



Mining in the global village

It has been just over fifty years since the concept of the 'global village' was introduced by Marshall McLuhan in 1964, yet it remains relevant to our everyday experiences. Modern communication technologies have seemingly shrunk the world even further since then.

Ray Tomlinson, in 1971, was the first person to send mail from one computer to another over a network (and also initiated the practice of using the @ sign to direct the networked electronic mail message to a particular user at a particular computer). In 1997, e-mail volume overtook postal mail volume, as more and more people recognized the convenience of this almost immediate, yet still asynchronous, mode of communication. That same year, 1997, saw the registration of the google.com domain name, and searching for information was transformed for ever, as people came to rely on the Google search engine to navigate the World Wide Web (invented by Tim Berners-Lee in 1989). It seems hard to believe that it's been only about 20 years since the mass popularization of the World Wide Web (arguably one of the world's greatest inventions since the wheel). Nowadays, we can almost instantly read about (or watch) events happening anywhere in the world.

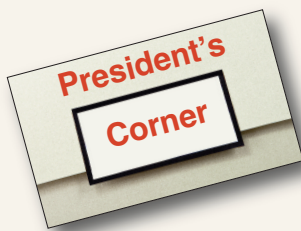
The interconnectedness of today's world has led to a direct link between the slowing down of the rate of growth in urbanization in China and the state of the economy in Rustenburg, for example. There is also much mobility of people between countries and continents. Many engineers trained in South Africa work in Australia, and many Australian engineers work in the USA, and so on.

The SAIMM maintains strong links with similar societies in other countries. In November 2011, an inaugural meeting was held in London between several leading international mining and metallurgical societies – AusIMM (Australasian Institute of Mining and Metallurgy), CIM (Canadian Institute of Mining, Metallurgy and Petroleum), IOM3 (Institute of Materials, Minerals and Mining), SAIMM (Southern African Institute of Mining and Metallurgy), and SME (Society for Mining, Metallurgy and Exploration). The meeting was intended to foster cooperation between the various organizations, to discuss opportunities for improving and sharing benefits to members, and to benchmark the institutions against each other. Further meetings between these societies were held in September 2012 in Las Vegas (SME), in February 2013 in Denver (SME), in February 2014 in Cape Town (SAIMM), in October 2014 in Vancouver (CIM), and in March 2015 in Hong Kong (AusIMM). Agreements have been signed between these societies, resulting in the formation of what is known as the Global Mineral Professionals Alliance (GMPA). Discussions were held about the state of the mining industry in the various countries, as well as the structure and strategies of the societies represented. There was broad agreement that the societies would offer services to each other's members at member rates. This is a significant benefit to SAIMM members, as they can attend international conferences held by AusIMM, CIM, IOM3, and SME at the same cost as members of those societies. Calendars of events are circulated between the organizations to coordinate major events and minimize clashes.

The flagship project of the GMPA is OneMine.org, a database of over 100 000 technical papers that is freely available to be used by the members of GMPA societies. Support of this project – both financially and by sharing technical papers – is a necessary precondition for a society to belong to the GMPA. Participating societies also agree to publicize their GMPA affiliation on their websites, and to share meeting calendars and information about each other's international events. Representatives of each society meet once a year to exchange information, to maintain a common set of standards for technical events, and to look for further ways to increase member benefits with reciprocal arrangements. This also provides an opportunity to share approaches and resources to deal with global problems shared by all.

Until asteroid mining becomes accepted practice, we will have to settle for this global approach on Planet Earth.

R.T. Jones
President, SAIMM



A sense of belonging

Over the past few months, I have travelled to a number of faraway countries where the culture and customs are very different, and where a South African might be expected to feel alien and alone. However, in all of those places, I have encountered people with whom I have shared values or have found interests in common, and, as a result, there has been a sense of belonging and connection. This need to belong is a basic aspect of being human. Is this, perhaps, one of the things we look for when joining a society such as the SAIMM?

Groucho Marx famously said 'I don't want to belong to any club that will accept me as a member'. The SAIMM, on the other hand, tries to be inclusive in its membership, while still maintaining focus on the fact that it is a professional institute. Different categories of membership apply according to the educational qualifications, experience, interests, achievements, and contributions of the individual member. Anyone with a declared interest and involvement in the minerals industry can apply to join as an Associate Member. Students in relevant fields of study are offered free membership. Companies can join too (as company affiliates).

For professionally qualified metallurgical and mining engineers, and those working in related disciplines, recognition by one's peers is very important. The letters MSAIMM (for full Corporate Members) and FSAIMM (for Fellows of the Institute) mean a great deal to people who work in the international minerals industry. These post-nominal letters signify professionalism, and show that the person is governed by a formal code of ethics. In order to qualify for MSAIMM, one typically needs to hold a recognized mining or metallurgical tertiary qualification and to have worked in a position of responsibility for at least two years. Members are welcome to apply to become a Fellow after being a member and holding a senior technical or consulting position for at least five years and having made a contribution to the work of the Institute, for example, by submitting papers to conferences or to the *Journal*, or participating in committees, assisting with organizing conferences, or reviewing papers. Honorary Life Fellowship is conferred by the Institute on Fellows who are deemed to have made an extraordinary contribution to the Institute or to the industry.

The current membership of the SAIMM is approximately 4800 (25% Students, 25% Associates, 37% Members, 12% Fellows, and < 1% Honorary Life Fellows).

There are also practical and tangible benefits to membership. It is useful to be kept informed about upcoming conferences, and perhaps even have the SAIMM provide the necessary financial backing and logistical support for members to hold a conference on a topic of particular interest. Many members also highly value the access they get to the OneMine database of over 100 000 technical papers from other societies in the global minerals industry.

The recently introduced membership card and benefits package (including discounts on car hire and cellphone contracts) are intended to assist members too.

The SAIMM likes to be known as a caring organization. For example, it works with the SAIMM Scholarship Trust Fund to support numerous students in financial need. Another recent initiative has involved the postponement or temporary waiving of fees for unemployed members, so allowing them to continue their membership even while going through a time of financial hardship.

Recent sociological studies have indicated that membership of groups in today's world is not only about what a person can get out of belonging, but is also strongly linked to whether people feel a strong affinity to the goals and objectives (the 'brand') of the organization. The SAIMM is known as an organization that values professionalism and is committed to the free and open dissemination of technical information.

The SAIMM has many long-standing loyal members, a number of whom have belonged to the Institute for over 50 years. The membership database shows that we have a number of members older than 90 years. This shows a remarkable sense of belonging. In addition to this, the recent surge of growth in student membership should continue to supply vigorous enthusiasm and energy to the life of the Institute, ensuring its success into the future.

The Institute exists primarily to serve the needs of its members, so I hope that you, our members, will let me know of any other needs that you would like to see being addressed by the SAIMM.

R.T. Jones
President, SAIMM



A right to knowledge

Nelson Mandela said that 'Education is the most powerful weapon which you can use to change the world'. Southern Africa suffers greatly from a shortage of well-educated people. However, it is a massive challenge to increase literacy, let alone to provide education for all people in the region, starting with early childhood education, through primary and secondary schooling, and culminating with university studies. But this is a challenge to which we must rise, as educated people are employable and have the capacity to build a better society, to create employment, and to reduce poverty.

The Universal Declaration of Human Rights (1948) says, in Article 26, 'Everyone has the right to education. Education shall be free, at least in the elementary and fundamental stages. Elementary education shall be compulsory. Technical and professional education shall be made generally available and higher education shall be equally accessible to all on the basis of merit.' Some countries seem to have got this right, with examples of free education (even at university level) seen in countries including Cuba in the developing world (which spends 10 to 11% of its GDP on education), and Norway in the developed world. Annual spending on education around the world exceeds five trillion US dollars, yet there are still around 800 million people who are unable to read or write. There is clearly a pressing need for more professional, dedicated, well-trained teachers, and for society at large to confer a high social status on these important people (as is the case in the Nordic countries).

In South Africa, the Freedom Charter of 1955 declared that 'Education shall be free, compulsory, universal and equal for all children. Higher education and technical training shall be opened to all by means of state allowances and scholarships awarded on the basis of merit.' More recently, Section 29 of the Bill of Rights in the Constitution of South Africa says that 'Everyone has the right to a basic education, including adult basic education; and to further education, which the state, through reasonable measures, must make progressively available and accessible'.

A report commissioned by the Department of Higher Education last year found that South Africa spends only 0.75% of its GDP on tertiary education, which is less than the average in Africa, let alone the world average. Universities say that government funding has not kept up with inflation and the huge increase in student numbers in recent years. Rising fees at universities have made studying unaffordable for many potential students. There is no doubt that many students are effectively excluded from a university education because of poverty.

Students at the University of the Witwatersrand started protesting around 14 October 2015, in response to an announcement by the university that fees would be raised by 10.5% in the New Year. The 'Fees Must Fall' student protests quickly spread to other universities across South Africa. University activities were significantly disrupted and access to campuses was effectively blocked. By 17 October, Wits University agreed to suspend the fee increase, and declined to take disciplinary action against participating students or staff members. Exams were postponed by a week. After a week of nationwide protests, a mass rally of many thousands of protesting students was held outside the Union Buildings in Pretoria. This resulted in the President of South Africa declaring that there will be a zero increase of university fees in 2016. A small group of demonstrators turned violent, setting fire to a portable toilet, and breaking down fences. The police responded with tear gas, stun grenades, and rubber bullets. The students themselves called for discipline, stressing that it was a peaceful protest.

There seems to be a general consensus view that the protesting students managed to achieve a great deal in a relatively short space of time. Overall, the protests were disruptive but relatively peaceful (with a few exceptions). Many commentators hold the view that these protests are historically significant for our country. Of course, it remains to be seen whether the zero increase in fees is altogether a good thing -- presumably good for students' finances, but not necessarily so for providing the funds needed for quality education (unless the funds can be made up from somewhere else). The universities have argued that they need a greater income to keep up their standards.

The SAIMM's Young Professionals Council responded promptly to the protests by presenting a very constructive option (by means of contributions to the SAIMM Scholarship Trust Fund) for people to contribute towards solving some of the very real problems faced by many students in South Africa. This fund makes a big difference to the lives of many students, and enables them to stay at university when they would otherwise have to drop out because of insufficient money for books or even food. This is a very good example of the way in which the SAIMM shows that it cares.

There is a further dimension to the story of the mining and metallurgy students of 2015. Perhaps half of the students who have recently graduated will not find employment in the year ahead. The universities have done a great job in response to the call to double the number of graduates in the past few years. However, in the current downturn, there are very few jobs available. This is a tragedy for the individual student who might have come from a rural village where the community has raised funds for him or her to get an education, with the expectation of a well-paying job, and the student has to return home dejected and empty-handed. Has a proper survey been carried out to determine how many engineers the mining industry actually needs in good times and in bad times?

As we approach the end of 2015, the mining industry is feeling rather battered and bruised after an exceptionally tough year. Many observers have indicated that 2016 is likely to be tough too, but we know that the commodity business is a cyclical one and the world we live in requires a variety of metals in order to function, so there is some optimism for the medium term. Best wishes to all for a good rest during the coming holiday season.

R.T. Jones
President, SAIMM



Mining Heritage

Visitors to the SAIMM offices in the Chamber of Mines Building in downtown Johannesburg cannot fail to notice the rather imposing stamp mill in the adjacent pedestrian walkway that was once Hollard Street. This 10-stamp mill went into operation at the Robinson Mine in Langlaagte in September 1886, making it one of the earliest stamp mills on the Witwatersrand. On the nearby noticeboard the fascinating story is told of how the mill was buried in a deep slimes dump and later recovered, exhibited at the Empire Exhibition in 1936, and then erected at George Harrison Park, before being relocated to the Main Street Mining Mall in 2004.

One block west along Main Street is an impressive display of a mine headgear, 23 m high, originally built in 1950 for Rustenburg Platinum Mines. Over the road from that is a mineworker's monument, sculpted by Andile Msongelwa, that was recently erected to recognize the role played by mineworkers in developing the economy of South Africa. Further along the attractive walkway of Main Street, from the mining-house headquarters in the west to Gandhi Square in the east, are other mining-related displays that include cocopans and a replica of the golden rhino from Mapungubwe. A walk around this area leaves one feeling that the mining history of Johannesburg, and indeed the wider region, has been well acknowledged.

There are numerous other places where some local mining history can be explored. Gold Reef City presents a display of mining history that is popular with tourists, including a descent of a 226 m shaft (to Level 5 of Shaft 14 of Crown Mines), and a gold pour. The Sci-Bono Discovery Centre has an interactive mining display aimed primarily at schoolchildren. Fred and Harry Struben's Confidence Reef Mine (a declared Provincial Heritage Site) in the Kloofendal Nature Reserve periodically has guided tours that can be arranged to see the site of an early discovery of the gold-bearing conglomerates of the Witwatersrand in September 1884. The Blaauwbank gold mine near Magaliesburg provides an opportunity to explore the narrow workings inside an early shallow gold mine.

The discovery of the world's most prolific gold mining area certainly transformed the place that became Johannesburg. The discovery of the main reef of gold in 1886 set off one of the largest gold rushes in history, and within ten years Johannesburg was the largest city in South Africa. The Witwatersrand Basin represents the richest goldfield ever discovered. It has been claimed that 40% of all of the gold ever mined has come out of the Basin. About 50 million kilograms of gold has been extracted from the Wits Basin to date. In 1970, South Africa's output accounted for nearly 80% of the world's gold production; forty years later, South Africa's share of world gold production had dropped to less than 8%.

Have we done enough to recognize the site of the discovery of the main gold reef? George Harrison, a bricklayer and prospector, is credited with the discovery, on the farm Langlaagte where he was employed to help build a small house. George Harrison Park, the site of his mining claim, is a very important part of our mining heritage, but is unfortunately in a sad state of disrepair. The site became a National Monument in 1944, and in terms of current heritage legislation is now considered a Provincial Heritage Site. Illegal miners and vagrants inhabit the original mine shaft, and are apparently working the remaining reef in the nearby Central Rand Gold open pit. The historic Langlaagte stamp mill had to be removed from the site when vagrants started using it for firewood. The site custodian, Johannesburg City Parks, seems to be unable to take action to rectify the filthy and unsafe condition of this historic site. In 2010, there were plans to restore and develop the park with designated pathways surrounded by lush grass and trees, a small play area for children, a mining headgear and viewing deck, and a museum showcasing the area's historical value. The viewing deck was erected, but since then, a commemorative plaque has been removed, there has been fire damage to the memorial panel, and metal railings within the old workings have been stolen, making the area somewhat dangerous. Surely we should be doing more to commemorate the official discovery of the gold-rich Main Reef pebble conglomerate.

Mining Heritage *(continued)*

Other areas reported to be under threat include the central avenue of Crown Mines Village (which has been invaded by squatters) with its fine corrugated iron buildings and beautiful plane trees. Last year saw the illegal demolition of the old ERPM Recreation Hall off Cason Road, near Main Reef Road in Boksburg. Until then, the Recreation Hall Annex was one of the few surviving industrial structures designed by Sir Herbert Baker. Further afield, Pilgrim's Rest is also struggling, as the provincial government has failed to maintain the buildings of the town appropriately (as required by various pieces of legislation), and the central reduction works are in urgent need of restoration.

A more controversial part of our mining heritage has been the array of mine dumps that formed a very visible outline of the mining areas along the reef. To nearby residents they were a nuisance, a source of much dust, and a health hazard. To others, they had a romantic appeal and charm – manmade golden mountains with a beauty of their own. One of the most prominent landmarks in Johannesburg was the Top Star drive-in cinema on the top of a mine dump, with a spectacular view of the city skyline. This disappeared a few years ago.

The extravagant homes of some of the early mining magnates (Randlords) on Parktown Ridge have been well preserved thanks to the stalwart efforts of bodies such as the Johannesburg Heritage Foundation. These are well worth visiting on days when special tours are arranged.

Many of the mining magnates (including Cecil John Rhodes) spent a great deal of time at the Rand Club, the most prestigious of the early gentlemen's clubs of Johannesburg. The Rand Club was founded in 1887, the year after the gold rush city came into being. In 1905, the third version of the Rand Club building was completed on the site bounded by Fox, Commissioner, and Loveday Streets. This building has been the site of many historical developments, including the 1895 Reform Committee and the plotting of the Jameson Raid, being a target in the 1913 Miners' Strike, and the tumultuous events of 1922. The building contains many historical artefacts, photographs, paintings, and sculptures (prominently featuring the rather diverse group of Rhodes, Paul Kruger, Queen Elizabeth II, and Nelson Mandela), as well as a well-equipped library. However, the Rand Club has a somewhat uncertain future, as it is not as well frequented today as it was a few decades ago, and it suspended its operations on 30 September 2015, after 128 years. Perhaps it will start up again with the support of a hotel group, or perhaps it could become a museum of mining-related history that provides a venue for special events.

Historical conservation preserves memories and reminds us of the accomplishments of the past – the successes and the failures. What can individuals do to preserve our heritage? One simple practical contribution could be to document what is known today. Wikipedia celebrated its 15th anniversary this month (15 January 2016) and provides a wonderful information resource. There is currently a project underway that intends to document heritage sites in Johannesburg and provide quick response (QR) codes outside buildings that can be scanned with smartphones to automatically link to websites with information (in a variety of languages) about the place being visited. If we all contributed information about people and places that we know about, I am sure the world would be at least a slightly better place.

R.T. Jones
President, SAIMM



Cooperative human social behaviour

It is fascinating to watch the social behaviour of large groups of creatures in the animal kingdom. The patterns made by flocks of birds flying in formation across a sunset sky, and by schools of silvery fish executing swift manoeuvres underwater, are spectacular to see. Some of this social behaviour has economic effects too. The pollination of crops by bees has been estimated to add about \$15 billion of value annually in the USA. For example, the almond orchards of California (where a million acres of land are devoted to the production of 1.8 million metric tons of almonds – about 60% of world production) are entirely reliant on the pollination services of 1.4 million beehives that are brought in specially each year, as this monoculture cannot provide sufficient pollen and nectar to sustain bees year-round. It is interesting that the revenue from migratory pollination surpassed that from honey around 2007. The bee-keeping industry goes largely unseen until we experience the occasional bee-sting.

Bees have been a favourite metaphor for human society at least since the Roman poet Virgil more than 2000 years ago. In South Africa, Eugene Marais was an early pioneer of the study of animal behaviour, ethology, carrying out research on termites and baboons in the Waterberg mountains. His book *'The Soul of the White Ant'* (published in English in 1937, based on articles originally published in Afrikaans in *Die Burger and Die Huisgenoot* in the 1920s) beautifully described his observations of termite behaviour and showed the remarkable way in which the behaviour of individuals fulfilling a particular role contributes to the overall functioning and survival of the collective termitary. Marais considered the colony as a single complex organism. His ethological studies of the social structure of a troop of chacma baboons were also very insightful.

Humans are also social creatures. Their patterns of interaction are even richer, with the added advantage of language to provide more intricate forms of communication. Although there is much individualism in human behaviour, there is also a significant element of cooperative conduct that contributes to the greater functioning of society as a whole. I would like to focus on the type of behaviour where individuals contribute to the good of others, or society as a whole, even when this comes at a cost to themselves. In today's transactional world, where seemingly everything has a price, what motivates people to contribute their time and energy for no monetary reward? Is voluntary service still alive today?

This altruistic behaviour is explained in many ways. The Biblical injunction 'it is more blessed to give than to receive' is believed by many. Others maintain that there is no such thing as pure altruism, and that people meet various needs of their own by giving to others. This too has some validity. It is indeed rewarding to feel that you have done a job well, or to be thanked for a contribution you have made. It is good and healthy to feel appreciated, although it is possible to take this too far to the extent of a pathological need to feel magnanimous, or to the point of satisfying a need to be needed. It is also possible for those who excessively love structure and rules to desire positional power. However, I see the principal reason for volunteering is that it makes the world a nicer place to live in. It is really enjoyable to participate in activities where you feel you are doing something you are good at, or that you are contributing to something worthwhile.

Service clubs, such as Rotary, Round Table, or Lions exist as voluntary non-profit organizations to provide networking and social events for members, but also primarily to provide charitable services to orphanages, animal shelters, and many other needy and deserving causes, including working towards the eradication of polio. The oldest of these organisations, the Rotary Club of Chicago, was formed in 1905 by an attorney called Paul Harris. He wanted to create a professional club with the friendly feeling of the small towns of his youth. The Rotary name came from the early practice of meetings rotating between members' offices. Rotary now has 1.2 million members around the world, and has the motto 'Service above self'.

Another great example of a more recent volunteer-run (in two senses of the term) movement is the

Cooperative human social behaviour *(continued)*

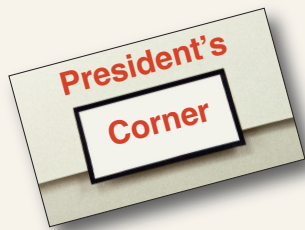
parkrun phenomenon. A group of friends started running together on Saturday mornings in Bushy Park in London. South African-born Paul Sinton-Hewitt (who used to second Bruce Fordyce in the Comrades Marathon) set up a computerized record-keeping system for free 5 km runs like these, and founded what has now become the internationally successful parkrun system (already active in twelve countries). Bruce Fordyce started parkrun in South Africa in November 2011, with 26 people running at Delta Park in Johannesburg. Just over four years later, there are now over 70 parkrun venues and more than 300 000 registered participants around the country. Each of these runs is manned by a group of volunteers who take it in turns to set up the course, time the runners, and make the results available online. There are numerous stories of how this has changed people's lives for the better – inspiring them to become much healthier and spend time in the outdoors with family and friends.

The development of open-source software is another good example of cooperative human social behaviour. Some of the world's most important computer programs (for example, the Linux operating system, the Apache web server, and various web browsers and e-mail systems) are developed by teams of people who offer their time and expertise without any expectation of financial reward. In return, they expect others to contribute freely too.

The lifeblood of a society such as the SAIMM is made up of a vast number of volunteers. Many of these people go above and beyond the call of duty in the service of the community to which we belong. Of course, there are challenges in managing and coordinating the efforts of people who are not paid for their work and not subject to the usual disciplines of an employer-employee relationship, but the SAIMM system could not function without the contributions of numerous volunteers. Council members meet every two months and regularly offer their wisdom and direction to the affairs of the Institute. The majority of the SAIMM's work is carried out by members of committees who put together the publications and events that provide the principal reason for the SAIMM's existence. Whether your interest is in mining, metallurgy, or economics, there is a place for you to get together with other like-minded individuals and put together a conference on a subject that interests you. There is a great deal of effort that goes into writing and reviewing papers and giving presentations that communicate ideas to the rest of the community, but the rewards are many. In addition to the networking, peer recognition, and business opportunities, there is much intellectual stimulation to be had, as well as opportunities for personal growth and development. There is also the camaraderie and friendship that comes from being a part of a community. I would like to encourage you to get involved and volunteer some of your skills and time – it really is worth it. To the active volunteers out there – your contributions are greatly appreciated!

It has been said that 'Volunteers are not paid – not because they are worthless, but because they are priceless'

R.T. Jones
President, SAIMM



Sustainability

When I travel on aeroplanes, I love to look out of the window, either at the popcorn-shaped cumulus clouds or the striated repeating ripple-patterned undulatus clouds, or the wispy feathery cirrus clouds. While enjoying this ephemeral beauty, I marvel at the atmospheric phenomena (and their governing mathematical equations) that are behind these structures. From the vantage point of 10 km up in the sky, the miniature-looking features on the ground can also be enjoyed. There are hills and valleys, snow-topped peaks, wide open deserts, forests and fields, rivers and lakes. I find that I can easily flip between seeing the world as fragile or as resilient, for both are true.

Apart from continents drifting slowly apart, and the occasional impact of an asteroid, or volcanic explosion, the earth has been relatively stable for a very long time, perhaps as long as 4.5 billion years, and scientific estimates say that we have another 6 billion years to go until the expanding sun eventually burns out our planet.

Yet, we are so reliant on our planet being positioned where it is relative to the sun, so that we receive sufficient radiant energy to keep our world in the very narrow band of temperature and pressure that supports life. The unique properties of water (H₂O) allow life to exist on planet Earth, and we need fresh water on a daily basis in order to survive. When seen from afar, the atmosphere that provides the air we breathe seems like a very thin skin surrounding our world. The planet Venus is often seen as having some similarities to Earth – a solid surface, almost the same diameter, a similar mass, similar rock composition, and a comparable distance from the sun; but instead of our life-supporting mixture of oxygen and nitrogen in just the right amounts, the atmosphere of Venus is dominated by carbon dioxide and is completely covered by clouds of sulphuric acid. The temperature and pressure of the Venusian atmosphere are much too high to support human life.

My university final-year design project involved the production of a chloro-fluorocarbon (CFC) refrigerant that was seen at the time as a safe, harmless substance. Only a few years later, it was seen as responsible for the destruction of part of the ozone layer that protects our world. Bill Bryson, in his book *A Short History of Nearly Everything*, tells the story of a hapless Ohio inventor called Thomas Midgely, Junior, who set out to create a gas that was stable, non-flammable, non-corrosive, and safe to breathe. The CFCs he invented went into rapid production in the 1930s and were used in numerous applications, from air-conditioners to deodorant sprays. It took half a century before it was noticed that these long-lived CFCs were destroying ozone at a prodigious rate, and they were subsequently banned. This same inventor had also earlier in the 1920s invented tetraethyl lead, an inexpensive compound that was effective at stopping engines from knocking. Unfortunately, the widespread use of lead (a known neurotoxin) as a gasoline additive led to the death of numerous workers and to damaging the health of countless other people, despite the denials of harmfulness from the producers. One of Midgely's other inventions led directly to his own death in 1944, when he was strangled in the cord of a device he had created for turning him and lifting him in bed (as he was crippled by polio).

One of the controversies of our present age revolves around the extent to which mankind is causing climate change, and what can be done about it. The rapid increase in human population with the onset of industrialization led to the consumption of vast quantities of fossil fuels, with the result that the atmosphere now contains around 400 parts per million of carbon dioxide, whereas the pre-industrial atmosphere contained only about 280 parts per million. Much evidence has been presented to show that this has led to a progressive warming of the surface of the planet through the greenhouse effect.

Sustainability *(continued)*

The current rate of change in the mean temperature of the Earth is at levels that are unprecedented in the past 100 000 years, and it is this rate that distinguishes today's climate change from past fluctuations. The climate is also becoming more variable, with more extreme conditions becoming more frequent than in the past. Will human beings, and the intricately connected food chain and environment, be able to adapt to these changes fast enough?

Jared Diamond wrote a book in 2005 entitled *Collapse*, and subtitled *How Societies Choose to Fail or Survive*. *Collapse* presents an attempt to understand why so many past societies collapsed, leaving behind only ruined or abandoned temples, pyramids, and monuments. Diamond examines why ancient once-productive societies, including the Maya, the Anasazi of the desert areas of the American Southwest, the Easter Islanders, and the Viking colonies of Greenland, as well as modern ones such as Rwanda, have fallen apart. Diamond identifies five factors that contribute to collapse: climate change, hostile neighbours, collapse of essential trading partners, environmental problems, and failure to adapt to environmental issues because of various political, economic, and social factors. Deforestation was a major factor in the decline of Easter Island's Polynesian society, famous for erecting giant stone statues. Because trees take so long to re-grow, deforestation has more severe consequences than crop failure, and can trigger disastrous erosion, leading to the wind blowing off the island's thin topsoil, resulting in starvation. It's hard to imagine what the person who cut down the island's last tree was thinking. Environmental factors are not the only ones at play: policy also matters, as can be seen in the two countries sharing the Caribbean island of Hispaniola – Haiti is a failure relative to the Dominican Republic. Diamond also argues that humanity collectively faces similar challenges to those outlined for individual societies, and rightly warns of alarming trends in biodiversity, soil loss, freshwater limits (China is depleting its aquifers at a breakneck rate), and over-fishing (much of the developing world relies on the oceans for protein).

I have yet to meet someone who, when genuinely challenged, would seriously suggest that we should stop all industrial activity such as the mining of metals. For example, there is no doubt in my mind that the use of stainless steel in kitchens and hospitals has brought about a better standard of health and life for mankind in general. Perhaps the challenge for us in the mining industry is to use the resources of our planet responsibly, mining the minerals we need, but refraining from the profligate and greedy exploitation that has sometimes taken place. We should be mindful of the impact that mining has on the environment and society, and should take care to clean up after ourselves as best as possible, building in responsible mine closure and rehabilitation to our plans. We should admit that there are places in the world where mining should not take place, even if the pure profit motive would dictate otherwise. The conservation of our natural environment, scenery, and wildlife is something we owe to our children and grandchildren.

This resilient but fragile planet is the only home we have, so let's look after it well.

R.T. Jones
President, SAIMM





Ethics

'Never let your sense of morals get in the way of doing what's right' – Isaac Asimov

One of the characteristic features of a professional society is that its members are governed by a code of professional ethics. The term 'ethics' is derived from the Greek word *ethos*, meaning 'character'. Ethics and morals both relate to 'right' and 'wrong' conduct. 'Morals' often refers to an individual's own principles or habits that provide a personal compass regarding right and wrong conduct. 'Ethics' refers to the rules of conduct that are provided by an external source within a particular context, and can be considered a social system or a framework for acceptable behaviour.

An often-quoted example in the field of law illustrates how professional ethics might apparently conflict with personal morals. A lawyer's morals may tell him/her that murder is reprehensible and that murderers should be punished, but professional ethics require a lawyer to defend a client to the best of his/her abilities, even if the client is guilty. There are good reasons for this ethical requirement, as it helps to build a fair society. Ethics is intended to be practical, and is conceived as shared principles promoting fairness in social and business interactions. However, ethical decisions should recognize the context within which they are set, and must recognize that duties can be ranked in a hierarchy (for example, to stop at an accident to render assistance takes precedence over the promise of meeting for lunch).

'The word "good" has many meanings. For example, if a man were to shoot his grandmother at a range of five hundred yards, I should call him a good shot, but not necessarily a good man.' – G.K. Chesterton

'Right is right, and wrong is wrong, and a body ain't got no business doing wrong when he ain't ignorant and knows better.' – Mark Twain, *The Adventures of Huckleberry Finn*

In South African society in 2016, we are acutely aware of the prevalence of dishonesty and corrupt business dealings around us. The need for integrity in business and politics has never been greater. I would like to live in a world where we all work towards the welfare, safety, and health of all people, and care for our environment.

'Educating the mind without educating the heart is no education at all.' – Aristotle

'Ethics are more important than laws.' – Wynton Marsalis

When people sign up for membership of a professional society such as the SAIMM, it is expected that they will always conduct themselves in a professional manner, and act with integrity and sincerity in all of their work. The SAIMM's Code of Professional Conduct appears as By-law H in the 'Constitution and By-Laws' document in the 'About SAIMM' section of our website, and is worth reading as a reminder about our professional obligations.

In essence, the code of professional conduct requires Members to eschew fraudulent or dishonest practices, not to conceal unethical acts, and to avoid working with others who behave unprofessionally. A professional should work to the highest possible standards, stay up-to-date with their field, and should undertake only work that he or she is trained for. Conflicts of interest should be avoided, and financial dealings should be open and fair, with no bribery. Honesty and confidentiality are expected. Professional behaviour involves no misrepresentation in advertising or unfair criticism of the work of others.

Any transgressions of this code are dealt with in terms of our 'Complaints and Disciplinary Procedure' (also on the website) by the Complaints Committee, which gathers facts, and screens complaints to ensure that they are neither frivolous nor malicious, before assessment by the Ethics Committee. The assessment is handled in a firm, fair, and confidential way, and can result in a warning, a reprimand, a requirement for further training, or even suspension, expulsion, or referral to statutory bodies.

'Live so that when your children think of fairness and integrity, they think of you.' – H. Jackson Brown, Jr.

R.T. Jones
President, SAIMM



Electronic Communication

During September 2009, a delightful experiment was conducted to demonstrate how slow South Africa's data transfer services were. A carrier pigeon called Winston was able to transfer 4 GB of data across the 80 km between Howick and Hillcrest, Durban in just over two hours, whereas Telkom's ADSL service was able to complete only 4% of the transfer in that time. Since then, fibre-optic connections to the internet have improved the situation considerably, at least in some wealthier areas of the country. The bigger limitation is now on the human end, not just the technical capacity.

I remember, as a child in the 1960s and 1970s, that my father wrote letters at least once a week to his mother in England. On Sundays, around lunchtime, we would drive to the mail sorting office and deliver the latest air-mail letter for despatch on the Sunday evening overseas flight to London. A reply would arrive a few days later; this turnaround time allowing for quite a reasonable conversation to take place.

When I started work, in the mid 1980s, most formal communication took place by hand-written or typed letters, delivered to office in-boxes by messengers, and a response time of a few weeks was expected. People with desk-bound jobs could also be reached by fixed-line telephones for more immediate interaction. Telex machines were still used, albeit only occasionally, but soon thereafter faded away. My first business cards contained a telex address, before the widespread advent of more modern technologies. Fax machines opened up the possibility of faster international communication, but it took a while for this to become widespread, as fax technology was often treated as a centralized resource that was tightly controlled. In our case, a manager had to sign off all faxes before they were sent.

Yet, even with paper-based communication conducted at a fairly sedate pace, it was possible to fall behind in one's work. I had a colleague whose in-tray became stacked perilously high. One day, he simply moved the entire contents of his in-tray to his out-tray (which must have overwhelmed the poor messenger). The remarkable thing was that most of it never came back to him.

E-mail became mainstream in the 1990s (although it was first used in a very limited form in 1971) and this introduced some wonderful efficiencies to communication. It became possible to write to someone on the other side of the world and to send documents or photographs (with no loss in quality), and to get a reply by the next day. Unsurprisingly, by 1997, e-mail volume overtook that of postal mail ('snail mail'). E-mail remains the most important form of business communication to this day. I enjoy this asynchronous mode of communication that allows one to write at a time convenient to you, and for the recipient to be able to respond at a time convenient to them. E-mail has become almost universal, with 2.6 billion people being reachable via e-mail. Recent estimates indicate that over 200 billion e-mail messages are sent and received daily. No wonder that most of us experience this as a flood of messages.

But there is a downside to the convenience of e-mail. Because it is so easy to use, e-mail has proliferated to the extent that it has become almost unmanageable for many people. Spam and other unwanted mail accounts for at least as much traffic as meaningful mail. People are often automatically copied in on correspondence that they are only peripherally involved in, but presumably are expected to read. People have got used to expecting an almost immediate response to messages, and this results in the 'tyranny of the urgent over the important'. A great deal of stress is caused by this.

If one is away travelling, or even in extended meetings, the backlog of correspondence can seem unmanageable. It is sometimes necessary to declare an 'e-mail amnesty' where (like my former colleague) all mail in the overflowing in-box is simply removed. Some people are brave enough to simply delete it all, in the expectation that anything really important will be asked for again. When I have had to resort to this sort of tactic, I have simply moved the messages into a '2016' folder, for example, where they could be found again if necessary.

It is certainly true that the past few decades have brought about vast changes. We have seen, or are busy seeing, the obsolescence of the telex, fax, landline phone calls, voice messages, and postal services.

The advent of social media and instant messaging has placed even more pressure on people. New diagnosable disorders have come into being around the worry that can arise from being 'disconnected' even for short periods, and from the feelings of inadequacy, jealousy, anxiety, and depression that often result from the daily unhealthy self-comparisons people make to others online.

Facebook (publicly launched in 2006) is by far the largest of the social networks, having 1.59 billion active users who use the system at least once a month. In the USA, for example, where 85% of adults use the internet, 72% of

Electronic Communication *(continued)*

internet users use Facebook, compared to the 23% who use Twitter (which has 320 million users worldwide). Initially, Facebook was used purely for social and recreational purposes, but it has now become essential to business too. A social media report by Sensis in 2015 reported that nearly half of all Australians access one or more social networking sites every day. The report also found that Australians now spend an average of 8.5 hours per week on Facebook alone, with 24% checking social media more than five times a day. Seven out of ten people used a smartphone to access their accounts.

The rise of smartphones has led to people being reachable for communication throughout their waking hours. Accompanying this, there has been a massive shift from voice communication to text communication, with instant messaging growing enormously. The short message service (SMS) has largely been superseded by instant messaging systems, as they offer almost free communication and are much more flexible to use. The number of SMS messages on the Vodacom network in South Africa peaked in 2012, and since then has been declining by about 14% year-on-year. The number of SMS messages sent annually per subscriber has declined from 245 in 2011 to 110 in 2016.

The most globally popular instant messaging service, WhatsApp, was launched in 2009. In 2013, WhatsApp became the most popular mobile instant messenger in South Africa. WhatsApp reached 1 billion users in February 2016, with 70% of those using the service daily. WhatsApp is a cross-platform instant messaging service, available on most smartphones and computers. This system transmits more than 34 billion messages per day (with a peak throughput of 64 billion messages on a single day). The system is also used to share about 700 million photographs per day. We are told that the average user spends 195 minutes per week on WhatsApp. The average number of messages received by WhatsApp users is 2200 per month, with 1200 being sent per month. WhatsApp was bought by Facebook in 2014. Despite this, Facebook has its own Messenger instant messaging system as well, and this has 900 million users. Snapchat (which supposedly does not store messages or photographs) is increasingly being used by younger people, with about 200 million daily active users.

LinkedIn (launched in 2003) is the system of choice for professional networking, allowing people to stay in touch with their network of business contacts. LinkedIn has 433 million users, with about 25% of those (that is, over 100 million) using it at least once a month. Of all the social networks, this one seems to me to be the least demanding of one's time (unless one is actively in the job market). As your circumstances change, a simple update can be done. Otherwise, you can simply wait to receive occasional updates about the career movements of your friends and colleagues.

Instagram is widely used for sharing photographs. It has 400 million active (at least monthly) users.

Skype (launched in 2003) is widely used for video and voice chatting. It relies on a reasonably good internet connection to work well, requiring about 30 MB per minute of video (*i.e.*, about 4 Mbps). It has 300 million monthly active users, with 4.9 million of those being active daily. Skype was bought by Microsoft in 2011. By 2014, Skype had taken over 40% of the market share of international calls. More recently, services such as WhatsApp, WeChat, Telegram, and others, also let one make Skype-like voice and video calls to other users, using VOIP (voice-over-internet-protocol), on top of their picture messaging and group chat capabilities.

My personal pattern is to receive over 120 e-mail messages per day, about 30 WhatsApp messages, about 2 SMS messages (usually banking-related), about 4 phone calls, and about 0.2 printed letters (usually bills). In addition to this, there is a seemingly endless stream of items on my Facebook news feed (literally uncountable items which I don't ever get to see), and I hardly ever get to see what is sent to my Instagram (which I check occasionally) or Twitter accounts.

On top of this, there is the vast amount of news that one is tempted to try to keep up with. Also, the vast personal library that is the internet makes huge quantities of information available just waiting to be explored. Collectively, we carry out 3.5 billion Google searches per day.

Our challenge seems to be how we manage today's communication media, instead of letting it control us. In addition to our e-mail service and website, SAIMM currently has a presence on Facebook, LinkedIn, and Twitter. I would be interested to hear which of these communication channels you find most effective.

R.T. Jones
President, SAIMM



Perils of Conferencing

Many people who haven't travelled on business have the impression that it is a rather glamorous and pleasant task to attend a conference. And, of course, it can be wonderful to visit an interesting place for a few days, and come back refreshed with new ideas and perspectives, but this isn't the whole story. There is also the downside of cramped long-distance flights, disturbed sleeping patterns occasioned by differences in time zones, unfamiliar food, and lack of exercise. The American comedian Fred Allen (who incidentally was born in 1894, the same year that SAIMM was founded) said, rather cynically that 'A conference is a gathering of people who singly can do nothing, but together can decide that nothing can be done.' He also said 'I like long walks, especially when they are taken by people who annoy me.' However, all things considered, conferences still provide a great opportunity to exchange technical information, and to network with one's peers.

While it is true that all activities in life have some associated risk, attending or holding a conference is not usually ranked very highly among life's risky behaviours.

I have a friend, Mike, who travelled to Turkey in 2001 to attend Metal Bulletin's 12th International Iron Ore Symposium in Istanbul, along with about 250 delegates from 33 countries. The conference was to be held in the splendidly situated Swissotel overlooking the Bosphorus. On his way to the conference, Mike's luggage went missing, but he was hopeful that it would eventually find its way to the conference hotel. Not long after falling asleep on the night before the conference, he was woken by a phone call, around 1 am, from the hotel reception. The caller said he should come down to the lobby, as his life was in danger because the hotel had been stormed by Chechnyan gunmen. Mike initially thought that this must be some sort of practical joke. After looking out of his hotel window and seeing armoured vehicles in the street, he realized that this was no joke at all. He quickly dressed and went to the elevator which had a man with a shotgun inside. In the lobby, there was broken glass everywhere, and about 120 guests were held hostage and ordered to lie on the floor in case they were caught in any crossfire. One delegate from Iscor had a shotgun held to his head. The hotel was soon surrounded by hundreds of police, and a twelve-hour stand-off ensued. The 13 hostage-takers were supporters of independence for Chechnya, and were protesting at Russian attacks in Chechnya. The hostages were treated reasonably well, and after two or three hours were given water to drink and bread to eat. During the long wait, Chechnyan national music was played. After the Turkish interior minister held talks with the gunmen, they agreed to end the stand-off, shook hands with the military personnel, and surrendered to the police, feeling that they had made their point and gained the international publicity they wanted. All 120 guests that were held hostage were eventually freed unharmed, at least with no physical injuries. The conference was cancelled and delegates were provided with refunds.

So, what else could go wrong when holding a conference?

I once wanted to attend a conference on Pyrometallurgy that was to be held in Falmouth, England. Unfortunately, it was cancelled when the hotel burned down a few months before the event was to be held. (Perhaps someone didn't understand that it was supposed to be *pyrometallurgy*, not *pyromania*.) I have also attended a conference in Germany where an elderly delegate died of a heart attack. There was also a time when a few delegates suffered from food poisoning at a local conference. Earlier this year, at a conference in Seattle, the city experienced a power failure that shut down the conference for a few hours in the middle of the day. Without power, it can be difficult to obey the dictum that 'the show must go on', yet I have seen another Mike manage to continue with his talk at a Platinum conference despite the loss of power for projecting his slides; I vividly recall his hand gestures describing the graph that he had intended to project. Audiovisual problems are rather common at conferences, but the worst interruption I have seen was at a conference in Delhi when the presenting computer rebooted itself and was unavailable for about five or ten very long minutes, during which time the presenter had to stand waiting awkwardly in front of a very large audience. Two of SAIMM's own conferences have had to work around the complication of having a public holiday declared (for voting in an election) in the middle of the conference. Political disruptions can be even more serious than this, of course. A large international conference was granted to be held in Ukraine two years in advance of the event, but by the time the conference was held, war had broken out between Russian-backed forces and Ukrainian soldiers; quite a lot of soul-searching took place among the organizing body, but the conference eventually went ahead in the capital city very successfully despite the fighting that was taking place about a thousand kilometres away. Conferences held outside the organizer's own country can be especially challenging, and there have

Perils of Conferencing (*continued*)

been instances of audiovisual equipment and materials for exhibition booths being blocked or seriously delayed at country borders. It often happens that presenters don't arrive at a conference because they have been unable to secure the appropriate visas in time. These 'no-shows' can seriously disrupt the scheduling of conference sessions.

Despite all of this, conferences remain one of the pre-eminent ways for professionals to exchange technical information with colleagues working in related areas. This is well recognized by professional registration bodies, and Continuing Professional Development (CPD) is mandatory for continued registration, for example, as a Professional Engineer (PrEng) with the Engineering Council of South Africa (ECSA). In order to be recognized for CPD purposes, conferences have to be formally accredited. SAIMM has the role of providing accreditation, on behalf of ECSA, of content for all mining and metallurgy conferences. Reputable peer-reviewed events are hosted by a number of local and international professional associations, including other institutes within the Global Mineral Professionals Alliance (GMPA), such as AusIMM in Australia, or CIM in Canada, for example.

Unfortunately, there are also many low-quality events in existence, arranged by commercial conference organizers. There are some people who make a very good (if not entirely honest) living by arranging international conferences in exotic locations far off the beaten track. The warning signs are easy to spot: there is no backing of a professional institute (or at least someone with a well-established reputation in the field), no organizing committee, no peer review of papers or presentations, and topics that are unnecessarily wide, general, or unfocused. These organizers typically prey on early-career academics who are drawn in by the prospect of speaking at an international event at an interesting and attractive destination. I have heard of conferences where delegates have presented to very small audiences who have no overlapping interests. Of course, it would be rather embarrassing to blow the whistle after the event, as this would expose the delegate's lack of good judgement, and so these events continue to proliferate.

SAIMM has a particular style of conferencing. Delegates can be sure that the conference will be held at a high-quality and comfortable conference centre, with good audio-visual facilities, tasty catering, and many opportunities for networking. Where appropriate, peer-reviewed proceedings are produced and provided to delegates in electronic form, with an option to purchase a printed copy. Conferences are volunteer-driven, with the support of a small full-time conference organizing team. Oversight is provided by SAIMM's Mining and Metallurgy Technical Programme Committees (TPCs), who take responsibility for finances, marketing, and training. Conference topics are usually based on commodities (*e.g.*, platinum, base metals, diamonds, heavy minerals, sulphuric acid), disciplines (*e.g.*, pyrometallurgy, hydrometallurgy), or are problem-focused (*e.g.*, power crisis, mine safety, furnace tapping). Some of these conferences are once-off, but others are repeated on a regular cycle of one to five years. SAIMM also participates, from time to time, in hosting large international events (such as IMPC, Apcom, Infacon, and Molten Slags) that are held in a variety of countries around the world. It is interesting to note that other countries and regions do things differently, some of them holding one large event (such as the TMS, SME, and CIM MetSoc annual conferences) in a different city every year, and some (such as GDMB's European Metallurgical Conference) having a large event every second year.

Conferences provide a very important source of funding for technical societies, and are the means by which resources are generated to support other worthwhile initiatives.

I often wonder what the conferences of the future will look like. In the past decade, we have seen an increase in the use of electronic technologies. It has become quite routine to have website repositories of conference papers and proceedings. Audio and video recordings of presentations are becoming more familiar too. It is likely that streaming video will be one of the next developments, enabling people far away to observe talks while they are taking place. I also expect to see greater use of devices or applications that will allow the audience to interact with the speaker to a greater extent, perhaps posing questions, or providing answers to snap surveys. I hope you will tell us what you would like to see in the future.

R.T. Jones
President, SAIMM



Celebrating the ordinary

Exceptionalism comes easily to South Africans. We are used to living in a country with wonderful weather, spectacular scenery, and the richest collection of mineral wealth in our ground. There is no other country in the world where you have two Nobel Peace Prize winners who lived in the same street. We are the Rainbow Nation of Desmond Tutu; the country where Gandhi formulated his ideas of passive resistance; and the people led by Nelson Mandela that practised reconciliation instead of a civil war. Johannesburg is the city where all of these great leaders lived and worked; it is also the location of the world's greatest deposit of gold; and is even claimed to be the world's largest manmade urban forest. I was born in Germiston (now regarded as part of greater Johannesburg; both cities were founded in 1886), and I grew up feeling proud of the accomplishments of the industrialists of my father's generation. The city was home to the Rand Refinery (the world's largest refinery of gold, which has refined 30% of all the gold mined in the world since antiquity), and the largest railway junction in the Southern Hemisphere.

South Africa, as a country, does not do things in half measures. For a few decades in the 20th century, South Africans were pariahs because of our discriminatory apartheid laws, then during the Mandela years we went to being one of the world's favourite nations and were a shining example to the world in how to overcome discrimination, and how to unite divided societies. Unfortunately, more recently, our reputation has been sullied and we have become known as one of the world's more violent, lawless, unequal, corrupt, and ineffective countries. Our national psyche seems to demand that we are either at the top or at the bottom of the pile. Surely there has to be a better way – maybe we could try to be just a normal and peaceful place.

The writer of the book of Ecclesiastes (usually assumed to be King Solomon) was someone in a position to test what made for a successful life. He pursued great wealth and found that unsatisfying; he pursued a life of hedonistic pleasures and found that to be like 'chasing after the wind'; he attained great wisdom and knowledge and found even that to be 'utterly meaningless'. Eventually he concluded that the secret to a happy and successful life was to find pleasure in the simple things – a shared meal with friends, the satisfaction of work, laughing together, and enjoying the beauty around us – a celebration of the ordinary. Despite this really good advice, we do seem to pay special attention to people who achieve first place and to things that are bigger or better than other things like them.

Charles Schulz, the creator of the *Peanuts* comic strip said 'Nobody remembers who came in second'. Andrew Carnegie said something similar: 'The first man gets the oyster, the second man gets the shell'. Most people I know will remember that Neil Armstrong was the first man who walked on the moon, but it is probably true that fewer will remember that it was Buzz Aldrin who was the second, and even fewer still that Pete Conrad was third. By the way, all three of these astronauts were born in the same year, 1930.

If you drive to the top of Northcliff Hill in Johannesburg, apart from the spectacular view of the World Cup soccer stadium to the south and the Sandton skyline to the north, you can see a signboard that states 'At 1807 metres above sea level the ridge is only 1 metre lower than the highest point in the Johannesburg municipal area'. Being of a curious turn of mind, I find this kind of statement drives me to distraction. I think that it should be against the law to say what is in second place without saying what is in the first place. After seeing this sign for the first time, it took me a little while to find out what the actual highest point of ground in Johannesburg is. In case you are wondering too, it is on the Observatory Ridge (to the east of the city centre), just above the site of the old observatory and the home of some technical societies.

That got me thinking about how things are measured and ranked. Many lists and rankings are contentious because they don't make explicit all of the factors that are included in the evaluation. Even if the factors are listed, different people might weight them differently.

For example, Victoria Falls is undoubtedly one of the world's greatest waterfalls. Yet it is not the highest. That honour belongs to the Angel Falls (979 m) in Venezuela, followed by the Tugela Falls (948 m) in South Africa. It is also not the widest; that title belongs to Iguazu Falls (2700 m) between Argentina and Brazil. It also does not have the largest mean annual flow rate; which goes to Niagara Falls (2407 m³/a) between Canada and the USA. What distinguishes the Victoria Falls (apart from its spectacular natural beauty) is that it is the largest falling sheet or curtain of water in the world, being 1.7 km wide and with a single drop of 108 m.

The largest lake in the world is also subject to definition. If saltwater lakes are included, then the Caspian Sea is the largest by surface area and by volume, but if we restrict the category to freshwater bodies only, then Lake

Celebrating the ordinary (*continued*)

Superior (North America) has the largest surface area (followed by Lake Victoria in Africa), while Lake Baikal in Asia is the largest by volume (containing approximately 20% of Earth's fresh surface water), followed by Lake Tanganyika in Africa. The deepest lake in the world is Lake Baikal, followed by Lake Tanganyika, then the Caspian Sea. So, if anyone asks me the ambiguous question 'What is the largest lake?', they will get quite an earful in response.

Even greater complexities occur when rating universities. This month saw the release of a list of 1000 top universities worldwide by the Center for World University Rankings (CWUR). The South African universities included in this list were the University of the Witwatersrand (176th), University of Cape Town (265th), Stellenbosch University (329th), University of KwaZulu-Natal (467th), and University of Pretoria (697th). This is quite impressive, given that there are approximately 20 000 universities internationally. The factors taken into account include quality of education, alumni employment, quality of faculty, publications, influence, citations, broad impact, and patents. The highest scoring position of these universities went to Wits University, being rated 35th in the world for alumni employment.

There are numerous university ranking systems, each with a different emphasis. Four of the most prominent are the Times Higher Education (THE) World University Rankings (perhaps the most widely accepted), the CWUR, QS World University Rankings, and the Academic Ranking of World Universities (ARWU/Shanghai). Earlier this year, the THE ranking of South African universities showed UCT (1), Wits (2), Stellenbosch (3), UKZN (4), Pretoria (5), and Unisa (6). The top five universities appearing in both these lists also appear in the top five positions in the QS ranking. These institutions are well known for providing graduates to the mining and metallurgical industries.

South Africa was once overwhelmingly dominant in gold production. However, this was achieved at a high social cost, with the introduction of the migrant labour system that has been so damaging to large portions of our society, and we continue to reap the cost of this today. In recent years, South Africa's gold production has decreased as many mines have become depleted, and the remaining ores are deeper, and extraction of the gold has become more expensive. South Africa no longer holds the dominant position it once did in gold.

Chromium (seen as essential to the production of stainless steel) is another element that South Africa has in great abundance. South Africa's chromite reserve base has been calculated at more than 70% of the world's total. World production of chromite is dominated by South Africa, with Kazakhstan in second place. Chromite production clearly depends significantly on what is in the ground, but is also affected by policies and infrastructure development within a country, as can be seen by the significant increase in chromite production in Turkey, and the significant decline in chromite production in Zimbabwe during the past decade.

Ten years ago, 90% of the chromite that South Africa produced was converted to ferrochromium (FeCr) in South Africa, making SA by far the world's largest producer of this ferro-alloy. China, by comparison, has very little chromite, and has to either import it (much of it from South Africa) to produce FeCr, or has to import the FeCr necessary for its stainless steel production. Thirty years ago, China was in seventh place for FeCr production, producing only 120 kt/a. By 2006 (ten years ago), China's FeCr production had grown to 1.0 Mt/a, and they had moved up to third place (after South Africa with 3.0 Mt/a, and Kazakhstan with 1.2 Mt/a). China continued to grow rapidly, and South Africa's production of FeCr declined as a result of power shortages and higher costs. China overtook South Africa as the world's leading producer of ferrochromium in 2012. I suppose that the question has to be asked whether it really matters if our country is in first or second place, but it certainly does matter whether the minerals in the ground contribute in the best way possible to the prosperity of the people of our region.

The Greek historian Polybius said: 'Those that know how to win are much more numerous than those who know how to make proper use of their victories'. I hope that the mining industry in southern Africa will strive towards making 'proper use' of our natural resources to the benefit of our people.

R.T. Jones
President, SAIMM



Goals, Systems, and Plans

On 12 May 1964 Don Shepherd, a 48-year-old gold miner (actually an underground locomotive driver) from Crown Mines in Johannesburg, set out from the Los Angeles City Hall to begin a solo coast-to-coast run across America. At the time, this was the longest run in the world by an amateur runner. Part of his preparation involved running from Johannesburg to Cape Town. He ran alone, completely unaided, with no backup vehicle, and only a small transistor radio for company. He had no financial sponsorship, and did the trip on a shoestring budget, allowing himself \$10 daily to pay for his food and accommodation. He had spent much time saving for and planning the trip. He carried a small backpack containing a spare shirt, socks, plastic raincoat, shoe patching equipment and scissors, petroleum jelly, toothbrush and toiletries, a small water bottle, and a map. Because he didn't trust the American style of running shoes, he posted a parcel containing a spare pair of canvas takkies to the postmaster in Lincoln, Nebraska, to be collected halfway through his journey. Don completed his 3200 mile (5100 km) journey to New York City in 73 days, 8 hours, and 20 minutes, averaging 70 km per day, typically running for nine to fourteen hours a day. His amazing story is told in his book «My Run Across the United States», published in 1970.

I met Don Shepherd and read his book while I was in primary school, and was inspired by the story. However, not everyone can undertake such a feat. Many years later, in 2010, I visited Guernsey (one of the Channel Islands), and remembered the story of the coast-to-coast run, and realized that sometimes one needs to re-frame grand ideas into goals that can actually be accomplished. A coast-to-coast run across the USA is beyond my reach, but Guernsey was small enough for me to fulfil my long-standing ambition to do a coast-to-coast run (not quite LA to New York, but still lots of fun). I started my run touching the ocean on the east coast at St Peter Port, Guernsey's capital, and headed west running along scenic tree-lined leafy narrow roads until I reached the ocean on the west coast less than ten kilometres later. The biggest challenge was finding the correct bus to get back to my hotel afterwards.

Goals are so important to many people, and can indeed provide direction and motivation to accomplish great things. Yet, they can also lead to disappointment if they are not achieved. All too often, life interferes with the plans we make. In the words of Robert Burns: 'The best-laid schemes o' mice an' men gang aft agley'. Dilbert cartoonist Scott Adams has written numerous articles and a book on the benefits of systems over goals, saying that 'goals are for losers and systems are for winners'. When trying to improve at something, it is perhaps better to implement a system (that can grow into a habit) than to set goals that often remain unmet. A system is something you do on a regular basis that will inevitably lead to improvement in the long run, whereas goals provide only occasional moments of great satisfaction, punctuating a more common state of non-accomplishment. Working to a system means that you focus on things you can control, rather than aiming at goals that are missed because of extraneous circumstances. Back to my running story: I prefer to run along trails that are enjoyable and pleasurable to me, rather than setting a goal of a certain distance per week. In this way, no willpower is required to exercise, and I have continued to participate actively in this sport over many years.

Time has passed so quickly over this past year, and my time as President of SAIMM is almost at an end. When I look back over the year, I see great strides of progress that have been made in certain areas, along with limitations brought about by the difficult state of the mining industry at present. Some plans have taken shape, some goals have been achieved, and some things have had to be deferred until better times. However, the structure of the Institute is a very sound one in that it ensures a steady flow of new ideas and energy into the organization, while retaining continuity for existing initiatives. I believe we have a very good system in place.

William Shakespeare (in his story of Troilus and Cressida) said: 'Things won are done; joy's soul lies in the doing'. We should take pleasure in real achievements and not only in the accolades that sometimes accompany them. It has been a great pleasure to work with a wonderful team in carrying out the business of the Institute during this past year.

R.T. Jones
President, SAIMM