench, Harms ADP held that the fact that an employee creates a work at home (or even during office hours at the premises of her employer) is only one of the factors that have to be taken into account in answering the question whether the work was made in the course of the employee's employment. The thrust of the decision was that for purposes of Section 21 of the Copyright Act the answer to the question remains primarily a factual issue that depends not only on the terms of the employment contract, but also on the particular circumstances in which the work was created. In other words, the phrase 'in the course of employment' in Section 21 is not limited only to tasks which are included specifically in terms of the provisions of the employment contract.

This conclusion was justified on the basis of the principle that the scope of employment may change explicitly or by implication. The court found that in the particular circumstances of this case, the computer programs in issue were created by Mr King in the course of his employment, notwithstanding that creating computer programs was not part of his job description, according to his employment contract. The copyright subsisting in the programs therefore belonged to the Weather Service.

Some of the key evidence before the court was that a job evaluation investigation concluded some two years prior to the termination of King's employment, and with which King had agreed at the time, stated that he was responsible for system development and programming. In terms of the evaluation it was estimated that King was spending 50 per cent of his time on system development and programming.

Quarterly reports prepared by King about the performance of his duties stated that the major component of his work was programming. Some of the other central evidence was that the programs were designed to fit with and become a part of the employer's own system; the employer exercised the right to approve the programs before they could be implemented in the system; the programs were directly related to the employer's business and were to the benefit of the employer; some of the programs were created specifically at the instance and for the use of the employer; and they were not created for external use by others, but were purely work related. The court concluded from all of this that, but for his employment with the Weather Service, King would not have created the programs and therefore that his employment was the primary cause of the programs.

Quite ironically it appears that none of the considerations that were decisive against King would apply in the case of a moonlighter who uses his employer's time and resources, at the employer's premises, to develop computer programs, which he seeks to sell for his own benefit. The finding that the fact that an employee creates a work at home (or even during office hours at the premises of her employer) is only one of the factors that have to be taken into account appears to lend itself quite nicely as a defense in favour of the moonlighter. It is, however, not only the moonlighter that employers (primarily those in the information technology sector) would need to be concerned about. The ruling that a factual analysis that goes beyond the provisions of the employment contract must be conducted in each case also means that even a very well drafted agreement may not provide sufficient protection. The possibility of having to resort to the courts in each instance will be unwelcome to most.

What is clear from the judgment is that King's claim that he was the copyright owner was undone by the evidence contained in the progress reports and job evaluation investigation. The outcome might have been different if it were not for those reports. It is therefore recommended that if the provisions of an employment contract cannot secure the desired outcome then, as in the King case, progress reports or similar records may be employed generally to tip the scales in favour of the employer.

The result is that it can no longer be left up to the employee to notify the employer of, or to maintain records of, or keep all material relating to or evidencing the creation of software or computer programs in the course of employment.

It would be particularly insufficient to require, baldly, that such records be delivered to the employer on termination of employment or on demand by the employer.

Apple launches new iPod Nano

Apple® has added a video camera, microphone and speaker to its range of iPod Nano music players. Users can now shoot a video anywhere, view it on their Nano and transfer the images to sites such as YouTube via their computers.

The new iPod Nano features an ultra-thin, sleek design with a 56mm colour display and polished aluminium and glass enclosure. It also features a built-in FM radio with live pause (which allows users to pause and then resume a radio show without losing any of the content) as well as a built-in pedometer. The new Nano is available in 8GB and 16GB models, and comes in eight brilliant colours being silver, black, purple, blue, green, orange, yellow and pink.

"iPod Nano is the world's most popular music player with over 100 million sold," said Steve Jobs, Apple's CEO. "And now we've added a video camera to its incredibly thin design, without any additional cost to the user."

The 8GB model holds up to 2 000 songs, 7 000 photos, eight hours of video and seven hours of captured video, while the 16GB model offers double that. Apple has sold more than 220-million iPods over the years.

Get down to earth guidance in a flash

Lightning activity is a major threat to industrial and commercial installations and operations, and to human safety. However, effective application of sound engineering techniques can reduce and manage these risks according to Ian McKechnie, managing director of Innopro, a specialist in earthing and lightning protection.

Innopro, in association with the School of Electrical and Information Engineering at Wits University, is presenting a one-day industry-briefing seminar on Best Practices in Lightning Protection and Earthing of Structures and Systems at various venues around the country during November 2009.

The seminars will be presented by Ian Jandrell and Ian McKechnie, both directors of the company. Ian Jandrell is a Personal Professor, CBi-Electric Professor of Lightning, and Head of the School of Electrical and Information Engineering, at the University of the Witwatersrand. Ian McKechnie is an Honorary Research Fellow in the same School.

The seminars are accredited for Continuing Professional Development (CPD) with the Engineering Council of South Africa (ECSA) and by Wits University, and attendees will earn one credit in the compulsory Category 1.

McKechnie says the briefing seminars are aimed at industry practitioners at all levels and will be beneficial to all persons involved in the design, management, insurance, risk assessment and/or maintenance of infrastructure and systems that can be affected or influenced by lightning and related electromagnetic interference.

He added that a formal technical qualification is not a prerequisite for attendance or for gaining benefit from the seminar.

Limited space is available at the seminars so booking is essential. Interested persons should contact Innopro at 012-6675151, or by email at training@gafrica.com, to register for this even.

Seminars will be held in Centurion (Gauteng) on 9 November 2009 and in Durban on 13 November 2009.

CALL FOR PAPERS AND PROPOSALS

IEEE International Conference on Communications (ICC 2010)

will be held in Cape Town, South Africa, from 23-27 May 2010, prior to the Soccer World Cup also being held in South Africa. The conference is aimed at addressing key themes on "Communications: Accelerating Growth and Development." The program will feature major Symposia, Tutorials, Panel Discussions, and Workshops. Full details of submission procedures are available on the IEEE ICC 2010 website, www.ieee-icc.org/2010/.

The organizers of IEEE ICC 2010 as well as our attendees expect accepted papers to be presented at the conference. IEEE reserves the right to exclude a paper from distribution after the conference (e.g., removal from IEEE Xplore) if the paper is not presented at the conference.

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> Paper Submission: 10 Sep 2009

Authors are invited to submit original technical papers for presentation at symposia and publication in the conference proceedings from the following list: oriented information in a broad range of communication areas from cognitive radio networks, ultrawide bandwidth systems and automotive networking and telematics to cognitive and cooperative wireless networks and peer-to-peer communications.

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Communication Theory Symposium
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Signal Processing for Communications Symposium (SPS)
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Communication QoS, Reliability and Modeling Symposium
Nelson Fonseca, nfonseca@ic.unicamp.br
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Multimedia Services, Communication Software and Services Symposium
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Communication and Information System Security
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Pramode K Verma, pverma@ou.edu
Abderrahim Benslimane,
abderrahim.benslimane@univ-avignon.fr

TUTORIALS

> Tutorial Proposal Due: 10 Sep 2009

Proposals are invited for half- or full-day tutorials in communications and networking topics. Proposals should be submitted to liye@ece.gatech.edu and mischa.dohler@cttc.es for review.

PANEL DISCUSSIONS

> Panel Proposal Due: 28 Aug 2009

Submissions are sought for panel discussions the latest technical and business issues in telecommunications topics. Proposals should be submitted to gibson@ece.ucsb.edu and dwngwenya@icasa.org.za for review.

WORKSHOPS

> Workshops Proposal Due: 30 June 2009

Submissions are sought for workshops on the latest technical and business issues in communications and networking topics. Proposals should be submitted to a.jamalipour@ieee.org and molisch@usc.edu for review.

Cape Town to host 2010 communications conference

The International Institute of Electrical and Electronics Engineers has chosen to hold its 2010 Conference on Communications in Cape Town next year, just a few weeks before the first game of the World Cup Football tournament kicks off.

The five day conference will start on 23 May 2009.

Briefing delegates at a special breakfast held in Midrand in September, chairman of the Local Organising Committee for the international conference, Marius Mostert said that for South Africa to host such a prestigious event was indeed an honour.

It is the first time that this annual conference has been held in Africa and it underlines the fact that Africa is currently the fastest growing telecommunications industry in the world; the focus of the conference will be on growth and development.

"The typical scope and scale of the conference is that we expect between 1 000 and 1 500 delegates to come to Cape Town where a combination of plenaries, forums, workshops, tutorials, symposia, exhibitions and poster sessions will be presented. In fact we expect more than a thousand papers to be delivered," he said.

Referring to the 2009 conference that was held in Dresden, Mostert said that over 2 000 delegates attended and 1 046 papers were present in 17 parallel sessions. Moreover, there were 34 exhibitors, 19 tutorials with 150 delegates and 10 workshops, each attracting over 300 attendees.

"This gives you an idea of the scale of the conference and, with the World Cup starting soon after the Cape Town conference ends, we are reasonably confident that we may attract even more delegates than Dresden," Mostert said.

The conference has the full backing of the South African government and in a special letter inviting delegates and exhibitors to the event, Minister of Science and Technology, Naledi Pandor, said that in the African context this conference was particularly significant because of the growth in the telecommunications sector throughout the continent.

She appealed to all members of the IEEE to support this conference and to make it a resounding success. "As the government we wholeheartedly support the initiative and will play our role in facilitating the event and hosting it with true South African hospitality that is renowned throughout the world," she said.

Mostert said that the work that goes into hosting such a prestigious conference needs the solid backing of local and international enterprises and, to ensure that all information and opportunities are conveyed to the international community, the local Organising committee has set up dedicated divisions to handle specific aspects of the event.

The specific committees are:

- Patronage – chaired by Viv Crone
- Keynote speakers and events – chaired by Ross Murch
- Exhibits – chaired by Steve Alves
- Panels – chaired by Jerry Gibson and Dumisa Ngwenya

Sunil Maharaj will run conference operations with sub-committees for registration, publicity and local arrangements and a technical programme committee controlled by co-chairman Jan Olivier and Chengshan Xiao. Sub-committees for this sector include the symposia, workshops and tutorials along with publications for the event.

Turning to the overview of the conference, the chairman of operations, Sunil Maharaj said that various specialised services have already been retained to handle preparations for the event.

"We aim to give all delegates attending the ICC conference at Cape Town's International Conference Centre a unique African experience that will include pre-and post-conference tours allowing individuals from different parts of the world to mingle with other like-minded professionals in the communications arena.

In outlining the role of Patrons at the conference, Viv Crone said that while the costs of participating as an exhibitor or patron might seem high, they had been benchmarked against similar international conferences to attract international organisations.

The packages offered (based on Africa's Big Five) include:

- Lion – R500 000
- Elephant – R150 000
- Buffalo – R100 000
- Rhino – R50 000
- Leopard – Mainly for academia at R30 000.

"When the exchange rate between the dollar or the Euro is factored into Rand prices, it's evident that the charges set for this conference are highly competitive and attractive both for local and international organisations wanting to showcase what they do," said Crone.

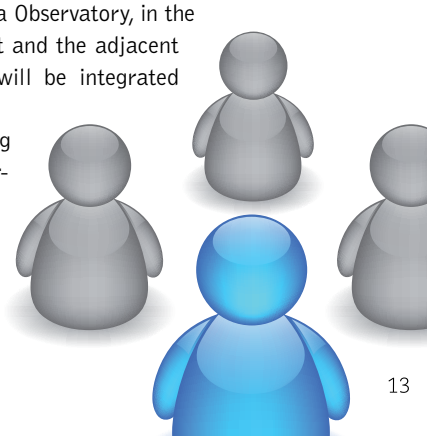
He emphasised that there were a number of other promotional opportunities for a range of events from delegate lunches to supplying bottled water or running an Internet café at the event.

"These are being offered on a first-come-first-served basis and we are open to suggestions from anyone interested in having a presence at next year's International Communications Conference," he added.

Steve Alves, who is responsible for the exhibitions, said that floor space and booths would be available for individual companies and that the critical issue was that the deadline for space is in January next year. "This might seem early but there is an enormous amount of planning that goes into setting up an international exhibition such as this," he said.

The exhibition opportunities have been identified and exhibitions space has been set aside in the Clivia Observatory, in the Strelitzia and Jasminum Restaurant and the adjacent conservatories so that exhibitors will be integrated into the conference at all times.

Anyone interested in obtaining more information about this conference can contact Marius Mostert via e-mail at mariusmostert@telkomsa.net .



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Sunspots suffer from 'depression'

Scientists at the Universities of Glasgow, Strathclyde and Central Lancashire have used 21st Century solar observations and image processing to solve a sunspot puzzle first noticed in the 18th Century.

Professor Alexander Wilson, the first Director of the Glasgow University Observatory (from 1760 to 1784), discovered, in 1769, what is now known as the 'Wilson Depression' - the slightly 'dished' appearance of sunspots, which is most visible when spots are at the edges of the Sun.

Wilson theorised that sunspots were depressions in the Sun's surface, and we have learned that the dished appearance is because the radiation emitted from the cooler sunspot comes from a slightly deeper layer in the solar atmosphere than the radiation emitted by the warmer surface that surrounds it. But, how much deeper?

Wilson could not answer this, and we cannot measure the depth directly, but it is crucial in understanding the internal structure of sunspots and their magnetic fields. Scientists have now developed a way to work out the depth by combining information from many thousands of sunspot observations.

Dr Lyndsay Fletcher, Physics and Astronomy Reader explains: "Sunspots can only be detected if they are large enough, and the visible size of a sunspot to an observer on Earth depends on many factors all working together.

The depth of the Wilson depression is one of these factors. Depth is important because the base of a sunspot, sunk below the solar surface, can be 'occluded' by the sides of the sunspot and by the surrounding surface when viewed edge on, which happens when the spot is at high longitude positions on the Sun, far away from the centre of its disk. This occlusion effect means that a deep sunspot viewed almost edge on will look smaller than a shallow sunspot viewed from the same angle.

"A useful analogy is to think of looking at a deep bowl and a shallow bowl nearly edge on. The bottom of the bowl (the base of the sunspot) is partly hidden by the sides of the bowl, and the deeper the bowl, the more of the base of the bowl is hidden.

"Likewise, deep sunspots at high solar longitudes will appear smaller and be more difficult to observe than shallow sunspots. However, this is only one small part of the many complex processes that determine the pattern of spots on the Sun, and so we had to examine the largest possible dataset of sunspot observations, and combine the results with modelling, to disentangle the sunspot depth from all the other factors at work."

Fraser Watson, the PhD student who led the analysis, said: "To ensure a reliable and consistent dataset of sunspots we used automated image processing techniques, developed with Professor Stephen Marshall of the University of Strathclyde.

"These methods allowed us to identify and take measurements from more than 25 000 sunspot observations made by the international SOHO (Solar and Heliospheric Observatory) spacecraft over the last decade.

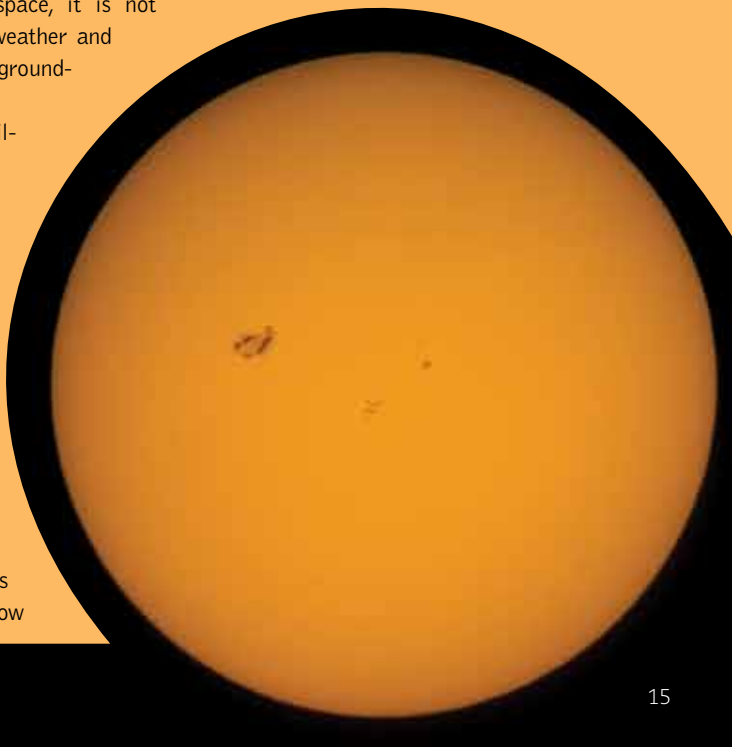
"A major benefit of this was that SOHO has been in operation throughout the last solar maximum, when the number of spots is greatest, and, being in space, it is not subject to the problems of weather and atmosphere that come with ground-based observatories.

"This large dataset available from SOHO meant that it was possible to study sunspot visibilities at all solar longitudes and allowed us to construct a model of sunspot shape and formation that produced the same statistical patterns as those seen in the data. In comparing our sunspot model with thousands of solar images we could pin down the depth of the base of sunspots to be around 1 500km below the surrounding solar surface."

Now that scientists have this measurement for the depth of sunspots, it can be used as a 'ground truth' in complex models of sunspot density, temperature and magnetic field. Sunspots will be a core area of research internationally in the next few years, with the launch of the new 'Solar Dynamics Observatory' satellite. Assuming, that is, that sunspot numbers start to increase again, as we are in a period of low sunspot numbers, the like of which has not been seen for 100 years.

The work was led by Fraser Watson (first year PhD student) and his supervisor Dr Lyndsay Fletcher (Reader) in the Department of Physics and Astronomy, University of Glasgow, in collaboration with Dr Silvia Dalla of the University of Central Lancashire and Professor Stephen Marshall of the University of Strathclyde, and grew out of a Glasgow-Strathclyde 'Synergy' summer project. It will appear later this year in the journal 'Solar Physics'.

Next year, 2010, marks the 250th anniversary of the founding of the Regius Chair of Astronomy at Glasgow University, first held by Professor Alexander Wilson.



Over the past 15 years, South Africans from all walks of life have been complaining about service delivery from government departments, municipal authorities and the provinces themselves.

Among the upper and even middle income suburbs of Johannesburg, Cape Town, Durban and Port Elizabeth, many of the complaints were made over dinner conversations without anyone actively protesting. But in suburbs or informal settlements on the outskirts of metropolitan authorities, the residents were that much more vocal, more violent and more determined to register their specific dissatisfaction.

Week by week, month by month, pockets of violent public behaviour was witnessed in regions throughout the land: From Orange Farm to Ermelo; from Hout Bay to Kayelitsha; from Durban to Chatsworth.

Angry residents all over the country were determined to tackle government and insist that government deliver on its 15 years of promises. Prior to this year's general election, protestors were vociferous in their criticism of government – not only in the Western Cape but also in other rural areas around the land.

They demanded service – and then went ahead and voted for the self-same African National Congress that had denied them that service for years.

It seems, in Africa, you don't let party loyalty get in the way of a lack of service delivery.

Why are so many South Africans so dissatisfied with government and council performance? Well, if you examine the facts, the picture that emerges is, frankly, little short of disgusting.

Let's start with local authorities.

In North West Province alone, all 25 municipalities in the province are teetering on the brink of collapse and will have to be rebuilt from scratch, mainly because of in-fighting within the ruling ANC and widespread fraud and corruption. This is the

assessment of a confidential report by an ANC national executive committee task team sent to investigate political and administrative chaos in the province.

In fact, the political in-fighting and power struggles in the province resulted in the entire Provincial Executive Committee being fired by the ANC National Executive in July.

This is not an isolated case: of the 283 municipalities in South Africa only ten received a clean bill of health in the audit report compiled for 2007. The Development Bank of Southern Africa and the South African Local Government Association are trying to address the widespread problems in municipalities by working with the SETA.

Early in August, President Jacob Zuma summoned all premiers and some city mayors to Pretoria to discuss lack of service delivery. What is it that he – and millions of other South Africans – is worried about?

A survey done by independent watchdog company, Municipal IQ, rates the productivity of the best and worst municipalities in South Africa on a 100-point scale and, predictably, the richest municipality, the City of Johannesburg Metropolitan Council, only managed to score 63,45 on the index, followed by Tshwane – which has seen its overdraft increase from R500-million to R1,2-billion over five years – in second spot with 61,22 points.

The top district in the C1 category was the Saldanha Bay Local Municipality with 58,87 points while in the C2 category for smaller municipalities the Umgungundlovu District Municipality, which effectively 'failed' by scoring just 42,66 points, was top.

The worst metro is listed as the Nelson Mandela Bay Metropolitan Municipality, which scored 57 points whereas the worst district in the C1 Category was Ehlanzeni District in Mpumalanga with a score of 32,87. The worst district in C2 was the OR Tambo District municipality, with a score of just 24,34.

Overall, the very worst local municipality was Nongoma scoring 17,23 and this was followed by Eastern Cape's Mbashe with 17,65, Masinga in KZN with 18,02, Intsika Yethu in the Eastern Cape with 19,70 and Vulahmehlo with 19,82.

This outlines the extent of lack of productivity in South African municipalities and is probably unprecedented in this country's long history. The scale itself is purely on productivity and not on ability of the local authorities to provide free basic services, let alone take care of the more complex issues of maintaining infrastructure, commissioning and paying for new projects, creating new road networks or installing new electricity supplies.

And those are basic, simple services in terms of what a local authority is expected to deliver.

During July this year there were 38 service delivery protests, many of them violent, the worst level since 2004 according to Municipal IQ. What may have surprised some people was that the protests did not take place in the poorest municipalities or in those with the worst service delivery backlogs.

To put this contention into perspective, it's worth noting that Diepsloot (north of Johannesburg and virtually non-existent 20 years ago) has more than 150 000 residents and more than 5 000 RDP (Reconstruction and Development Programme) houses in the geographical region. In fact, on an averaged basis, Johannesburg, in the past few years, has spent more than R4 000 per resident on provision of services compared with the national average of R1 000.

This, says Municipal IQ, illustrates the pressure on municipalities to deliver – and that pressure is extreme.

At a housing summit held in Gauteng in July 2007, provincial MEC for Local Government, Dorothy Mahlangu ruefully alleged that most of the protests were orchestrated by individuals or groups who were aware of government plans to develop the region but wanted to sow division in communities. It seems to be a recurring theme: government officials and a cross-section of other administrative bodies including taxi associations and unions, always seek to blame some or other 'conspirators' when protests turn.

And yet any actual evidence of such 'conspiracies' seldom, if ever, emerges.

Mahlangu readily admitted that the protests were mainly centred in under-developed, informal settlements where residents were angry,

dissatisfied and disgruntled because of government's inability to provide housing, electricity, sanitation or clean water.

Added to this was the under-current of perceived government corruption, fears that communities or informal settlements may have been relocated to different areas, the consistently poor quality of government housing programmes and widespread fears that groups of people living in informal settlements would be evicted from the land they illegally occupied.

That was more than two years ago, when widespread, violent protests were taking place at Orange Farm, Vlakfontein, Hospital Hill, Freedom Park, Thembelihle, Eikenhof, Slovo Park and Kliptown.

In July this year, widespread service delivery protests reached a climax in Gauteng, Mpumalanga, KwaZulu-Natal and the Western Cape. The complaints were identical to those recorded in 2007.

Going back even further, former President Thabo Mbeki warned the National Council of Provinces in 2006 that South Africa could face a mass revolt if the municipalities' sloppy record of service delivery did not improve. He said then that the weaknesses in municipalities were a serious threat to the country's democracy and, if left unattended, would fuel disenchantment, creating a gulf between councillors and the masses.

The disgruntlement among community residents was the same then as it is today: a lack of sanitation and water, no clinics or effective public healthcare, non-existent maintenance of infrastructure, no electricity distribution, no housing or land development and no functioning schools for the communities.

Mbeki blamed a lack of skills for the lack of service delivery. Today, with a changed political structure within the same governing party, President Jacob Zuma still blames a lack of skills at a municipal level for the government's failure to deliver services to the people they are meant to serve.

How widespread is the lack of skills? Several astonishing facts have emerged:

- The South African Institute of Chartered Accountants has compiled a report that shows that South Africa needs 22 000 accountants to feed the economy and the shortage is exacerbated in the public sector.
- In terms of adjudicating skills, the former departments of Local Government and the Treasury have been trying to conduct a skills audit of senior municipal officials who are classified as being qualified at S57 Management level. In Limpopo only 30 percent of the S57 staff completed the audit and, while the final results of this audit have never been published, it appears that the skills level record in those submissions was way below the minimum standard set down by the National Treasure for the 2013 compliance targets. That's the audit from just one province where only 30 percent of the managers participated.
- Only ten of the 283 municipalities in the country received a clean audit report for 2007 and in many of the smaller municipalities, the Auditor-General was unable to find sufficient financial facts or records to back up the poorly prepared financial records submitted by these municipalities.
- In terms of the Scarce Skills List published by the Department of Labour, South Africa needs 13 470 construction, distribution and production and operations managers and more than 10 600 engineering

professionals such as chemical, civil electrical, industrial, mechanical and mining engineers. It also needs 10 755 building and engineering technicians, 7 600 mechanical engineering and trades workers such as aircraft technicians and toolmakers; 15 835 fabrication engineering trades workers such as welders and sheet metal workers and more than 12 800 other technicians including chemical, gas, petroleum and power generation plant operators. That is a total of 142 120 scarce skills that are directly linked to engineering in South Africa.

- The Department of Home Affairs claims that because of the skills shortages 35 000 positions for civil engineers, quantity surveyors, bio-engineers, construction managers and foremen could not be filled.
- Last year, labour specialist, Allyson Lawless, a former head of the South African Institution for Civil Engineering estimated that the lack of engineering skills was hampering development and would mean that South Africa and Africa would be unable to meet the millennium development goals set down by the New Economic Partnership for Africa's Development.
- South Africa currently has just 473 engineers per million people whereas developed and productive countries such as Japan have 3 306 engineers per million people according to research compiled by the Human Sciences Research Council and contained in a report published in March this year.
- Joan Roodt, a researcher who helped to compile the HSRC report, noted that a great many municipalities in South Africa do not employ a single technician or engineer and this creates very serious problems as the municipalities are supposed to be at the forefront of delivering services and maintaining existing (or building new) infrastructure.

There is no doubt that government departments – even the top government leaders – are aware of the fact that municipalities are unable to deliver services because of the key shortages of staff that they employ. The question is: what is government doing to overcome the problems?

The short, snappy and simple answer is nothing – although there have been indabas, task teams, special investigative committees and all sorts of other initiatives aimed at coming up with solutions.

These are all well and good but the stark reality is that government officials have been talking about skills shortages at a municipal level for at least ten years and, while various dire warnings have been issued by government spokesmen and leaders, no actual progress has been made in improving or rectifying the situation.

It is this inability to resolve service delivery problems, coupled with government intransigence and widespread corruption in municipal structures that hampers all service delivery.

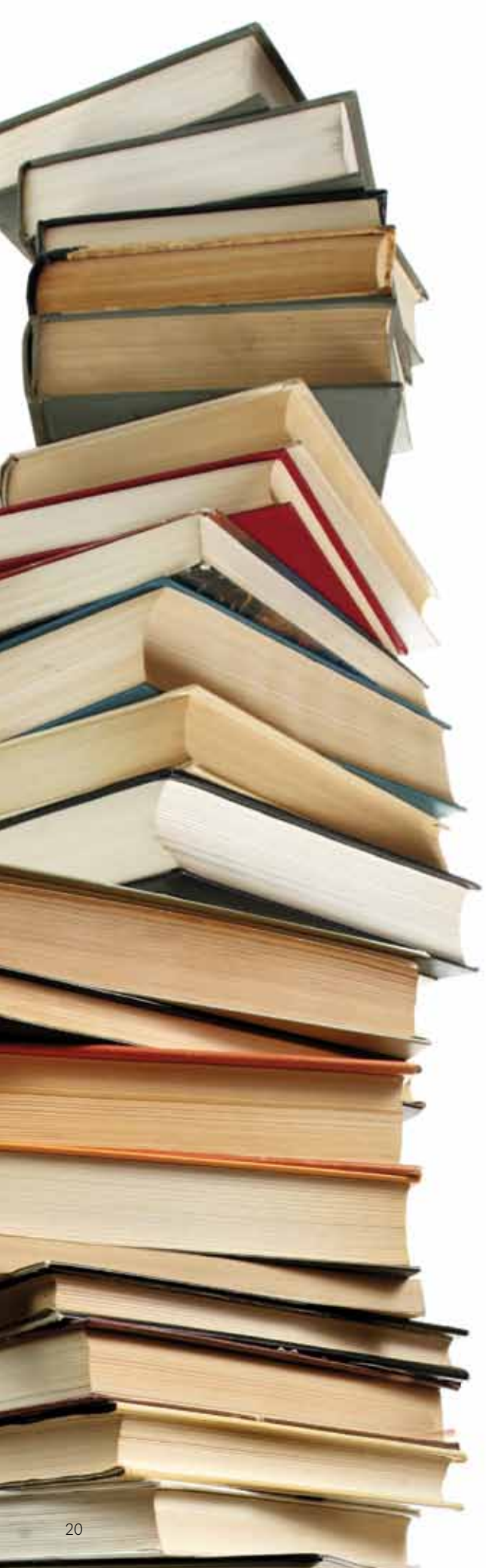
Examples of this lack of capacity include the fact that more than R2-billion must now be spent by government on rectifying or rebuilding many of the more than 2,6-million homes built as part of the government's RDP housing projects implemented since 1994, according to a plan outlined by Kaba Kabagambe, director general the Department of Human Settlements. Already R500-million has been spent on this national project.

And, in terms of corruption, according to a Public Service Commission report published in July this year, more than half of the 8 545 senior managers employed within the public service failed to comply with a stipulation to fully disclose their personal financial interests. The PSC warned that this meant that 4 454 senior managers, including 151 directors-general and deputy directors-general could face charges of misconduct. The PSC said that it had already identified 434 managers who may have potential conflicts of interest within the public service.

In its report the PSC stated: "The lack of compliance is a serious indictment of the managers and their political bosses because failure by even one public official can result in significant losses of taxpayers money channelled corruptly to private enrichment."

So perhaps the allegations of corruption within the municipal structures by protesting residents of informal settlements, townships and residential areas are not that far-fetched.

Finally, it is particularly disconcerting to realise that while government claims to be addressing service delivery problems, in reality the problems have been addressed many times in the past and will probably be addressed many times in the future. Our track record of poor service delivery will continue unabated and violent protests from disgruntled and frustrated citizens are likely to become an intrinsic part of life in South Africa.



Is the paper book in the throes of death?

by Antonio Ruffini

In the USA, the sight of people reading paperbacks on long subway journeys is changing; more and more one can spot commuters reading from book-shaped electronic tablets. The device is likely to be a Kindle, and most South and Southern Africans are still unfamiliar with it. Nonetheless, it puts into question the long term future of the paperback novel.

In particular, when a friend, let's call him Rob the Reader (his real name actually is Rob and he really is a reader, unlike Joe the Plumber of US presidential election politics fame who turned out to be neither Joe nor a plumber), recently started using a Kindle electronic book reader it was clear something was happening.

Rob reads two to three novels a week and when he renovated his home, he ensured there was sufficient wall to ceiling bookshelf space across several rooms to accommodate his 4 000-plus book collection. To call him a book aficionado is an understatement. He is also the sort of person who, five years ago, saw himself as never in his lifetime abandoning paper to read in electronic format for pleasure.

Nowadays he still reads paper books, but only half his reading is in that format. A few months ago he took up a Kindle 30-day money back offer, fully expecting to use up the trial period and hand back the device. It didn't happen that way. "It does not mean electronic book readers are perfect," he says. "I won't read the Kindle in the bath, or take it to the beach and it is limited in that one can't loan a book to a friend."

On the other hand, Rob has enjoyed the instant gratification of hearing about an interesting book on podcast, immediately ordering it, and having it on his Kindle in seconds.

The first version of the Kindle was released by Amazon in 2007 and sold out within hours. Two subsequent versions have been released, the Kindle 2 and Kindle DX, in February and May this year respectively. The device measures about 135 mm by 190 mm, the size of a trade paperback and the screen itself is about the size of a standard mass market paperback. Its thickness has reduced from the earlier version of just over 20 mm to about 9 mm and it weighs less than a book.

To date, it is purely a United States phenomenon. Due to copyright laws and restrictions of access to the content it has not even crossed the border to Canada, though it is rumoured to be due for release in the UK later this year. The Kindle comes with free and lifelong access to Amazon's wireless network, Whispernet, which is only offered and supported in the US. The Kindle's success has been due in part to the high number of titles available for download, with Amazon offering almost 350 000 of them. The Kindle also comes with a basic web browser giving it access to Wikipedia.

It uses a greyscale electrophoretic display (the electric ink (eInk) concept described in one of the earlier editions of WattNow, February 2007, pg 38), and retails in the US for US$300. It is not cheap because the electric ink technology remains expensive. In addition, while hundreds of thousands of titles are available, there is something of a war ongoing between the publishers/Amazon and readers

as to what the suitable pricing for electronic books should be. Consumers seem unwilling to go beyond a price cap of US$10 for a new title and are even questioning how Amazon can justify the current prices for Kindle content, which they consider too high, let alone attempts to creep prices higher. The argument by readers is that if the author of the work would make US$1 per copy sold, as is typical now, and if the publisher and Amazon take US$2 each per copy, those construe fair remunerations for all concerned, and there is ample room to lower prices. It takes into account that consumers are unable to transfer ownership of their Kindle books as they can with paper versions, there is no cover art, no physical format object to own, etc., thus what consumers are getting is a lower value product that should be priced accordingly. On the other hand, publishers and Amazon see the new release prices on Kindle lowering the overall value they are able to get for the content, capping it in effect, which undermines their significantly more expensive, and lucrative, hardcover and trade paperback pricing structure. They are thus strongly resisting attempts to force prices down.

Some old classics are available for low prices, though, and the format means there are free samples available of the first chapter of each ebook, giving readers a chance to decide if they want to buy the full download. There is also believed to be about 100,000 ebooks available on the internet free of charge.

eInk technology has not yet managed colour on a commercial basis but when it does Rob the Reader suspects it will change the consumer magazine market forever.

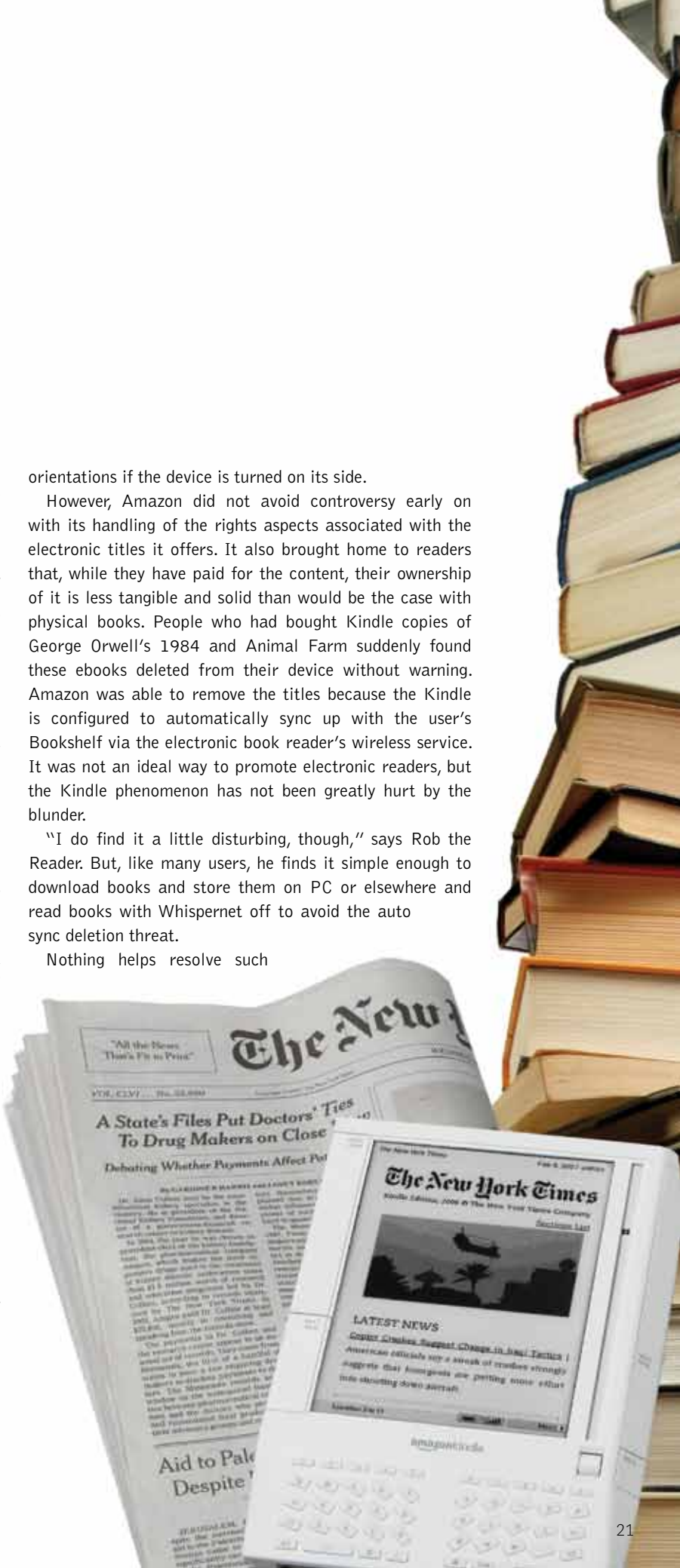
Already, the Kindle has evolved significantly since its first release. Its internal memory has expanded from a few hundred MB, sufficient to hold 150 non-illustrated books at one time, to 4GB of which 3.3 GB is user accessible and capable of holding 3 500 non-illustrated books at a time. The four-level greyscale display has been upgraded to a 16-level greyscale display. Battery life has improved to the point where it lasts for four days while using the wireless connection, and two weeks if it is offline.

The Kindle has a text-to-speech option to read the text aloud, and the latest model has an accelerometer that automatically rotates pages between landscape and portrait orientations if the device is turned on its side.

However, Amazon did not avoid controversy early on with its handling of the rights aspects associated with the electronic titles it offers. It also brought home to readers that, while they have paid for the content, their ownership of it is less tangible and solid than would be the case with physical books. People who had bought Kindle copies of George Orwell's 1984 and Animal Farm suddenly found these ebooks deleted from their device without warning. Amazon was able to remove the titles because the Kindle is configured to automatically sync up with the user's Bookshelf via the electronic book reader's wireless service. It was not an ideal way to promote electronic readers, but the Kindle phenomenon has not been greatly hurt by the blunder.

"I do find it a little disturbing, though," says Rob the Reader. But, like many users, he finds it simple enough to download books and store them on PC or elsewhere and read books with Whispernet off to avoid the auto sync deletion threat.

Nothing helps resolve such



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issues, not to mention attempts not only to keep prices high but increase them, like competition. At the end of August 2009, Sony launched its Daily Reader Edition, its first portable reader, which will use AT&T's 3G network to wirelessly download books, newspapers, magazines and other text.

Unlike the market leader, Sony's unit, which will cost US$400 when it becomes available around the end of this year, will accommodate several ebook formats, including one of the many that libraries in the US use, for the electronic editions they lend.

This reader features a touch-screen that allows users to turn pages with the swipe of a finger, and they can use a stylus to write notes directly in the margins of the book. However, users can't directly access websites, the way they can on Kindle, and the Sony Reader also won't translate text into speech.

eBooks have been around for a while, but enthusiasm has been limited due to the backlit screens of earlier generations of the technology, something that eInk has resolved, as here there is no backlighting and the reading light is good.

The current generation of readers offers intelligence in that they remember where one was last reading, and unlike with PDF files you need not search the whole document for your place each time you reload it. Though only one font is offered in the case of the Kindle, font size can be changed to suit one's vision, and there is left and right hand scrolling for convenience.

But ebook readers are also still in the early stages of their development curves. Apart from the limitations of the cost of the technology and the permissions required to make Kindle an international experience, there is a lack of standardisation among various and competing ebook platforms, so it is not easy to convert from one to another. Amazon is unable to offer its Kindle customers guidance as to the number of other platforms to which they can transfer the ebooks they have bought, since the right to how many times an ebook title can be transferred to a different platform is decided by the publisher. That means consumers risk losing titles when they change from one platform to another.

Some users complain ebook readers are relatively easy to break. However, work is underway on new material that is unbreakable.

Another issue that arose, and demonstrated the extent to which publishers were taken by surprise by the success of ebook readers, is that some non-proofed non-final versions of books initially made it onto electronic readers and there have been reported cases where line break hyphens appeared in the middle of words. Also to be resolved is the representation of some of the more non-standard symbols on ebook readers.

Already Kindle 2 has resolved some usability issues with better speed, crispness of the characters on screen and the ability of users to create their own indexes. A number of users report that they read more with the Kindle as they always have it with them when they travel and read in queues and in places they would not typically take out a paperback (a bit of the blackberry browsing effect).

The regular book market is, however, not the big prize at which Amazon and its competitors are aiming. The grand prize is the textbook market, which could not only provide the economies of scale but would change that market forever. Textbooks are expensive and cumbersome, and librarians argue that taking away the printing and distribution costs could reduce the production costs by as much as 80%, most of which they would like to see passed on to end users.

The Kindle is also good for authors. Concurrently with the Kindle device, Amazon launched a content distribution system for authors to self-publish directly to the Kindle. Authors can upload documents in several formats for delivery via Whispernet and charge between US$1 and $200 per download. The authors receive 35% of revenues based on their listed price, regardless of discounts by Amazon.

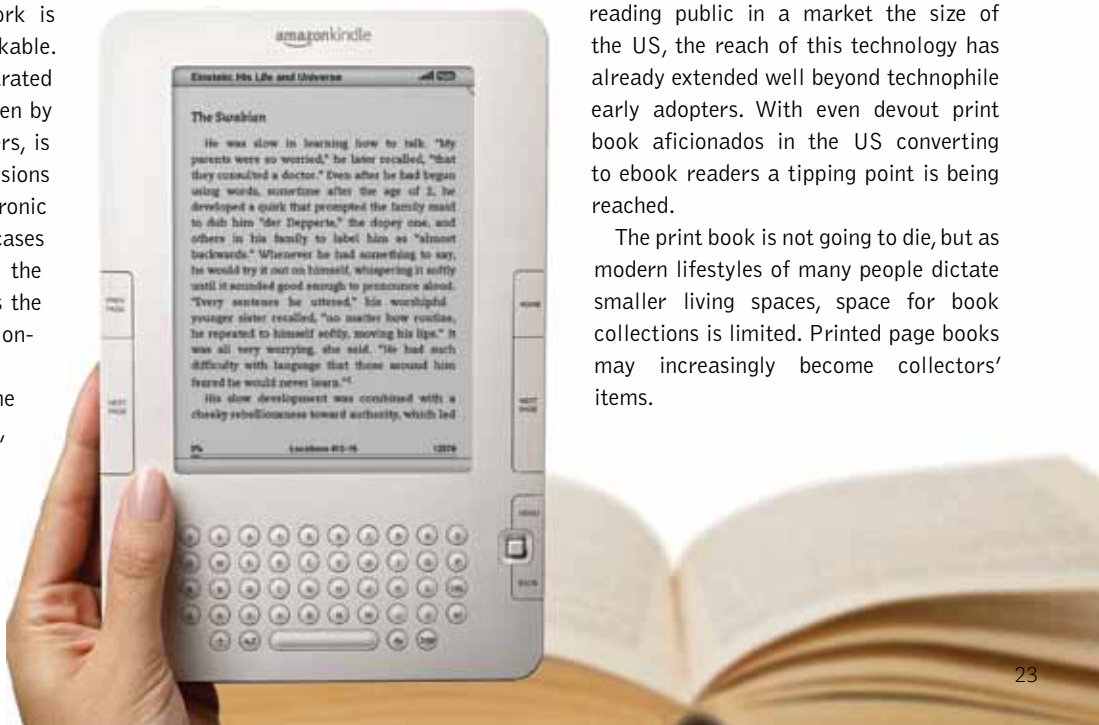
There is also an interesting debate as to whether ebook readers will remain standalone items or be part of the convergence of multi-media technologies. Some reading devices already offer MP3 functions, for example.

The argument that ebook readers have their own niche relates mainly to the expense of nanotech eInk technology. It makes the screens expensive and, at the moment, the electronics used ensure it is a slow input device. To change that would require more powerful electronics which would increase the complexity and cost. To merge with other functionalities would require a lowering of the cost of eInk nanotechnology. Others disagree on the electronics pricing issue and say it is just a question of reaching the right economics of scale.

The other argument towards ebook readers being dedicated devices is that while a few people may be willing to read novel length texts on the small screen sizes of pda and cell phone type devices, most find that unappealing. eBook readers have their own natural size slot, which makes it a fit for purpose item and limits technology convergence in its case.

It is still early in the development of ebooks but, with rapid acceptance by the reading public in a market the size of the US, the reach of this technology has already extended well beyond technophile early adopters. With even devout print book aficionados in the US converting to ebook readers a tipping point is being reached.

The print book is not going to die, but as modern lifestyles of many people dictate smaller living spaces, space for book collections is limited. Printed page books may increasingly become collectors' items.



New era for Nissan

Peter Middleton

On August 2 in Yokohama, Nissan unveiled its electric vehicle. Called the Nissan LEAF, the car is a medium-sized hatchback, comfortably seats five adults, has a range of more than 160 km and is designed specifically for a lithium-ion battery-powered chassis. Immediately prior to the launch, Nissan SA's Product Engineering Division hosted an event to present the company's technology developments. Peter Middleton reports.

More than any other product, car choices are closely associated with people's personalities and values. A person who loves the 1982 VW Beetle is unlikely ever to own a Toyota Camry. People don't easily swap a Land Rover Defender for a 7 series BMW – and it's not just about cost.

Development of car technology, within each and every manufacturing stable, is therefore massively multi-directional, almost to the point of being divisive. The contrast becomes most evident when high performance cars for the 'petrol heads' are compared with eco-cars for the 'greenies'. Even eco cars are emerging across a huge performance range – try comparing Tesla's EV roadster with Reva's G-Wiz, for example.

Nissan's briefing about technology developments was, therefore, not that brief. It was presented by Paul Gurney, vehicle test group manager and Fumio Uchiyama, general manager of Nissan SA's Product Engineering Division.

Gurney began by talking about the global R&D programme, and the recent establishment of the new Nissan Advanced Technology Centre (NATC) in Atsugi, just west of Tokyo. The building itself has been designed to stimulate and concentrate creativity, says Gurney, and "focus on new forms of mobility", the new EV development in particular.

Gurney moves on quickly to tell us of some of the exciting happenings in South Africa. The launch of the 370Z sports car, with VVEL (variable valve event and lift), and C-VTC (continuous valve timing control) to give more efficient airflow through the cylinder; significantly improve responsiveness; and optimise the balance between power and environmental performance. It translates into 6% more engine power and 11% better fuel efficiency. The car also features Nissan's SyncroRev Match, which allows the ordinary Schumacher fan to change down into a corner in a more sporting manner – giving greater road holding and improved stability.

GT-R, the big sister of 370Z and World Performance Car of the Year in 2009 will be launched into South Africa in September. The GT-R set a new lap record of 7:26:70 around the Nürburgring run, arousing 'cheating' allegations from Porsche. The car's gearbox, a six speed dual clutch transmission that powers all four wheels, won the Most Advanced Technology Award at the Japan 2008/2009 Car of the Year awards. Not one for the 'greenies'–it does nevertheless meet California's Ultra Low Emission Vehicle (ULEV) standards!

Gurney tells us that Nissan is developing technologies based on a framework called the 'orchard' concept. "This framework consists of a Harvest plan; Seeding & Growth and Soil Enrichment – which ensures we think about technology development in a comprehensive manner." Nissan's R&D's core value? 'Trusted driving pleasure'.

Nissan has historically been associated with being conservative, meeting basic needs, says Gurney. "NATC is now shifting that expectation," he suggests, and cites the new D-Platform Nissan, derivatives of which include the Fuga (Japan) and Infiniti M Series (USA) – direct competitors to the 5-series BMW and E-class Mercedes Benz: "This new platform will include 12 of the 17 brand new Nissan technologies to be launched in 2009," he claims.

Regarding environment, in the long term, Nissan is committed to the development of cleaner lower emission vehicles. The long term target is a 90% reduction of CO2 emissions by 2050 from 2000 levels – and, in the shorter term, a 40% reduction by 2015 from 2005 levels – with a triple layered approach: vehicle improvements (30%), driving style and traffic avoidance (10%).

There are still a lot of improvements to be made on the internal combustion engine, he believes. Nissan, in alliance with Renault, is leading with a new generation of clean diesel technology (fitted to QASHQAI and X-TRAIL). In addition, the company's dual fuel injector system, which inkjets a finer more accurate spray of fuel also results in a further 4% efficiency gain. "This technology also has a catalytic converter benefit. It can reduce the quantity of rare metal required by 75% and therefore reduce the cost," says Gurney. VVEL technology contributes a further 10%. On the drive side, Nissan also has CVT – continuously variable transmission, a technology that uses changing pulley sizes to achieve very smooth, stepless transmission of power. When fitted to identical vehicles, it is more fuel-efficient than an automatic transmission by up to 20% and manual transmission by between 5 and 10%.

The really significant savings are only possible by switching to EVs or fuel cell vehicles, admits Gurney. To support this, the overall R&D budget spend on environmentally friendly technology is up from 54% to 70%. Hence the Nissan LEAF development – "the world's first electric car designed for affordability and real-world requirements," claims the launch release. "Slated for launch in late 2010 in Japan, the United States, and Europe, Nissan LEAF ushers in a new era of mobility – the zero-emission era. The car is the embodiment of Nissan's radical, transformative vision for the future and the culmination of decades of investment and research," we read.

Nissan LEAF is powered by laminated compact lithium-ion batteries, which generate power output of over 90 kW, while its electric motor delivers 80 kW and 280 Nm. "This ensures a highly responsive, fun-to-drive experience that is in keeping with what consumers have come to expect from traditional, gasoline-powered automobiles." The range? 160 km per charge. "Extensive consumer research demonstrates that this range satisfies the daily driving requirements of more than 70% of the world's consumers who drive cars," says Nissan

The company expects the car to be competitively priced in the range of a well-equipped C-segment vehicle – but "the Nissan LEAF is expected to qualify for an array of significant local, regional and national tax breaks and incentives in markets around the world." It will start building EVs at its Oppama plant in Yokosuka, Kanagawa Prefecture, from next year, with initial production capacity of 50,000 units a year.

A key feature of the LEAF, and also among the 17 Nissan innovations cited by Gurney, is 'Connected Mobility': an advanced intelligent

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transportation IT system. Connected to a global data centre, the system can provide support, information, and entertainment for drivers 24 hours a day. The dash-mounted monitor displays Nissan LEAF's remaining power or range, along with a selection of nearby charging stations. It can also receive mobile phone signals and use them to turn on air-conditioning and set charging functions while the car is powered down – and an on-board remote-controlled timer can be pre-programmed to recharge batteries, presumably if you leave it unused for a few days.

Tooru ABE, the Chief Product Specialist says: "We wanted this vehicle to be a partner for the driver and an enhancement for the passengers. We also wanted it to help create a zero-emission community, and these IT features will help make that possible."

Gurney's list of Nissan innovations includes several that are IT-based and related to driving style and traffic avoidance objectives. These include:

- Eco driving support: Encouraging the driver to drive more efficiently; instantaneous readout of fuel efficiency is incorporated as part of the main instrument stack. The psychological impact can lead to up to 10% savings, simply by increasing driver awareness of efficient and inefficient driving style.
- The ECO pedal: The accelerator pedal resistance increases when driving in an inefficient range – giving up to 10% savings, again related only to driving style.
- Eco advice: A wide range of advice on how to change driving patterns for the better - Based on computer games technology, the GPS can communicate with other vehicles and interactively feed back driving style and fuel efficiency progress of other drivers on the road. People involved in this eco-driving trial were able to show an improved fuel consumption of 18%.
- Fastest route guidance system: A navigation system linked in real time to a traffic information hub – for example, the CARWINGS system in Japan, which interacts with the onboard GPS to feedback en-route traffic information and to automatically recalculate routes that avoid congestion. Overall travel reduction time of 20% and a 17% reduction in CO2 emissions were achieved in tests during rush hour in Yokohama City (Tokyo).

IT innovation also dominates the safety field:

- The Around View Monitor: Cameras and computer software simulate a bird's eye view of the surroundings, to help with parking and such like.
- Distance Control Assist: Similar to the eco-pedal, it gives feedback through the accelerator, via a physical increase in resistance, if the distance to the car in front becomes dangerous.
- Lane Departure Assist: Cameras are used to warn the drivers when the car strays outside of its lane – and a yawing motion can be generated by the stability control system to keep the vehicle in its lane.

The LEAF's chief designer says the "styling will identify, not only Nissan LEAF but also the owner as a participant in the new era of zero-emission mobility." Targeting a particular set of personalities with specific values? For those without this particular set of motorcar leanings, the GT-R is certain to be around for a while yet.

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

Jan Reynders
Chairman of the Organising Committee of ISH 2009.

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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

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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 SAIEE

Dear Paddy,

Your July issue has just reached me, and to answer Jim Kearney's request for some suggestions of the 'Seven Modern Wonders of the Scientific World" (page 21) I have a few proposals.

Concorde; Nuclear power; Radar; Digital television; Super-conductivity; Solar power; Fuel cells; Hybrid cars; LEDs; Key-hole surgery; Glass-fibre transmission; Hubble telescope; Mars rover; International Space Station; Laptops; Pocket calculators; Electronic voting; Combat drones; Cruise ships; Articulated passenger vehicles (5-unit trams and 2 or 3-unit buses)

Where does one stop? Has this mass-production of "Wonders of the World" caused more problems than it has solved? A cynic might say "Is mankind good at handling small problems, but incompetent at dealing with big ones?" Over-population and the resulting climate change for instance.

Thank you for WATTnow. It is always very interesting and thought-provoking.
I hope I am not too late with my suggestions.

Yours sincerely,
Michael Rutherfoord, Pensioned SAIEE member, Zurich, Switzerland

Hello Paddy,

I live in a complex with over 200 units, each with a geyser. We would like to install a ripple relay system to control the geysers. You can imagine Maximum Demand after prolonged shut down with all these geysers coming on. I am trying without success to source a supplier for one of these systems, can you HELP? We would be obliged.

Regards,
James Struthers.
P.S: WATT now is great. Look forward to it every month. Well done.

Hi Paddy, Dear friend,

This is Ms. Joancy Jiang from China Xingyue Group who was established in 1989. The comprehensive SWTO [Ed: No idea what SWTO means] Xingyue Group lists on the Top 100 of Zhejiang Province private enterprises and Top 500 of Chinese private enterprises. Xingyue Group is specially engaged in all kinds of Electric bicycle, Go-kart, ATV,[ED:unknown] Scooter, Motorcycle, Generator, Security door, Engine, etc.

Zhejiang Xingyue electric bicycle limited company with more than 10 years' produce experience who has strong and comprehensive capacities, with the ability of manufacturing 500,000 PCS of electric bikes, and many auxiliary company: entire electric bicycle, electric bicycle materials, producing factory, electric machinery factory, frame factory and baking varnish factory, etc.

Our market covers entire EU, America, East-south Asia, Japan, Australia, etc. For many years, the group has been always keeping the guideline of "Guided by market, based on modern technology, see quality as life, abide the rule of honest and credible" executed quality and services according to ISO9001 standards.

It was awarded as "Honest and Credible Enterprises of JingHua city" "Excellent Enterprises in Honest and Credible of ZheJiang Province" "Lawful enterprises in honesty and credit of China".

Enclosed with our newest products list, including pictures and specs for your reference. Please tell me your favourite or interested models so that I can offer more exact and helpful information.

Besides, if possible, I would like to get some special requirement from you, such as style, specs or kits. Anything we can do, it. It will be done for you.

Well, any questions, please contact me without hesitation. I am sincerely expressing our brilliant future.

Best regards!
Ms. Joancy Jiang

[Editor: The letter above was received unsolicited from a person in China. I have deliberately not corrected the English because it is rather quaint. It also shows the degree of enterprise that China has in reaching new markets in an effort to sell its products.]

Cash-strapped Eskom may delay Medupi and Kusile

Eskom's newly-appointed executive chairman, Bobby Godsell, is a no-nonsense man who has a proven track record of taking tough decisions and implementing them, so when he warns that Eskom will cancel or delay its infrastructure expansion contracts you can believe that he is serious.

It's not spin-doctoring, alarmist's tactics or blustering. It's fact.

And he is unequivocal in the Eskom Annual Report when he writes that the R9,7-billion loss incurred by Eskom this year must been seen in the context of the R30-billion spent on the build programme – a build programme that is not sustainable.

"The bottom-line in terms of the funding is that Eskom can only build new infrastructure if it has the money to do so. At present, the organisation has not secured the funding for the current build projects. We have taken a conscious decision that we will stop or delay projects if we do not have the funding," says Godsell.

He goes on to say that the government has provided R60-billion in a loan with equity characteristics and warns that government's own revenues are likely to be constrained in the near future.

As a result, he says, Eskom needs to find other sources of expansion funding, perhaps in the form of a development bond that will enable South Africans to invest in the expansion of the energy system.

Eskom, at an operational level, has had a reasonable year if one considers that there has been no load-shedding activity and that the coal stocks have built up from 12 days to an average of 41 days and every power station in the country now has a stockpile of coal sufficient for 20 days of operation.

However, there are many other issues where the picture has been less than rosy. First of all, costs for the Kusile and Medupi power stations have soared from the initial estimates of R80-billion to more than R120-billion each. That's an increase of about 50 percent – and an increase that has yet to be adequately explained.

The reserve margin at Eskom has increased from about five percent in January 2008 to about 14 percent in January this year. However, the pressure on Eskom's energy supplies will remain until at least 2012 when the new power stations are due to start generating electricity.

As a result, Eskom's demand-side management (DSM) programme is hoping to reduce national demand by about 3 000MW by March 2011.

Eskom's building programme means that R385-billion is due to be spent in the next five years on capacity expansion and current estimates show that South Africa will need 40 000MW of new generation capacity by 2025 of which 12 476MW will come from Medupi and Kusile, the return-to-service power station and the Ingula project.

A further 6 148MW will come on stream in the next five years as a result of the old coal-fired powers coming back into service, the upgrade of Arnot Power Station, the first three units of Medupi and the first unit at Kusile starting to generate power.

But as Godsell clearly warns, the build programme is dependent on funding and at the moment Eskom has not finalised all the necessary funding required to complete it.

Apart from the R60-billion loan that government has already made to Eskom, it has also provided a R176-billion guarantee facility to the organisation but Eskom still has to find the balance of the money and its three main sources of funds are the shareholders, external debt and revenue.

And it's on the revenue side that Eskom keeps running into difficulties: it applies to the National Electricity Regulator for significant price increases and these are consistently refused, making it difficult or impossible for the organisation to generate the revenues it feels are justified in terms of the expansion programme and the future requirements of industry and consumers.

The 2008/09 financial year was the last year of the first multi-year price determination (MYPD) agreement negotiated with Nersa and, as Eskom points out in the annual report, the organisation faced significant financial challenges because of the capital expansion programme that was underway.

In December 2007, Eskom was granted a 14,2% increase for 2008/09 and then in June 2008 a further increase of 13,3 percent was gazetted, bringing the average annual price increase to 27,5 percent, which was well below Eskom's application for a 60 percent increase.

The price increase for the first of the second MYPD was delayed until June 2009 when Nersa approved an average price increase of 31,3 percent for the nine months between July and March.

Included in that increase was a government levy of two cents per kilowatt-hour payable to government and calculated on electricity generated from non-renewable sources. In essence, once the adjustments for the levy have been made, Eskom says it will get an actual price increase of just 24,08 percent.

It is this lack of substantial price increases that contribute to Eskom's view that the electricity tariffs – coupled with the build programme – are simply not sustainable.

Of course the numbers and figures relating to Eskom's performance during the year include some interesting numbers:

- Capital expenditure (including interest capitalised) was almost R47,1-billion, significantly higher than the almost R25-billion spent during the previous financial year.
- Almost 113 000 new electrification connections were made to Eskom's nationwide grid.
- Eskom's staff complement grew by 2 242 while its procurement of goods and services from black economic empowerment companies reached R35,2-billion.
- Eskom's return on assets was severely impacted by the major increase in primary energy costs (mainly from buying coal on short-term contracts at higher prices), despite a reduction in sales volumes of 4,2 percent.
- Worryingly, at the end of March 2009 almost R2,8-billion was owed to Eskom by trade debtors whose accounts were older than 75 days, a significant increase from almost R1,9-billion the previous year. Clearly, while Eskom is building power stations it's battling to force its major customers to pay it on time for electricity consumed.

As Godsell says, the organisation's financial results clearly indicate that financial sustainability is Eskom's single central challenge. Eskom's constant rallying-cry over the past few years – which Godsell is now trumpeting too – is that South Africans pay far too little for the electricity they consume. In other words, electricity is too cheap.

Says Godsell, those countries belonging to the Organisation for Economic Co-operation and Development pay between eight and nine American cents per kilowatt-hour whereas the average tariff in South Africa is just three American cents.

He says that there is an urgent need to achieve an average tariff that recovers the full cost of producing the electricity and allows the organisation to build up its own reserves to partly fund the capital expansion programme.

Godsell says that Eskom has implemented a cost management programme to ensure that it breaks even at the operating level and is also in the process of renegotiating its commodity-linked pricing structures with aluminium producers who benefit from discounted prices and fluctuations in exchange rates.

So Eskom's got its problems and, considering its fundamental role in the South African economy, these problems are not going to be easily resolved.

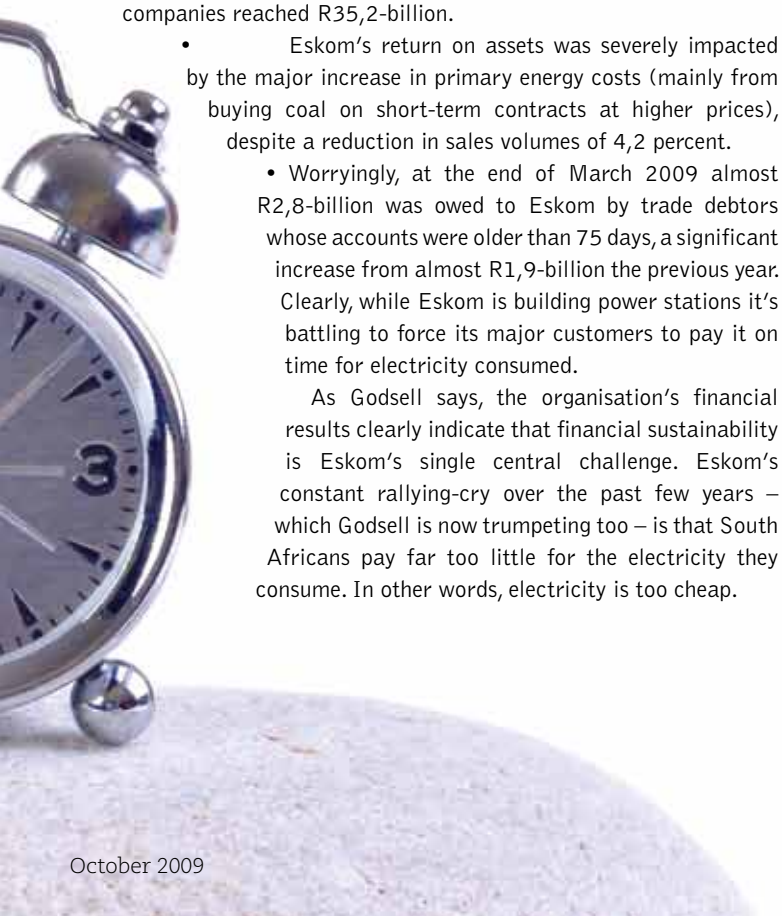
The combination of difficulties facing the electricity supplier are unlikely to lessen in the immediate future as labour costs rise and Eskom increases its own remuneration packages to attract more highly skilled labour. For instance, the group's employee costs rose from R11,3-billion in 2008 to R15,1-billion in 2009 and more than R820-million was spent on training staff.

In a separate development, the Democratic Alliance has alleged that Eskom has been guilty of gross mismanagement of funds during the procurement of capital and management of coal supplies. The allegations are apparently based on a confidential internal memorandum that was provided to the political party by unnamed sources.

The document, entitled Forensic Investigation: Claims against Suppliers alleges there were irregularities in the supply of coal to the power utility amounting to more than R100-million.

The memorandum refers to an investigation carried out by Deloitte and Touche, which revealed that gross irregularities amounting to unlawful and possibly illegal conduct had allegedly taken place on a massive scale for a number of years.

By the time WATTnow went to print, Eskom had not yet commented on the allegations.



Scoot around in a Coupe – but beware of taxis

A rather odd-looking, three-wheeled buggy known as the Scoot Coupe – a mixture of a scooter and a golf-cart – is available in the United States from Panther Motors and is able to travel at speeds of more than 70 kilometres an hour while using just three litres of fuel per 100 kilometres.

The two versions of the Scoot Coupe that are street-legal in the US are the 49cc model that can be driven by any licenced driver, or the more powerful 150cc version that requires a motorcycle licence.

Panther is now working on an electrically-powered version of its buggy and a 500cc commuter vehicle that comes with a retractable top. Already the buggies are in use in Hawaii where tourists rent them for quick, open air trips around the islands. In the larger US cities, vehicle dealers are pitching them as inexpensive vehicles to run errands around a neighbourhood.

However, Ocean City in the US is extremely disenchanted with these buggies, which they regard as a nuisance and, in a four-three vote by councillors, it was decided to ban them from the city streets.

The Scoot Coupe comes with ABS braking system, has rack and pinion steering and dual wishbone suspension. It uses a single cylinder four stroke, air-cooled engine with a centrifugal, automatic clutch. It has a fuel tank capacity of just 3,78 litres – enough to drive around for about 400 kilometres in city streets.

The 49cc P50 model sells for $6 299 while the P150 model is $6 599.

Spruce Pine has nothing to do with timber

Mention the words Spruce Pine and you conjure up images of exceptional timber boards with a fine grain and excellent colour. And, you'd be totally wrong. Spruce Pine is a charming, low-key town in the Blue Ridge Mountains of North Carolina, in the heart of a global billion-dollar silicon chip industry.

There are just 2 000 residents in the town where the ultra-pure quartz mineral, essential for building most of the world's silicon chips, is mined. Spruce Pine quartz sells at about $50 000 a ton and contains feldspar, silvery flakes of mica, flashes of garnet and smokey veins of quartz.

It is made of silicon and oxygen – like all quartz – but when making computer chips it's not the silicon that's important but rather the quartz used to make the wafers used in computer chips.

To make these wafers, a seed crystal of silicon is heated to high temperatures in a giant mixing bowl until the molten, silvery metal can be slowly stretched, according to Bob Carland, director of the Minerals Research Laboratory at North Carolina State University.

As it comes out of the mixing bowl, it has just one crystal so everything is aligned the same way. The metal cylinder is laid down and cut with a diamond saw into slices – much like salami – or silicon wafers.

Carland points out that for the wafers to be made into silicon chips, the mixing bowls or crucibles must be exceptionally clean as the slightest defect will be transmitted to the sliced wafers. Spruce Pine's high-purity quartz is ideal for making the crucibles, the benches and the other instruments that are used to produce the chips.

See-through billboards coming to our roads

A new method of manufacturing inorganic light emitting diodes (LEDs) allows them to be attached to a range of materials ranging from glass to rubber and paves the way for use of the inorganic LEDs on curved surfaces such as brakelights, or to wrap a patient in a light blanket for medical diagnostic purposes.

According to Professor John Rogers of the University of Illinois at Urbana-Champaign, the main problem with organic LEDs is that they are about 400 times less bright than the conventional inorganic LEDs widely used around the world.

In simple terms, for instance, billboards that currently use conventional inorganic LEDs can be read in bright sunlight whereas organic LEDs would not be seen because the light emitted is so much dimmer.

However, organic LEDs are, in theory, easier to manufacture because they can be made smaller, processed in higher quantities and spread out in thin films that are easy to manipulate and connect.

Professor Rogers and his team have now devised a method of manufacturing thin, inorganic LEDs in high quantities that can be cut up into smaller pieces by dipping them in a strong acid. The separated elements can then be picked up by a tiny stamp that cuts holes into a material at the precise point and size of the LEDs.

The LEDs and the stamped material can be overlaid on any kind of surface from glass to plastic to rubber.

Using this technique, a bright layer of LEDs could be placed onto any transparent material and still provide the necessary display. He says that it will be possible, using this technique, to make something that is completely see-through but contains inorganic LEDs transmitting light to create images.

He says this manufacturing process might be particularly useful for instrument panel clusters and points out that the group is now working towards perfecting different applications which, Rogers says, is more to do with engineering than any of the laws of physics.

Drunk – well don't try starting your new truck

A breathalyser, installed in the drivers' cabins of the heavy duty trucks driven on roads and highways throughout the world, can now prevent a drunken driver from starting the vehicle. The integrated breathalyser and immobiliser device was developed by Durban-based PFK Electronics.

Known as the Alcohol Interlock Blocking system, the device, which was developed more than three years ago, has been widely exported to Sweden, the Netherlands, France, Lithuania and Britain. Now, in a partnership with MAN Truck & Bus, it is being introduced locally.

The system comprises two modules: an alcohol breathalyser unit, where the driver has to provide a breath sample, and an immobiliser unit, which prevents the vehicle from being started or driven if the driver is over the legal limit.

The data on the blood-alcohol content and the time and date of the test are stored on the unit and can be retrieved by the fleet manager. Alternatively, the data can be relayed immediately to the control centre using an ordinary cellular phone signal.

The system can be set to acquire random breath samples from the driver. It cost about R6 000 and can be installed in existing trucks as well as into new models. Given the extensive problem of drunk driving in South Africa – amongst all classes of vehicles, not just heavy duty trucks – it seems that manufacturers and insurance companies should co-operate to install units into every new vehicle sold in this country and should make it a requirement to fit the unit before granting insurance cover to a driver.

At R6 000, it's a small price to pay when compared with the excessive carnage that we see every year because intoxicated drivers insist on using our roads irresponsibly.

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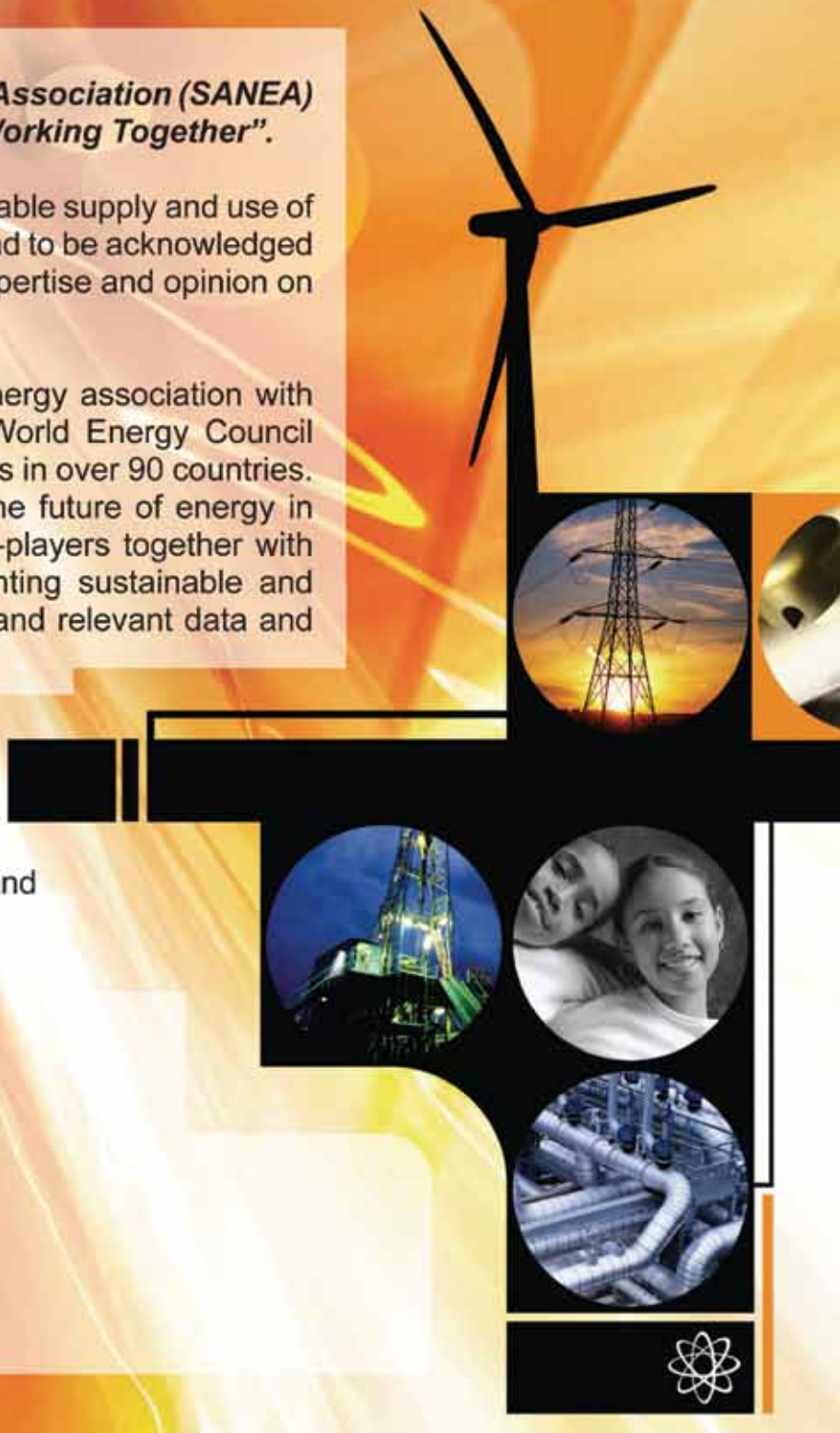

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Connectivity, not bandwidth the issue for SA

A lack of access to the Internet – rather than a lack of bandwidth – is seen as a major stumbling block for the telecommunications industry in South Africa, and the real challenge, according to Angus Hay, chief technical officer of Neotel and deputy president of the SAIEE, lies in creating greater connectivity.

He says that Neotel, as a converged services operator, is rapidly rolling out 3G and CDMA networks and has managed to provide services to more than six million people countrywide in the short time that it has actively been providing telecommunications services.

But Hay points out that there is still a significant challenge in getting telecommunications infrastructure to the rural areas as it costs about ten times more to do so than to connect people in urban areas.

He warns that this could increase the digital divide that currently exists between people who have access to services and those that do not. Hay was addressing delegates at the Southern Africa Telecommunications Networks and Applications Conference held in Swaziland during September.

Hay says that there is more collaboration among industry competitors in terms of infrastructure, primarily because of the highly competitive environment in the retailing arena and companies throughout the country are trying to minimise the costs of deploying services by collaborating with others.

Civil engineering costs for developing infrastructure contribute significantly to the high cost of providing services and this is particularly relevant in remote rural areas, Hay says that an example of greater collaboration among traditional competitors is the 'tri-build' terrestrial fibre optics network from Johannesburg to Cape Town that has Vodacom, MTN and Neotel as partners.

Hay says that while bandwidth has, until recently, been a restriction for provision of services, the new undersea cables that are operating in South Africa have relieved some of the congestion and with new cables on the horizon, the bandwidth problems will not be a limiting factor for the next few years.

However, he emphasised that access to services was now the major challenge for all telecommunications service providers in South Africa.

Drug-dispensing contact lenses

It's amazing what scientists and engineers dream up when they apply their minds to a problem. For instance, billions of people around the world suffer from a range of eye problems from a mild form of dry eyes to advanced levels of glaucoma that, untreated, can lead to blindness.

Scientists and engineers have developed a contact lens that gradually dispenses a steady stream of medication to effectively treat different ailments. As an example, people with glaucoma – caused by damage to the nerve that connects the eye to the brain – need to insert eye drops into the eye several times a day.

Because of our natural blinking reflex, only a small percentage of the medication is absorbed into the eye; the balance is washed out by tears. Drug-dispensing contact lenses overcome this problem by releasing the right amount of medication at the right time directly into the eye.

According to Dr Daniel Kohane, director of the Laboratory for Biomaterials and Drug Delivery at the Children's Hospital in Boston, the contact lenses can release large amounts of medication for long periods at a steady rate.

Kohane collaborated with Dr Joseph Ciolino of the Massachusetts Eye and Ear Infirmary and chemical engineers based at the Massachusetts Institute of Technology to develop the drug-dispensing contact lenses. In the prototype lenses developed for the tests, Kohane's team dispensed appropriate levels of ciprofloxacin – an antibiotic used in eye drops – for 30 days and, in some tests for up to 100 days.

The drug-dispensing contact lenses are the same size and thickness as those used to correct eye problems and the researchers have already begun testing them on animals. The first human trials are expected to begin soon.

The full research document is published in the July issue of Investigative Ophthalmology and Visual Science.

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Who cares about debt ... just buy a yacht

For ordinary mortals, the global economic crisis is a reality and in South Africa more than 93 000 people are already using debt counsellors to help them pay off debts incurred over the past eight years or so.

But for the not-so-ordinary mortals who have more money than sense, there is the option of buying a multi-million dollar luxury yacht to cruise the oceans at leisure.

Two of these super-luxury yachts are being built by Schopfer Yachts and they offer plenty of distractions to keep their owners from fretting over money, fossil fuels, global warming, climate change or any other triviality.

The first of the yachts, the 76m Oculus, has berths for 12 guests, features 3,5m ceilings in all rooms, provides an elevator tube between levels, has retractable wave-guards and a second storey owner's suite.

The exterior styling represents the jaw and eye socket bone structure of a large killer whale. The retractable wave-guard provides a sun-deck for passengers when the yacht is not travelling at speed. The wave-guard closes to create a sleek design that allows the yacht to cruise at speeds of up to 25 knots. The yacht, with its extensive luxury fittings has not yet been sold.

A second yacht, the 91m Infinitas – inspired by the infinity symbol – has a pool deck, living room, dining area, kitchen, clear-glass sky bridge and helicopter pad. It costs a mere $140-million. It has two sections, the carved out stern and the elliptical-shaped mid-section.

The pool deck provides direct access to the kitchen and dining room and various other lifestyle suites. It has an outside walkway around the pool, and bridge or flyover that connects the second deck and elevator to the pool deck. In the lower level lounge, glass 'portholes' allow guests to see into the pool.

DNA modification creates synthetic cells in bacteria

Researchers have got a bit closer to creating a synthetic cell after a team successfully transplanted the genome of one type of bacteria into a yeast cell, modified it and then transplanted it into another bacterium. This experiment paves the way for creating synthetic organisms by inserting man-made genomes into bacterial cells.

Sanjay Vashee, a researcher at the J. Craig Venter Institute in Rockville, Maryland, works with leading scientist J. Craig Venter who has specialised in the controversial field of synthetic biology. Vashee says the cell that the team created went on to show multiple rounds of cell division to produce a new strain of the modified bacteria.

Cells have a natural 'immune' system that usually protects them from foreign DNA such as those in viruses. Vashee and his colleagues have succeeded in disabling the immune system, which consists of proteins called restriction enzymes that target specific sections of DNA and chop up the genomes at those points.

Bacteria can protect their own genomes by attaching chemical units called methyl groups at the point where the restriction enzymes attack. As part of the experiment, the scientists modified the bacterium Mycoplasma mycoides while inside the yeast cell. Then they attached the methyl group to it – or inactivated the restriction enzyme of the recipient bacterium – before transplanting the genome into the new cell.

One of the goals of the research team is to transplant a fully synthetic genome into bacterial cells and, in that way, create bacteria that can be programmed to carry out specific functions such as digesting biological material to produce biofuel.

While these experiments are underway, another group of scientists at the same Institute has synthesised the complete genome of a bacterium dubbed the Mycoplasma genitalium, but Vashee says that as yet there is no conclusive proof that the Institute obtained M. Genitalium cells after its genome was placed in recipient cells.

Many critics have condemned synthetic biology experiments because of the dangers such developments could represent for life, as we know it, on Earth.

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Cement that gobbles up carbon

A group of British scientists from Imperial College London has invented cement that absorbs carbon dioxide. The team has managed to raise a million pounds to fund its work on Novacem, which is made from magnesium silicates rather than calcium carbonate.

According to Novacem chairman, Stuart Evans, the cash injection from Imperial Innovations, the Royal Society Enterprise Fund and the London Technology Fund will be used to develop a pilot plant to make the cement. The plant is due to be operation by 2011.

The cement industry worldwide has a notoriously large carbon footprint and the production of about 2,5-billion tons of cement annually contributes about five percent of total global carbon dioxide emissions, more than the entire airline industry.

Novacem is currently working closely with Rio Tinto to secure a supply of raw materials to make the cement and is involved in discussions with a number of cement manufacturers around the world on future commercial production. It would take at least five years for Novacem to be commercially available.

Evans estimates that for every ton of Portland cement that is replaced by Novacem, around 75% of a ton of CO2 would be saved. With its carbon-absorbing properties, Novacem would transform the cement industry throughout the world.

A string of new technologies for the cement industry is being developed by scientists all over the world in an effort to cut down the effects of carbon emissions on climate change. Commercial organisations involved in new technologies for the cement industry include Calera based in California, Carbon Sense Solutions of Canada, Calix from Australia and the British company Cenin.

Were Africa's early humans the world's first engineers?

Tribes of early modern humans were using heat treatment to improve stone tools more than 72 000 years ago and traces of these techniques have been found in South Africa at Pinnacle Point, a Middle Stone Age site on the country's coast.

Fire is believed that have first been used about 800 000, years ago but according to lead researcher, Kyle Brown of the Arizona State University, there are traces of fire being used to treat stone as early as 165 000 years ago, indicating that human beings had used it for a lot more than cooking, heating, lighting and protecting themselves.

He says that the heating of stones to modify their characteristics is one of the earliest forms of engineering in the world. About 10 000 years ago humans were using fire to make ceramics and to extract iron and copper from stones but new evidence suggests that they were using fire to make tools tens of thousands of years ago.

The heat treatment of stones makes them more brittle so it is easier to chop away flakes and then hone the flakes to a fine cutting edge that will slice through animal skins, chop wood or shape other stones.

The stone tools found at Pinnacle Point were made of silcrete, a hard and resistant material that looks like quartzite but is not as coarse. Archaeologists searched a 50km radius around the site but were not able to find the right kind of stone to recreate the tools.

The tools were made from a material that was a deeper red in colour, had a high gloss finish and was more brittle and these properties came from putting the stones into a fire and then pulling them out.

Researchers say that the early engineers would probably have buried the stones in sand about 2cm below the fire and gradually, over 12 hours, have built up the fire to heat the stones to about 300° and then kept it heated for roughly five hours.

They would then have allowed the stones to cool for between 15 and 20 hours.

Using this technique, researchers say, early engineers created the more brittle material that was used to make the stone tools found at Pinnacle Point.

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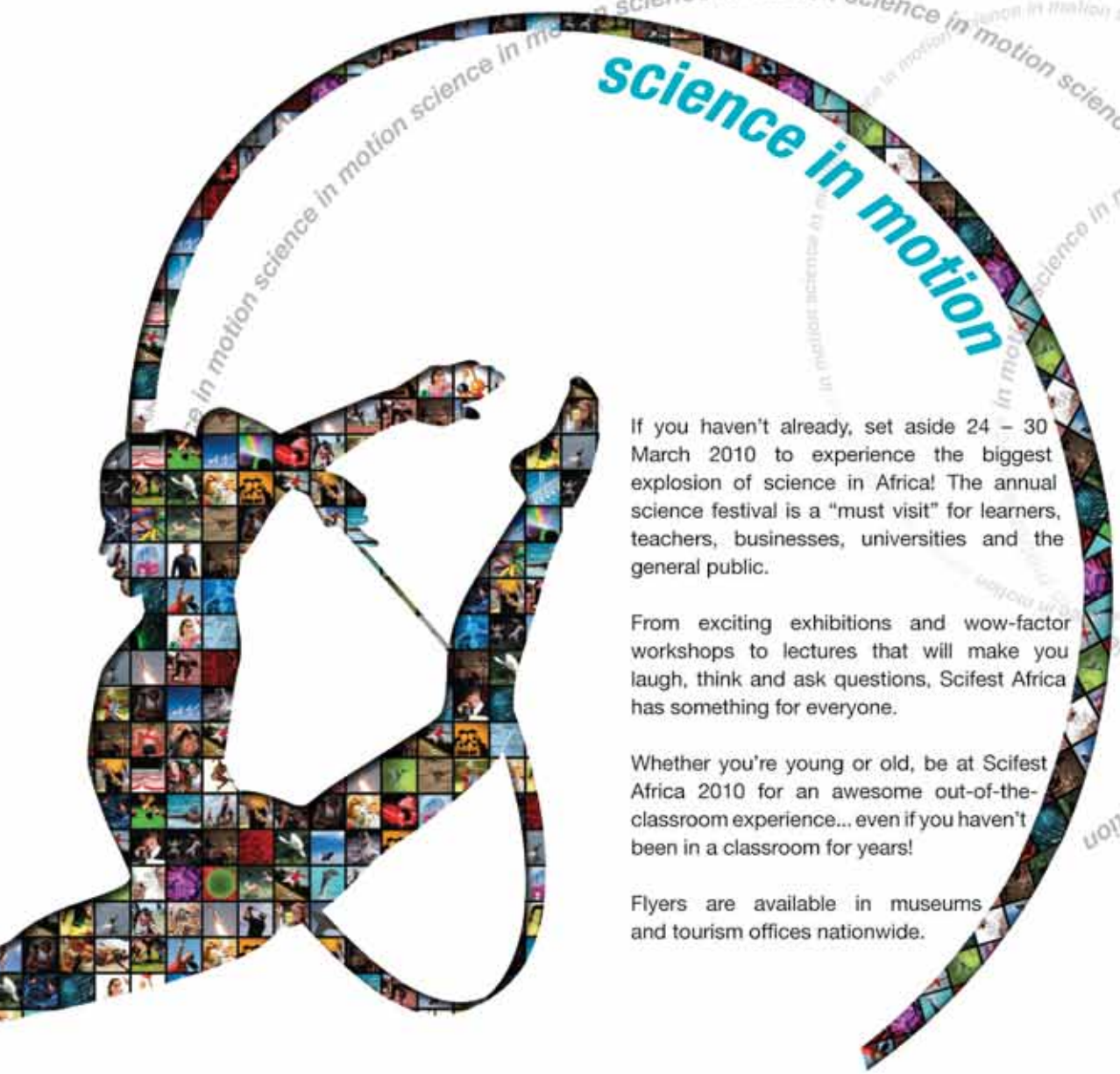

If you haven't already, set aside 24 – 30 March 2010 to experience the biggest explosion of science in Africa! The annual science festival is a "must visit" for learners, teachers, businesses, universities and the general public.

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Flyers are available in museums and tourism offices nationwide.

Africa's banana crop threatened by disease

An international agricultural research organisation has warned that two banana diseases spreading through Africa could threaten the food supplies for more than 30-million people who use bananas as their staple diet.

The Consultative Group on International Agricultural Research (CGIAR) says the banana bunchy top viral disease has already infected about 45 000 hectares of agriculture land in Malawi alone and a survey done late last year found that it had spread to at least 11 other countries.

Apparently the disease is well established in Gabon, the Democratic Republic of Congo, northern Angola and central Malawi. The banana bunchy virus causes all the leaves on the plant to sprout at the top, stunting plant growth and fruit production.

In a separate study undertaken earlier this year, the CGIAR says it found bacterial wilt disease in banana plants in Ethiopia, Uganda, Rwanda, western Kenya and north-western Tanzania as well as in the north and south Kivu districts in the DRC.

Uganda, the continent's leading banana growing country has suffered serious infections of the banana bacterial wilt disease since 2001, which has led to crop losses estimated at between $70-million and $200-million annually.

Apparently, the traditional varieties of bananas grown in Africa are susceptible to both diseases and as a result, says the CGIAR, expensive control measures will have to be introduced to eradicate the diseases. These include excavating entire banana fields and burning the plants to eradicate the disease.

Life in the universe could be commonplace

Scientists have found traces of glycine, an amino acid found in proteins, in material ejected from the comet Wild-2 after NASA's stardust probe picked up the material in 2004. Many scientists are convinced that the bombardment of Earth by ice and rock billions of years ago carried with it some of the most important chemical precursors for life on the planet.

Scientists content that this primordial 'soup' may have been responsible for seeding life on Earth and sparking the chain of events that influenced this planet.

According to Carl Pilcher, head of NASA's Astrobiology Institute, the discovery of glycine in a comet supports the notion that the fundamental building blocks of life are still prevalent in space and strengthens the argument that life in the Universe may be common rather than rare.

The NASA spacecraft flew past the 5km-wide comet 81P/Wild-2 in January 2004 and its probe gathered samples of the dense gas and dust surrounding the comet's icy nucleus, 240km from its core. The grains of gas and dust were collected on a special collection grid, lined with a super-fluffy material called aerogel and returned to Earth two years later once the canister detached itself from the spacecraft, entered the Earth's atmosphere and landed safely by parachute in the Utah desert.

Glycine is the most common of 20 amino acids in proteins on Earth. Chains of amino acids are strung together to form protein molecules that exist in everything, from hair to the enzymes that regulate chemical reactions inside living organisms.

For years scientists have been puzzled as to whether these organisms originated on Earth or in space. Pilcher says that it took some time for lead investigator Dr Jamie Elsila to convince NASA authorities that the glycine signature found in the Stardust's sample was genuine and not the result of contamination on Earth. Glycine has apparently been detected in meteorites and has been seen in interstellar gas clouds but it is the first time that it has been detected in a comet.

Plastic island emerges on the North Pacific Gyre

Two research ships are in the middle of the Pacific Ocean where they are studying a huge island of plastic debris estimated to be about the size of the State of Texas in the United States. Ocean currents are believed to have pushed the refuse together to create the 'island'.

Project Kaisei, led by Ryan Yerkey, is studying the impact of waste on marine life and the organisers are hoping to clear the plastic and recycle it for use as a fuel or to make new products from recycled plastics.

Yerkey believes that within the next 20 years people will be harvesting the oceans for trash that will be recycled for a number of industries including biofuels. The North Pacific Gyre is a vortex of currents that is believed to have forced the debris together to create the island. Yerkey points out that the marine debris, situated between California and Hawaii, is not a solid mass.

Interestingly, Dr Katsuhiko Saido, a chemist at Nihon University in Chilba, Japan has found that huge amounts of plastic decompose at surprising speeds in the oceans, but they release contaminants into the water at the same time.

For years environmentalists have expressed concern about the volumes of plastics in the oceans, which are thought to pose a direct hazard to marine life, including seabirds and mammals.

Dr Saido and his team of researchers have found that the plastics decompose when exposed to rain and sun, and when they do they release the chemicals bisphenol A (BPA) and PS oligomers.

Previous studies in animals suggest that BPA can disrupt hormone systems. Plastics do not normally break down in an animal's body but the substances released from decomposing plastics can be absorbed into the metabolic systems. The findings of the researchers have been published by the American Chemical Society based in Washington.

Lightning can strike upwards

Lightning that strikes 'upwards' was captured on film in a rarely seen phenomenon that occurred during last year's Tropical Storm, Cristobal. The lightning strike reached more than 60 kilometres into the upper atmosphere.

These giant electrical 'jets' are as powerful as cloud-to-ground lightning bolts and this was confirmed by the United States team of researchers who took radio measurements of the electrical charge.

However, scientists do not yet know what types of storms are conducive to the formation of these giant lightning jets. The lightning does not occur during every storm.

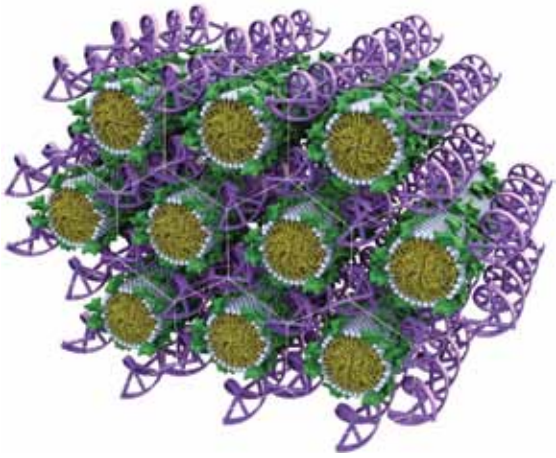
According to lead author, Professor Steven Cummer from Duke University, the team was able to show conclusively that the lightning strikes were not just sparks from a thunderstorm. They are actual lightning strikes that deliver the electrical charge upwards into the upper atmosphere.

Because the air between the clouds and the ionosphere is thinner at higher altitudes there is less resistance, allowing the charge to travel further and faster than cloud-to-ground strikes.

Professor Cummer admits that he managed capture the images by chance after he trained his camera on the sky above the storm hoping to photograph another phenomenon known as 'sprites' – the red or blue electrical discharges seen above storm clouds.

He plans to install a low-light, high-speed camera to capture colour images of the huge lightning 'jets' so that scientists can study the chemical processes and temperatures discharged during such upward strikes.

DNA – a scaffold for smaller computer chips?



IBM researchers, working with the experts from the California Institute of Technology, have started work on developing a new technology that uses synthesised DNA molecules to create tiny circuits that could form the basis of smaller, more powerful computer chips.

The new technology, dubbed DNA Origami, is expected to be used in the production of circuits that allow for electronic components to be spaced at distances of just six billionths of a metre. The six nanometre mark is currently about eight times better than current chip technology.

The DNA acts as a sort of scaffolding for millions of carbon nanotubes that self-assemble into precise patterns that stick to the DNA molecules. The fastest computer chips manufactured today use a 45 nanometre process.

Researchers have found that lithographic patterning (which uses a series of processes to shape or alter the existing shape of deposited material) can be combined with DNA origami structures on surfaces that are compatible with today's semi-conductor manufacturing equipment.

To make the chip, scientists create the patterns for the circuits using lithographic templates based on traditional chip manufacturing techniques. They then pour a DNA solution over the surface of the silicon and tiny DNA nanostructures, such as triangles, squares and stars, line themselves up to the patterns that have been etched out using the lithographic process.

The DNA nanostructures adhere to the etched patterns. The full research document entitled Placement and Orientation of DNA nanostructures on lithographically patterned surfaces has been published in Nature Nanotechnology.

Plankton, the ocean's own blender

Scientists suggest that swarms of jellyfish may be stirring the ocean and lifting nutrients from the sea bed to the surface so that these can be used as a primary food source for many other creatures. Two aeronautic scientists say they have found how marine organisms – ranging in size from tiny copepods to shrimp-like krill and jellyfish – could play a vital role in mixing ocean water.

The new study is part of a small but growing body of research that is studying how marine life affects the oceans and their circulation. William Dewar, a marine scientist at the Florida State University in Tallahassee says that this is a topic that has been overlooked in the past.

John Dabiri, an engineer studying how jellyfish use propulsion, came across a study done three years ago by marine scientists in Canada, which showed how plankton generated turbulence in a coastal inlet. The study suggested that if measured on a global scale, migrating plankton could play a role in mixing the ocean water.

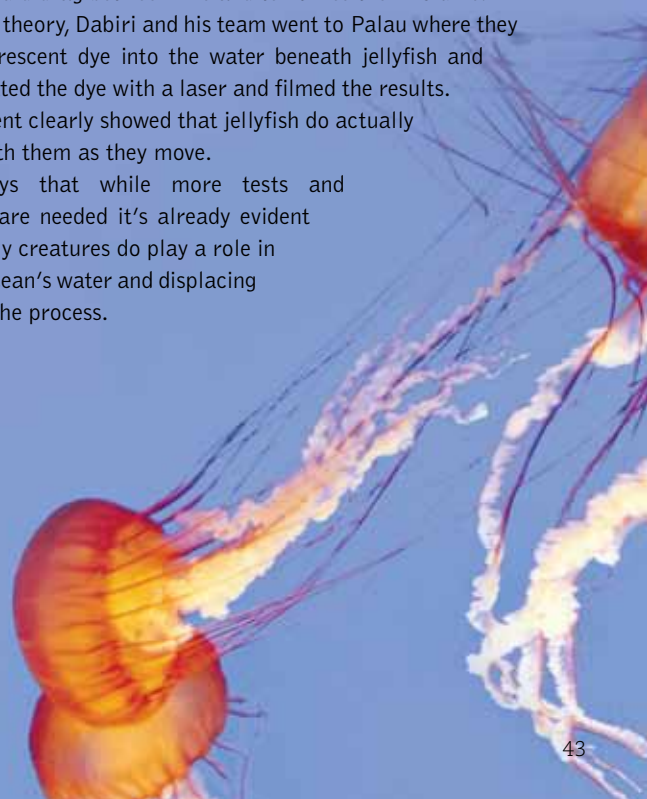
At the time, the study was largely discounted by other scientists who said that any turbulence would be dissipated. But Dr Dabiri was intrigued and while researching the subject further came across a 50-year-old study reported by the grandson of Charles Darwin.

Using fluid-dynamics modelling techniques, Dabiri and colleague Kakani Katija showed that Darwin's proposed mechanism for mixing the ocean water was based on the fact that any organism drags with it any surrounding water as it moves – in much the same way as a spoon drags honey in a jar when it is moved.

What Dabiri discovered was that the bigger the creature, the less efficient the dragging process. He found, for instance, that while a whale may drag one to two times its body weight, krill and other tiny organisms could drag between five and ten times their volume.

To test the theory, Dabiri and his team went to Palau where they injected fluorescent dye into the water beneath jellyfish and then illuminated the dye with a laser and filmed the results. The experiment clearly showed that jellyfish do actually tug water with them as they move.

Dabiri says that while more tests and experiments are needed it's already evident that these tiny creatures do play a role in mixing the ocean's water and displacing nutrients in the process.



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Venus bright spot is not a 'love bite'

In July this year, amateur astronomer Frank Melillo of Holtsville, New York, spotted a strange, bright spot in the clouds surrounding Venus.

His observation has been confirmed by astronomers at the European Space Agency. The ESA's Venus Express probe showed that the spot appeared at least four days before it was seen on Earth and has been watched daily since then. The spot is expanding and scientists suspect that winds in the thick atmosphere are dissipating it.

However, astronomers and scientists are not sure what caused the blemish, theorising that it might be the aftermath of a massive eruption from a huge volcano. Much of Venus is thought to have been modelled by volcanic activity; though there is no proof that volcanism does exist on the planet.

A volcanic eruption strong enough to be spotted from Earth would have to be extremely powerful because of the incredibly thick layer of cloud, mainly carbon dioxide, that surrounds the planet, keeping it shielded from detailed observations for the time being.

Alternatively, some kind of atmospheric turbulence, such as a coronal mass ejection from the sun might have interacted with the clouds on Venus, forming a bright spot in the southern hemisphere cloud layer.

Sanjay Limaye of the University of Wisconsin-Madison believes that a massive volcanic eruption is an unlikely explanation as there is no evidence of steam or the ash that usually accompanies such an eruption.

He says that, right now, scientists simply do not know why Venus is blemished.

Piranha released into Devon River

There is no accounting for some people in this world and the British Environment Agency was surprised when, during a routine patrol of the East Okement tributary of the River Torridge in Devon, it found the body of a South America piranha in the water. Apparently some fool had released it into the British river system.

The piranha is widely regarded as one of the most ferocious freshwater fish in the world.

Inspectors from the agency expected to find salmon, brown trout, bullheads, stone loach and minnows in the River Torridge so you can imagine their surprise when, having completed a survey of a 20m area of the river, they came across the submerged tail of a large piranha lying under a mud bank.

The inspectors took the 35cm fish back to the laboratory and, after dissecting it, found that it had been fed on sweet corn, an indication that it was probably being kept as a pet by someone in the area. Piranhas reach an average size of between 15 and 20 cm, so this was an exceptionally large specimen.

The inspectors believe that the piranha was released into the river system because it had grown too big for its tank. According to Paul Gainey, a specialist at the Environment Agency, a piranha would not survive long in the cold waters of the United Kingdom.

He points out that there is a growing problem in the UK with people importing exotic pets – often illegally. When they get bored with them or find that they grow too large, these folk simply release them into the wild rather than risk possible prosecution from authorities.

He urged people of Britain – and other countries – to approach the authorities if they wanted to get rid of an alien, exotic pet species rather than release it into the wild as doing so could have a dramatic impact on prevailing ecological systems in the area.

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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.

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Britons steam to new land speed record

A group of British engineers has broken the longest-standing land speed record by travelling at 225,06km/h in a steam car. The feat was achieved in the Mojave Desert and smashed American Fred Marriot's record of 204km/h, set in 1904 in his Stanley Steamer.

The 7,6m, three ton car that looks like a tubular barrel was driven by financier Charles Burnett who lives in Lymington, Hampshire. It achieved 219,04km/h on its first run and 243,15km/h on its second run to provide an average speed of 225,06 km/h. The record has been accepted by the Federation Internationale de l'Automobile (FIA), the body that controls all motor sport throughout the world.

The car was made from a mixture of lightweight carbon fibre composites and aluminium, wrapped around a steel space frame chassis and fitted with 12 boilers that comprised almost 3,2km of tubing.

Before each run, 50 litres of demineralised water was pumped into the car's boilers and heated to about 400°C before being injected into the turbine at more than twice the speed of sound to produce three megawatts of heat.

Because of the fixed gearing on the vehicle, acceleration is slow and the car required a track of at least ten kilometres for the car, dubbed Inspiration, to achieve its top speed. The boilers are powered by LPG and actually produce enough steam to make 23 cups of tea a second.

The exhaust emissions are pure water vapour.

Africa wants $67-billion a year to compensate for climate change

A resolution drafted by ten African leaders at a meeting held at the African Union headquarters in Addis Ababa, indicates that Africa intends to ask rich nations to provide $67-billion a year to mitigate the impact of climate change on the world's poorest continent.

The talks were held in preparation for the United Nations summit on climate change that will take place in Copenhagen in December this year and were aimed at achieving consensus among African leaders. Africa contributes little to the worldwide pollution blamed for global warming, but experts predict that the entire continent will be particularly hard hit by droughts, floods, heat waves or rising sea levels resulting from climate change. The leaders want rich nations to provide the money that will ostensibly be used to set up aid programmes to mitigate against the effects of climate change in Africa.

Earlier this year, Ethiopian Prime Minister Meles Zenawi called on rich nations to compensate Africa for global warming, claiming that pollution in the northern hemisphere may have caused the devastating famines in Ethiopia in the 1980s.

Currently the 50 poorest nations in the world contribute less than one percent of the carbon dioxide emissions that scientists claim are responsible for global warming and consequent climate change.

Developing nations have accused the richer nations of failing to take the lead in cutting greenhouse gases and have failed to provide aid or compensation to the poorer nations for the devastating effects that climate change will have on poor nations.

A new climate treaty is due to be agreed in Copenhagen in December, but according to Yvo de Boer, head of the UN Climate Change Secretariat, little progress has been made on trimming the 200-page draft treaty that was presented in Bonn in August.

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Kenya plans to plant 7,6-billion trees

Kenya intends to plant about 7,6 billion trees over the next 20 years in an effort to counteract the effects of widespread deforestation after decades of chopping down trees to clear lands and provide fuel for rural people. The result of the deforestation is acute water and power shortages for the country.

Just three percent of the land in Kenya's agriculture-based economy is covered by forests. The government is hoping to increase the extent of protected forests to about ten percent of the country's total area.

Environment Minister John Mchuki estimates that Kenya will have to spend about $20-billion over the next 20 years to plant the trees required to return Kenya's forests to their natural state prior to deforestation.

The country plans to spend about $650-million on repairing its crumbling road infrastructure and around $400-million on developing new power generation capacity. However, it is the effects of deforestation that have been blamed for the drying up of rivers and Kenya's inability to use its hydro-electric power plants.

Kenya's biggest forest, the Mau, has already lost about 25 percent of its 400 000 hectares in recent years to new human settlements, illegal logging and the burning of trees for charcoal. Many politicians in Kenya were apparently allocated parcels of land in the Mau forest in the 1990s and they allegedly used these allocations to create new human settlements and embark on commercial activities that led to rapid deforestation.

Other smaller forests in Kenya have suffered the same fate as people continue to chop down trees in illegal logging operations, to create more agricultural land or to use as fuel in an energy-deprived country.

£300-billion needed for climate change compensation

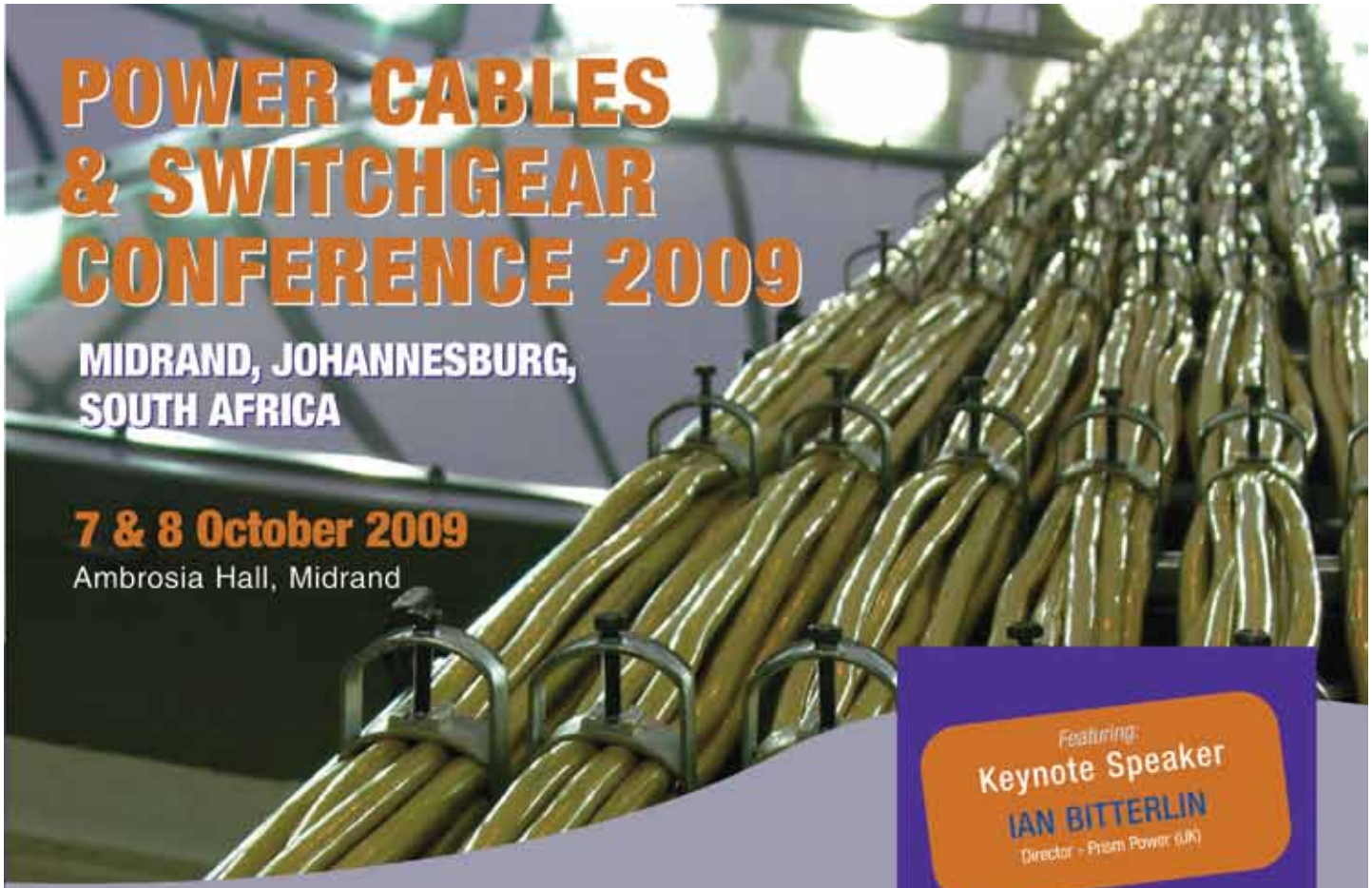
The global community will need to spend more than £300-billion on adapting to climate changes such as flood, disease and deforestation according to scientists at the international Institute for Environment and Development and at the Grantham Institute for Climate Change at Imperial College London.

Originally, the United Nations estimated that it would cost up to £105-billion to pay for sea defences, increases in deaths and damage to the infrastructure caused by global warming. However, scientists say that these figures are hopelessly low and now estimate that it will cost at least three times that amount to counteract the devastating effects of climate change.

Professor Martin Parry, a former co-chairman of the Intergovernmental Panel on Climate Change, says the UN's estimate ignored sectors such as energy, manufacturing, retailing, mining and tourism. He warns that Britain alone will have to spend several billion on flood defences, rebuilding of roads and upgrading houses against the higher mean average temperatures that are likely to prevail in the UK.

His warnings come ahead of the United Nation's Framework Convention on Climate Change, which is due to be held in Copenhagen in December. At this meeting it is hoped that world leaders will thrash out a new international treaty to replace the Kyoto Protocol.

Rich countries are expected to announce cuts in carbon emissions in order to slow down global warming but poorer countries are unlikely to agree to anything until the rich nations agree to provide them with enough money to set up measures that will allow them to adapt to climate change.



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Jet-propelled lobsters don't amble

Lobsters use jet assisted walking to move rapidly across the ocean floor according to scientists researching the crustaceans. Paddle-like structures on the abdomen are fanned to create a wake, which propels the creatures forward more rapidly than if they were ambling along the ocean bed looking for a morsel on which to feast.

The investigators wanted to find out why the lobsters use these fans or pleopods and how much force they can generate. Researcher Jeanette Lim, working with Professor Edmin DeMont of St Francis Xavier University in Antigonish, Canada, devised a mechanical model to replicate the moving parts of the lobster.

To achieve an accurate result, Lim bought an American lobster, emptied the tissue from the abdomen and connected eight mini servo motors bought from a robotic toy company. The motors made the life-sized model fan its pleopods at the same rate as a live lobster.

The force generated by the pleopods surprised the researchers, providing between 27 and 54 mN of thrust, equivalent to that produced by proficient swimmers such as the bluegill sunfish or the surf perch, which use their pectoral fins to move at slow to moderate speeds.

How the lobsters harness these forces is unclear. They beat their pleopods to swim but new research shows that the pleopods allow the lobsters to achieve substantial thrust that can actually help them walk rapidly along the ocean floor without leaving it.

Not all types of lobster produce similar forces as the pleopod shapes, which affect their ability to be used as an effective paddle, vary greatly among the different species. To measure the forces, Lim used a technique called particle image velocimetry to image and measure how fluid flows from the pleopods and gauge the force generated.

The pleopods are rather flimsy appendages compared with the rest of the crustaceans body.

Lim is currently completing her PhD at Harvard University in Boston.

Solar-powered paramotor flight from Monte Carlo to Morocco

A British family has set a new world record for the longest solar-powered flight by paramotor. The adventurers, Gilo Carozo, his brothers and niece, spent their summer holiday on the wing around the Mediterranean and travelled more than 1 800km flying from Monte Carlo to Morocco.

The 15-day journey took them through France and Spain and included a flight above the shark infested waters of the Straits of Gibraltar.

The team, comprising Gilo, brothers Cosmo and Damian and Damian's daughter, Tilly, along with five other pilots, flew the plane while the respective families followed on the ground. The group wanted to raise awareness of ataxia, a debilitating disease which affects that part of the nervous system that controls balance and co-ordination. Damian Cardoso and his wife Madeleine have been responsible for fund-raising for Ataxia UK. Three of the couple's six children suffer from the debilitating condition.

The solar electric flight raised £10 000 for the charity.

The flight was not without its problems and mishaps: there were a number of failed take-offs and several emergency landings that resulted in broken propellers and a broken foot for one of the pilots.

The electric paramotor used on the plane was powered by lithium polymer batteries, which were charged in rotation using 12 solar panels mounted on top of one of the support vehicles. Members of the team took turns to pilot the aircraft that was accompanied by three other planes using bioethanol-powered paramotors.

On average, the team covered 210km a day, flying at a height of around 1 500m above sea level.

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FROM THE CENTENARY PRESIDENT ... du Toit Grobler

THE SAIEE AND ECSA

The final meeting of the outgoing Council of ECSA took place on 25 August 2009. During the meeting it was announced that Dr Oswald Franks, Dean of the Faculty of Engineering at the Cape Peninsula University of Technology had been offered the position of CEO of ECSA which he subsequently accepted. The acting CEO since January, Prof Hu Hanrahan, Fellow and past Council Member of the SAIEE, will step down when Dr Frank takes up his new position towards the end of the year. Dr Frank is congratulated on his appointment and Prof Hanrahan is saluted for the admirable way in which he acted as CEO. During the joint luncheon for the outgoing and incoming councils, the Hon. DQM Doidge, Minister of Public Works, handed over Merit Certificates for Excellent Service beyond the call of duty to Members of the outgoing Council and Committee Members of that Council. Among the recipients were Prof Bea Lacquet, Mr Rod Harker and du Toit Grobler all repeat recipients of this reward.

The incoming Council also held its inaugural meeting on 25 August 2009. The Hon. Doidge presided over the election of the President Mr Chris Campbell and Deputy President Prof Thokozani Majozi. The SAIEE congratulates both gentlemen on their election.

ANNUAL SAIEE CHARITY GOLF DAY

The annual charity golf day of the SAIEE took place on 14 August at the Pretoria Country Club. The President's choice of charity was the Maria Kloppers Child Care Home in Observatory, a division of Abraham Kriel Child Care. The nett income has not yet been determined, but on the 4th of September 2009 an anonymous donation of R10 000 by a member of the Institute was handed over to the Campus Manager of the home, Mrs Ernesta van Niekerk. The balance will be handed over once it has been determined.

INTERNATIONAL SYMPOSIUM ON HIGH VOLTAGE

A successful International Symposium on High Voltage (ISH) 2009 took place in Cape Town from 24 to 28 August 2009. The Institute was responsible for the administration of the Symposium and we are proud of those members of staff who were involved. A special word of appreciation goes to Ms Sue Mosely for all her hard work over many months.

SAIEE CENTENARY BERNARD PRICE MEMORIAL LECTURE

The BPML is scheduled to be held between 14 and 30 September 2009 at nine venues, including all SAIEE Centres and interest groups, with the main event taking place on 30 September 2009 at Wits. On 14 September 2008, Prof Dr WA Gruver met with the Sappi Group Head Technology in Braamfontein.

FORTHCOMING EVENTS

- The launch of the SAIEE Centenary Book on 29 October 2009.
- The Centenary Banquet on 19 November 2009, with the Hon. Trevor Manual, Minister in the Presidency, as guest speaker. Remember to book a table and to nominate persons for the SAIEE Awards.
- The SAIEE Centenary Conference and Exhibition on 20 November.
- The unveiling of the Centenary Legacy Exhibition at Sci-Bono. On 4 September 2009 a cheque for R100 000 to fund the legacy exhibition was handed over to the chairman of Sci-Bono, Mr Phiroshaw Camay.
- Annual SAIEE Student Competition to be held the University of KwaZulu-Natal on 20 November 2009.

Kind regards,
du Toit Grobler Pr Ing, Pr Dipl Ing FSAIEE
SAIEE Centenary President 2009

From left to right: du Toit Grobler, Sappi Senior Regional Electrical Engineer, Prof Bill Gruver, BPML Guest Lecturer, Guy Spindler, Sappi Regional E & I Manager, Andrea Rossi, Sappi Group Head Technical.

Ernesta van Niekerk, Campus Manager of the Maria Kloppers Child Care Home, receives a cheque of R10 000 from du Toit Grobler, President of the SAIEE. The sum of money was donated by a member of the SAIEE who wishes to remain anonymous.

A busy time for the SAIEE between April and July

24 April: SASOL sponsors SAIEE Centenary Book.
From left: Mike Crouch, Marketing Director SAIEE, Chris van Rensburg, Publisher of the book, Bev Lawrence, Sales Director CvR, and Theuns Erasmus, Head of SASOL Electrical Sector holding the sponsorship certificate.

28 May: President's Invitation Lecture held at UJ. Jack van der Merwe gave a fascinating talk on the Gautrain and the progress that has been made. After the lecture Senior Vice President, Andries Tshabalala, proposed a vote of thanks and presented Jack with a token of appreciation for his outstanding lecture, which was repeated at the SAIEE KZ-N Centre in Durban.

18 June: Joint lecture between IEEE and SAIEE at the University of the Witwatersrand.
Dr Scott Rouse talked about work done in Canada to reduce energy consumption in the major cities. He presented interesting statistics on consumption levels. Prof Willie Cronje, IEEE representitive on the SAIEE Council, introduced the speaker.

14 May: The Student's Chapter committee of the University of Johannesburg with their Professor, Mike Case. Mike Crouch presented an overview of the Institute and the advantages of membership.

10 June: Mike Crouch spoke to the Tshwane University of Technology about the SAIEE and its value to engineers. The picture shows Dr Nhfanhla Mbuli, SAIEE Council Member and the Chapter Committee.

16 July: Tour of Kelvin Power Station.
It was interesting to inspect the old generators but disappointing that the machines were not running due to maintenance work.

22 May: Meeting with Minister of Science and Technology, Naledi Pandor.
From left: du Toit Grobler, Centenary President SAIEE, Stan Bridgens, Business Director SAIEE, Minister Naledi Pandor and Professor Jan Reynders. The meeting was to discuss the upcoming Centenary celebration on 5 June and the ISH conference in Cape Town.

12 June: Breakfast briefing by Ajay Naidoo, CEO of Neotel.
The picture shows Ajay, du Toit Grobler and Thomas Makore, who proposed the vote of thanks.

31 July: Breakfast briefing by Pat Naidoo.
Dr Pat Naidoo, SAIEE Council Member spoke on the status of the Western Power Corridor Project of the SADC. The project has been put on hold due to political problems with the Congo. The picture shows du Toit Grobler, Pat Naidoo and Mike Cary, SAIEE Junior Vice President, who proposed the vote of thanks.

Western Cape Centre talks to students

by Dave Martin

In August, the South African Institute of Electrical Engineers was invited to address the many first year electrical engineering students enrolled at the University of Cape Town regarding future prospects and careers in electrical engineering.

Two of the Western Cape centre's committee members volunteered to be part of this event, namely Unathi Nombakuse and Phumelelo Ngxonono.

There was no set format or defined area of focus for the talk and the speakers were told that they had 45 minutes to talk to the students and they could discuss anything they liked. As a result, the session was more conversational than formal and this approach effectively bridged the gap normally created between industry and academia.

Students were able to engage freely with the speakers about their personal issues or concerns when it comes to working in the engineering industry.

Unathi and Phumie covered the following:

- A brief background on their achievements since graduating from UCT.
- The importance of sticking to goals and working tirelessly to achieve them.
- Expectations that industry has for qualified engineers.
- The importance of further training once an engineer has graduated

Students had a range of questions for the guest speakers and the most pertinent were:

- Whether engineers can be over-qualified and if so does industry have room for them and is it prepared to pay them accordingly?
- Lack of practical training opportunities offered by the industry (especially to foreign students or those who are funding their studies themselves).
- Relevance of curriculum at university when it comes to obtaining a job.

It was also proposed to Ms Renee Smit, who was hosting the talk, that similar talks be held for other students who had reached a more advanced stage of their studies such as those in third or fourth year. Ms Smit agreed to investigate the opportunities and revert to the SAIEE with her findings and suggestions.

From left: Prof. John Greene, Reneé Smit and Phumelelo Ngxonono.

ARJ's centenary but no bash, shindig or jamboree

While the South African Institute of Electrical Engineers celebrates its centenary with a host of special events to commemorate 100 years of active involvement in South Africa's engineering sector, a second centenary was reached without fanfare or any celebrations save for the acknowledgment contained in this short article.

You see, the African Research Journal – a specialist publication produced by the SAIEE – has already published its Volume 100 Number One edition and is currently producing Volume 100 Number Two, which will be available shortly.

The African Research Journal has produced 100 volumes (each volume represents a year) and as a quarterly it has now published 397 volumes and before the end of this year (or perhaps early in the new year) the 400th issue will be available.

Peer-reviewed, quality engineering papers are published in the journal, which carries no advertising and is supported purely by the SAIEE. It is the most comprehensive, locally produced journal of its kind in the country.

That is a special milestone in an industry such as publishing which is typically fraught with financial obstacles, editorial conundrums and ever-present budget constraints. It is indeed a tribute to the longevity of the African Research Journal and its ability to maintain a high standard and quality of technical excellence in a market that is highly specialised.

And, it's a tribute to the commitment of the various editors who have worked tirelessly to ensure that four issues are produced a year. Four issues for every one of the last 100 years.

That's a legacy that really has lasted and few publications in any form in South Africa have managed to replicate the achievement.

An achievement that has largely gone unnoticed.

SAIEE Centenary Celebrations

Dr Trevor Wadley and his Tellurometer

As part of their centenary celebrations the South African Institute of Electrical Engineers will be hosting an open day on 15 October at the Johannesburg Observatory, featuring the work of one of their most remarkable members, the late Dr Trevor Wadley.

In the 1950s, Wadley developed two outstanding products: his professional radio receiver and the Tellurometer.

The radio receiver became standard equipment for the Royal Navy and for many other administrations around the world. For the first time radio receiver frequencies could be accurately set and maintained for extended periods.

In less than half an hour, his electronic Tellurometer could measure long distances accurately to within 1 part in 105. This had a profound effect on land surveying as it then became possible to determine distances with much the same precision and effort as measuring angles.

From 9:30 to 16:30 on the 15th of October, prototypes and evolutionary examples of both these devices will be on display and Tellumat will be demonstrating several working Tellurometers, including a pair of the first production models (ca 1957).

Four talks will be presented during the day as follows:

1 10:00
Jim Smith (Hon Sec History Sect International Federation of Surveyors.)
Distance measurement before the Tellurometer

2 11:00
Dirk Vermeulen (Vice-Chairman of the SAIEE Historical Section)
What made Wadley's products tick?

3 14:00
Brian Sturman (Project Manager – Tellumat)
The evolution of the Tellurometer

4 15:00
Mike Crouch (Marketing Director of the SAIEE)
The History of the Johannesburg Observatory

All of this will take place at the historical Johannesburg Observatory, which in itself is worth a visit. As the auditorium capacity is restricted to 100 it will be necessary to reserve seats for the talks and to have access to the light lunch.

RSVP Gerda Geyer on 011 487 3003 or by email geyerg@saiee.org.za.

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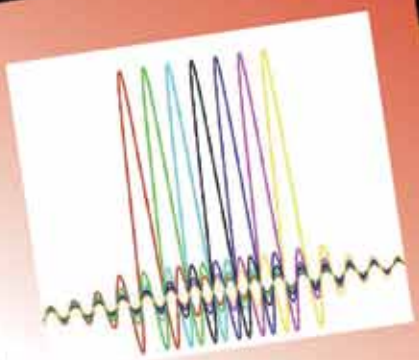

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