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A word of welcome from the SAASTEC President...

Dear Friends and Colleagues

It is a great privilege to once again welcome you to a SAASTEC conference, our 14th annual conference, taking place for the first time at the National Zoological Gardens in Pretoria.

Most of us had the opportunity to attend the 6th Science Centre World Congress in 2011 and benefited from networking with our international colleagues. This year, the intention of our SAASTEC conference is to 'step outside' our regular networks and engage with other like-minded colleagues and organisations in South Africa. We are pleased that this SAASTEC conference sees a start to this initiative.

The theme of the conference is Sustainability of: energy, outreach and awareness, environment, biodiversity, human capacity and exhibits. Indeed the programme reflects the diversity of this conference theme.

SAASTEC would, once again, like to thank the Department of Science and Technology for their generous support of our conference.

I wish you an outstanding conference as well as an equally outstanding social programme.

Yours sincerely

A handwritten signature in black ink that reads "Julie Cleverdon". The signature is written in a cursive, flowing style with a long horizontal line extending from the end of the name.

*Julie Cleverdon
Chair, SAASTEC
Director, Cape Town Science Centre*

Programme

Monday 26th November 2012

Time	Activity
14:00	Delegates arrive at the NZG
	Tea/Coffee/Juice
14:00-17:30	Registration Informal walk around the Zoo and interaction with Zoo staff (Includes some awesome “behind the scenes” tours!)
18:00-20:00	Icebreaker – Finger supper in Aquarium and surrounds NYS Volunteers programme

Tuesday 27th November 2012

Time	Activity	Delegate	Mins
08:00	Registration at Conference Venue		30
09:00	Morning Tea / Coffee		
09:00-10:30	Opening Session Chair : Julie Cleverdon		
09:00	Welcome by Julie Cleverdon (SAASTECH President)		5
09:05	Welcome by NZG Management		5
09:10-09:40	Challenges and solutions in human capacity development – the GIZ experience”	<i>Thilo Thormeyer, GIZ</i>	30
09:40-10:10	Intercontinental collaborations through study visits in science advancement: lessons learned in Miami.	<i>Candice Potgieter, Irene Schoeman, Elize de Jager, Nomkhitha Mona, Norman Mthembi and Shadrack Mkansi.</i>	30
10:10-10:20	Questions		10
10:20-10:55	Tea / Coffee		35
10:55-11:00	Housekeeping (Ulrich Oberprieler)		5
11:00-13:00	Topic : Sustainability of Biodiversity Session 1 (Chair : Lorenzo Raynard)		
11:00-11:15	The Science and Myths of Owls	<i>Armstrong Mashakeni, National Zoological Gardens of SA</i>	15
11:15-11:30	Pooling our resources	<i>Ulrich B Oberprieler. National Zoological Gardens of SA</i>	15
11:30-11:45	Museums and Education: Relevance in a Changing World	<i>Allison Ruiters, Durban Natural Science Museum</i>	15
11:45-12:00	Making Waves: Growing South Africa’s research capacity in the aquatic sciences?	<i>Garth van Heerden, Vanessa Rouhani and Ndiviwe Baliwe, SAIAB</i>	15
12:00-12:10	Questions		10
12:10-13:05	Topic : Sustainability of Energy Session 2 (Chair : Gilbert Lekwe)		
12:10-12:25	Energy Dialogues – Towards Environmental Citizenry	<i>Marian Brown and Dr Anthony Lelliott, Wits University</i>	15

12:25-12:40	The importance of science centres in South Africa creating awareness of careers in science at an early age: a preliminary analyses	<i>Robyn Rütters Nelson Mandela Bay Science & Technology Centre - UDDI</i>	15
12:40-12:55	Investigation on the Energy efficiency awareness of the youth	<i>Koena Selatile, Sci-Enza</i>	15
12:55-13:05	Questions		10
13:05-14:00	Lunch @ Flamingo Restaurant		60
14:00-16:00	Topic : Sustainability of Education Session 3 (Chair : Michael Peter)		
14:00-14:15	Suitable Science: Adapting science centres to serve pupils from diverse school backgrounds	<i>Derek Fish, Unizul Science Centre</i>	15
14:15-14:30	An investigation on the effectiveness of the Sci-Bono Outreach programme (Emasondosondo) in the teaching of electrochemistry at Grade 11	<i>Trust Nkomo, Fannie Matumba & Thabang Molise, Sci-Bono</i>	15
14:30-14:45	Bringing Life to Science Centres	<i>Elize de Jager & Paul Bartels, NZG</i>	15
14:45-15:00	Chemistry, CAPS and Trying to Capture a Generation Lost In-between	<i>MJ Schwartz, Unizul Science Centre</i>	15
15:00-15:15	Early Childhood Development Programme	<i>Alinah Masobela, ArcelorMittal Science Centre (Sebokeng)</i>	15
15:15-15:30	Perceptions of science educators in teaching science with integration of computers and online virtual technology tools	<i>Pumezo Kwinana, FOSST Discovery Centre, University of Fort Hare</i>	15
15:30-15:45	Continuous evaluation: The safeguard for a sustainable science centre	<i>Rudi Horak, SciEnza</i>	15
15:45-15:55	SANSA Techno Program	<i>Msizi Khathide, SANSA</i>	10
15:55-16:05	Questions		10
16:00-16:20	Tea / Coffee		15
16:20-16:40	Assessing an exhibition and hands-on Fossil Fuel workshop at Sci-Bono Science Centre as a tool to promote students understanding of fossil fuels and climate change	<i>Ian McKay School of Geosciences, Wits</i>	20
16:40-17:00	The Bloodhound Project is an attempt at the World Land Speed Record in South Africa but with the number one aim of inspiring the next generation of scientists and engineers.	<i>Dave Rowley BLOODHOUND SSC Education Programme</i>	20
17:10-21:30	Delegates to board buses for dinner at Intundla Game Lodge http://www.intundla.co.za/ (Transport supplied – delegates to leave cars at zoo – buses will return to zoo and drop delegates at the designated hotel.		

Wednesday 28th November 2012

Time	Activity	Delegate	Mins
08:00	Registration at Conference Venue		30
08:30	Morning Tea / Coffee		
	Housekeeping (Ulrich Oberprieler)		
08:30-10:16	Topic : Sustainability of Exhibitory Session 4 (Chair : Jan Smit)		
08:30-08:42	Science – Boys or Girls?	<i>Diane Stacey Naidoo, Unizul Science Centre</i>	12

08:42-08:54	The evolution of exhibits: a behind the scenes tour of the science of building world class exhibits.	<i>Trevor McGurk Sci-Bono</i>	12
09:54-09:06	Dialogue in the Dark	<i>Stuart Hopwood, Sci-Bono</i>	12
09:06-09:18	Student models in Science Centres: a win win situation, especially for small Science Centres	<i>Tanja Reinhardt, Kumesh Naidoo, STEC, UKZN</i>	12
09:18-09:30	The development of a game based application (App) for a zoo	<i>Lezanne van der Walt, Rudi de Lange, Marcel Mare, TUT</i>	12
09:30-09:42	What happens when an exhibition becomes outdated or loses relevance? Reduce, re-use and recycle, of course!	<i>Jani DeBruin, Cape Town Science Centre</i>	12
09:42-09:54	Interactive exhibits in a community context: are we relevant?	<i>Michael Ellis, Sci-Bono</i>	12
09:54-10:15	Questions		19
10:15-10:45	Tea / Coffee		25
10:45-11:55	Topic : Sustainability of Science Centres Session 5 (Chair : David Kramer)		
10:45-11:05	Lessons learned from establishing a science centre in Bahrain	<i>Mike Bruton, MTE</i>	20
11:05-11:25	"Give me a dollar please, actually make that a Rand"- a look at introducing an Individual Giving Strategy as part of your overall fund-raising strategy to help secure long term sustainability for your centre.	<i>Julie Cleverdon Cape Town Science Centre</i>	20
11:25-11:45	Centres or Festivals? What's the best way to promote Science?	<i>Derek Fish, Unizul</i>	20
11:45-11:55	Questions		10
12:00-13:00	Session 6: (Chair : Alison Ruiters)		
12:00-12:15	Astronomy as a tool to stimulate science centres across Africa	<i>Kevin Govender, IAU Office of Astronomy for Development</i>	15
12:15-12:30	Evaluating the impact of Sci-Bono's programmes: What we learnt along the way	<i>Michael Peter, Sci-Bono Discovery Centre</i>	15
12:30-12:45	South African science centres in perspective	<i>Lorenzo Raynard, SAASTA</i>	15
12:45-13:00	Questions		15
13:00-14:00	Lunch @ Flamingo Restaurant (all delegates)		
14:15-15:20	Session 7 (Chair : Mike Bruton)		
14:15-14:30	Dealing with the dark side of SET awareness	<i>D Kramer, Sci-Bono Discovery Centre</i>	15
14:30-14:40	Programmatic Support Grant Intervention (PSGI): A better way for sustaining your science centre	<i>Thandi Mtsweni SAASTA</i>	10
14:40-14:55	Planning a multi-functional digital planetarium in an old telescope building: optimal diameter, seating and acoustics	<i>MJH Hoffman, JH Greyling, PM Lamusse, C Erasmus, HJ van Heerden, Boydon Observatory</i>	15

14:55-15:10	A sustainable science and nature centre in the making	<i>Marine Soichot, Arda – Réunion island</i>	15
15:10-15:20	Questions		10
15:20-15:40	Tea / Coffee		20
15:40-17:10	1st Workshop Session (Delegates must choose 1 workshop) Session 8		
15:40-17:40	Exhibit Signage <i>Derek Fish, UniZul</i>		120
15:40-17:40	How to go viral <i>Lorenzo Raynard, SAASTA</i>		120
15:40-17:10	Keeping critters in a science centre <i>Mike Adams, Conservator: Reptiles, Department: Conservation & Collections</i>		90
15:40-17:10	Bringing genetics to life <i>Desiré Dalton, Researcher & Head: Wildlife Conservation Genetics Unit, Department: Research & Scientific Services, National Zoological Gardens of South Africa</i>		90
15:40-16:40	Teaching Biodiversity with Animal Soft Toys <i>Mike Bruton (MTE)</i>		60
??:??-18:00	Free networking time		
18:00-21:30	Conference Dinner @ The Waterhole (NZG)		



Thursday 29th November 2012

Time	Activity	Delegate	Mins
08:00-08:30	Registration at Conference Venue Morning Tea / Coffee		30
08:30-10:00	SAASTEC AGM (Voting year)	All	90
10:00-10:30	Tea / Coffee		
	Housekeeping (Ulrich Oberprieler)		
10:30-11:45	Topic : Sustainability of Science Communication Session 9 (Chair : Candice Potgieter)		
10:30-11:00	Science Centres and the Press	<i>Lynne Smit, Hippo Communications</i>	30
11:00-11:20	Science communication is going places – why it matters and how we can do better!	<i>Marina Joubert, Southern Science</i>	20
11:20-11:35	Mobile science: sustainable science communication using mobile technology.	<i>Thandi O'Hagan & Fikiswa Majola HartRAO</i>	15
11:35-11:45	Questions		10
11:45-12:50	Topic : Sustainability of the Outreach and Awareness Sector Session 10 (Chair : Eliza Fraser)		
11:45-12:00	Bread, Milk and Biotechnology	<i>Irene Schoeman, Sci-Enza</i>	15
12:00-12:15	The roles of Anglo American science centre in promoting science literacy in schools and the public	<i>Jan Seopa, Anglo American Science Centre</i>	15
12:15-12:25	Outreach programmes for Sustainable Awareness	<i>Given Ratsoma Sci-Enza (NYS volunteer)</i>	10
12:25-12:40	Sustaining science through Sci-Enza/Mae Jemison outreach programme	<i>Affinity Muzhinduki Sci-Enza, Amy Canby, US Embassy</i>	15

12:40 12:55	Exploring IKS ideas for Science Centres: Possibilities, Observations, Ideas and Suggestions	<i>Mdumiseni Nxumalo, UniZul</i>	15
12:55- 13:05	Questions		10
13:05 14:00	Lunch @ Flamingo Restaurant		45
14:00- 15:00	Topic : Sustainability of Capacity Building Session 11 (Chair : Alfred Tsipa)		
14:00- 14:10	Technical Skills Development Through Science Centre Projects	<i>Akash Dusrath, Sci-Bono Discovery Centre</i>	10
14:10- 14:20	Building Human Capacity with the Sci-Bono Science Career Stream	<i>Thami Mangena, Sci-Bono Discovery Centre</i>	10
14:20- 14:30	Sustainability of Human Capacity	<i>Tebogo Habedi, ArcelorMittal Science Centre, Newcastle</i>	10
14:30- 14:45	Role of ArcelorMittal Science Centre In Engineer Development	<i>Daniel Motsapi and Khuliso Makungo, Arcelormittal Science Centre</i>	15
14:45- 14:55	Questions		10
15:00- 15:30	Final Word by Minister Derek Hanekom, DST Session 12 (Chair : Julie Cleverdon)		30
15:30- 16:00	Tea		30
16:00- 17:30	2nd Workshop Session (Delegates choose only 1 workshop) Session 13		
16:00- 17:00	Social Media - <i>Carolina Odman (capacity 20)</i>		90
16:00- 17:00	Introduction to Nanotechnology - <i>Tebogo Mohlakane, National Museum (capacity 50)</i>		60
16:00- 17:00	Responsible Management of Scientific Information - <i>Joanne Riley, SAASTA (unlimited)</i>		60
16:00- 17:00	Making a rain gauge - <i>John Crossland, Cape Town Science Centre (capacity 20)</i>		60
Delegates who are not staying for workshops on Friday leave. Free evening			

Friday 30th November 2012

Time	Activity	Mins
08:30 09:00	Morning Tea / Coffee	30
09:00 13:00	3rd Workshop Session (Delegates choose only 1 workshop) Session 14	
09:00- 12:30	Social Media <i>Lynne Smit – Social media expert, veteran journalist, author, PR strategist. Ray Joseph - Freelance journalist, journalism trainer and media consultant, former newspaper editor, social media expert.</i>	240
09:00- 12:30	Exhibitory <i>Theo Koullapis and Stuart Hopwood</i>	240
09:00- 12:30	“Universal Design for Learning Science” Science popularisation through low-cost and locally available materials <i>Hideo Nakano (science specialist) and Alfred Tsipa (science specialist) Osizweni Education and Development Centre</i>	240
13:00- 13:30	Lunch Delegates Depart	



Abstracts of Talks

1. **Challenges and solutions in human capacity development – the GIZ experience**

Thilo Thormeyer

Deutsche Gesellschaft für Internationale Zusammenarbeit (German Association for International Cooperation)

GIZ is a German development agency responsible for international cooperation. The paper will briefly look at the history of GIZ and the different modes of delivery. The Human Capacity Development (HCD) instruments of GIZ will be described as well as three relevant HCD international programmes relevant for South Africa. All these programmes are directed at the leadership level. The author will then present some of the training concepts which are aimed at bringing about real change in human behaviour. The U-process is one the approaches that has been applied by GIZ in their leadership training and is presently being developed further in various parts of the organisation. The presenter will look at some of the tools used and will present some additional ideas on human capacity development relevant also to natural scientists. The paper will conclude with some personal observations about the leadership journey.

2. **Intercontinental collaborations through study visits in science advancement: lessons learned in Miami.**

Candice Potgieter, Irene Schoeman, Elize de Jager, Nomkhitha Mona, Norman Mthembu & Shadrack Mkansi.

The Department of Science & Technology through the Capacity Building Programme, the programme managed by SAASTA sent five delegates from five different science & education organizations to Miami in Florida to foster collegially engender new methods in communicating science and to further ensure professional development of communicators back home in South Africa. This project was of a holistic nature and the report will cover various aspects of the aforementioned experiences and how they were practiced by the various delegates.

Based on the principle of hands-on and minds-on learning in science education, our team members gained personal experience about programmes focusing on science outreach and awareness in various areas of Miami, Florida USA. As a group we will share the lessons learned in Miami. The experiences will include aspects of social media, workshop & programme design, science centre capacity building, international collaboration networks, science infrastructure development, exhibitions and display, material and content development, outreach programmes, special programmes, science education and communication and of course the educational climate in Miami Florida. We want to show the fellow South Africans that:

- There is much to be gained by South Africa and the U.S. in sharing best practices,
- There is a higher impact in learning by experience from outside your geographic region
- There's value in what we are doing in South Africa that can be adopted and adapted by the United State
- There are untapped resources in our country that should be explored,
- We are part of a global community where we co-exist in the outreach and awareness sector,
- In Miami there are footsteps of South Africa and the African continent,
- People have interest in what is happening in South Africa,

The paper will acknowledge and demonstrate that South Africa has much to share with the

world. We have successful interventions in our country and visits to outside countries can enhance and confirm our success. Our team was from a diversity of science centres which enriched the experiences as we visited our counterparts in Miami to exchange ideas.

3. **The Science and Myths of Owls**

Armstrong Mashakeni
National Zoological Gardens of SA

This paper unveils the learner's perspective of superstitions, myths and the science of owls. In general, owls are viewed as omens of bad luck, ill health or even death. This belief is widespread even today. Seeing and owl or hearing it hoot is usually interpreted that someone will die. The Swahili people of East Africa believe owls bring illness to children, while the Zulu people of South Africa know the owl as the witchdoctors' bird.

Unfounded superstitions such as these threaten the existence of these silent nocturnal hunters. The myths are enforced by African stories, horror films and Halloween decorations in which they are linked to haunting night themes and portrayed as symbols of magic and witchcraft or indications of death and destruction. The physical appearance can be frightening to uninformed learners or the public. People are often afraid of their wide staring eyes and the tufts of feathers which give them the appearance of horned devils.

This negative connotation may have risen from the fact that owls are nocturnal; animals which are active at night often have negative roles in myth and folklore. However, in Africa deep taboos about owls are still powerful and living traditions. In fact, in West Africa the pattern of owl beliefs probably reflects European attitudes up until the medieval age.

Some learners still have believes that have been passed from generation to generation. Some questions that are raised cannot be explained through science. African believes about owls also continue to boom while evidence is lacking to support such beliefs.

Topic : Sustainability of Biodiversity

Session 1
(Chair : Lorenzo Raynard)

4. **Pooling our resources**

Ulrich B Oberprieler
National Zoological Gardens of SA

This paper explores the differences and similarities between science centres, museums, zoos and such-like institutions. The author argues that, given the scarcity of resources in the science advancement sector, more emphasis should be placed on cooperative programmes. This will not only enhance delivery of products and services, but also improve the credibility awarded to such institutions.

5. **Museums and Education: Relevance in a Changing World**

Allison Ruiters
Durban Natural Science Museum

Initially viewed as repositories for objects and specimens, the role of museums has evolved into that of institutions that are inclusive and accessible, placing their collections at the heart of their activities. Using their collections as a basis, today museums immerse themselves in varying forms of public engagement (education and exhibition programmes), ensuring that the knowledge generated by their collections is available to the wider public. This ensures that our institutions shed the vestiges of our colonial past, which revolved around exclusion, and claim our space within our society as spaces that not only generate and impart knowledge, but also ensure that that this knowledge is accessible to all. This evolution expresses the sentiment of IMD 2012 – "Museums in a Changing World".

Museums in a Changing World, is recognition that institutions are faced with interpreting, and existing in, a field that is becoming increasingly fluid. Each may face a unique set of goals, interests and audiences. But the necessity to thrive in the face of these changes is something that binds all institutions, large and small. Museums in a Changing World is as

much about museums growing and shaping their future as it is about displaying and interpreting issues like climate change and new electronic media.

6. **Making Waves: Growing South Africa's research capacity in the aquatic sciences?**

Garth van Heerden, Vanessa Rouhani and Ndiviwe Baliwe
SAIAB

The National System of Innovation has been set a target for South Africa to double its research output to reach 1% of global research output by 2025. This will take more than merely increasing research funding. It needs development of the country's Human Capital resources by means of strategic interventions at various levels to deliver on these bold objectives.

Previously, education and outreach activities at the South African Institute for Aquatic Biodiversity (SAIAB) followed a museum-based education format. After becoming a National Facility under the NRF, outreach activities were intensified with two dedicated staff and a bus for travelling to rural areas, particularly in the Eastern Cape. Funding constraints and loss of staff have led to a change in focus in SAIAB's Science Advancement activities.

Human Capacity Development at SAIAB is now focussed on the Winter School, the ACEP Phuhlisha Programme and an Internship Programme. These are strategic initiatives that aim to support postgraduate studies in the Aquatic Sciences at Historically Black Universities with the goal of establishing an increased and sustainable stream of research outputs in marine sciences. The University of Fort Hare and Walter Sisulu University are participating as strategic partners in this initiative and jointly we offer a managed programme approach through which students are not only given financial assistance but also logistic support as well as academic and professional development. The goal of these initiatives is to tap into latent talent at HBU's to grow the postgraduate school at SAIAB and these organisations.

Topic : Sustainability of Energy

Session 2

(Chair : Gilbert Lekwe)

7. **Energy Dialogues – Towards Environmental Citizenry**

Marian Brown and Dr Anthony Lelliott
Wits University

Until recently, publications on energy conservation programmes that inform learners on sustainable energy practices in schools have been non-existent. This paper reports on an energy conservation programme, "Energy Dialogues" developed by Delta Environmental Centre. The programme was primarily aimed at influencing pro-environmental attitudes of learners in the Gauteng province of South Africa. A survey confirmed that Grade 11 learners have significant knowledge of the causes and consequences of poor energy usage, but this does not translate into change in behaviour. Various authors agree that an interactive component of information transfer may offer learners a more personalised experience and influence a long term behavioural change. This was observed during the "Energy Dialogues" programme. The pro environmental attitudes of learners were influenced by a combination of social cohesion and practical information transfer. As a group, learners shifted in and out of various cognitive spaces, and with time, collaborative thinking developed. A change in behaviour within the confines of the school were observed but not transferred into the community. Learners complained that they failed to convince their parents of sustainable energy practices. Learners' intentions to be citizens of the environment were strongly dictated by authority figures and their socio-economic situation. This research highlights the importance of engaging all members of a community in dialogue about sustainable energy practices to ensure environmental citizenry.

8. **The importance of science centres in South Africa creating awareness of careers in science at an early age: a preliminary analyses**

Robyn Rütters

Nelson Mandela Bay Science & Technology Centre- UDDI

Learners at schools in South Africa have to make a choice for their Grade 10 -12 subjects at the end of the ninth grade. The reality is that a minimal percentage of these learners are aware of the career possibilities in STEM at this Grade level, mostly due to a lack of exposure to these fields or lack of guidance thereof (<http://www.scienceinafrica.co.za/scicrisis.htm>). The result is that these learners choose subjects which will not qualify them for tertiary studies in the field of Science.

This study will explore the impact of which exposure to career opportunities in the field of Science have on learners Grades 6 to 9 and the knowledge which they have of the careers in Science before entering a Science Centre. The aim of this paper is to establish to which extent Science Centres create awareness of the choices for future careers after the learners have visited the Centres. It will also establish whether Science Centres contribute to study choices in tertiary Science education.

Five different Science Centres in South Africa will be invited to participate in this study.

Questionnaires will be given to first time visitors from Grades 6 to 9 prior to entering the building probing questions in the line of their choice of careers as well as their favourite subjects.

A second set of questionnaires will then be given to the same students post the visit based on whether the visit have changed their career interests.

The results of this study will give an indication of how Science Centres can impact career awareness in turn stimulating focus on STEM subjects as choice subjects. It will also guide the participating Science Centres on their effectiveness in creating awareness of careers in STEM.

9. **Investigation on the Energy efficiency awareness of the youth**

Koena Selatile,

Sci-Enza

Research Question: to what extent do youth who visit Sci-Enza science centre save energy to help protect our environment?

The purpose of this study was to investigate the energy efficiency awareness and sustainability amongst the youth, including those from the disadvantaged background. As this year is international year of sustainable energy, it is very important that the young generation also do their part in saving energy, as this is a serious issue in South Africa, concerning the electricity shortage crisis. It has been said that being energy efficient also means securing a sustainable future for the country as well as reduction in greenhouse gas emissions to help combat global warming.

To carry out the investigation several methods were used. Questionnaires and quizzes based on energy (renewable and non-renewable) were conducted in the science centre for the young visitors to answer as well as hands-on activities such as making electric motors. It was found that people, particularly the young generation, tend to be more energy efficient once they become more aware and exposed to the activities depicting the importance of saving energy. This will help them be aware of how much energy goes to waste during their inefficient use of electricity during their everyday activities at home and schools, and the consequences thereof. And also understand the benefits of saving energy. The responses from the survey helped to evaluate and determine how wisely they used electricity. This will also help in the analysis and give an idea of what perception there is on saving energy amongst the youth.

<http://www.geni.org/globalenergy/library/energy-issues/south%20africa/index.shtml>

Topic : Sustainability of Education

Session 3

(Chair : Michael Peter)

10. **Suitable Science: Adapting science centres to serve pupils from diverse school backgrounds**

Derek Fish,
Unizul Science Centre

This talk represents the final submission of the author's Masters Study into different perceptions of Science in school visitors to Unizul Science Centre, drawn from diverse school backgrounds. Visitors coming from: rural schools, township schools and urban schools were all exposed to the same sound presentation under identical conditions in late 2011. They all answered multiple choice pre and post-tests, and were then asked to respond to questions requiring both written and graphical answers. Clear differences between the schools emerge from the data and suggestions are made as to how best to present Science Shows to each of these groups in a science centre, with recommendations also given for exhibits and workshops.

11. **An investigation on the effectiveness of the Sci-Bono Outreach programme (Emasondosondo) in the teaching of electrochemistry at Grade 11**

Trust Nkomo, Fannie Matumba and Thabang Molise,
Sci-Bono

Emasondosondo Outreach programme targets grade 10 to 12 Physical Sciences and Mathematics. This is aimed at improving the understanding of difficult concepts. The team visits each school once a term and that amounts to four times a year. This programme has not been evaluated before and there has been growing to measure its effectiveness. The focus of this paper is on Physical Sciences. The report has been narrowed to investigate the effectiveness of the intervention in only one topic, electrochemistry, which is difficult to teach and learn. Results of the research could influence decisions on whether to expand, refocus or market the programme.

12. **Bringing Life to Science Centres**

Elize de Jager & Paul Bartels
National Zoological Gardens of South Africa

Science Centres have a powerful part to play in conserving biodiversity and achieving global sustainability by exposing the youth to the application of life and conservation sciences. However, the life sciences often get neglected in science centres.

A programme with a unique approach will be shared in this paper where the education component focuses on veterinary science including anatomy, physiology, reproduction, nutrition, pharmacology, eco-toxicology and diseases and is anchored in two iconic wildlife groups: vultures and rhinos. A number of anthropogenic impacts, including climate change, land use change, excessive consumption, poverty and poaching are linked to the different learning areas. Aspects of spiritual beliefs, indigenous knowledge and the importance of the bio-economy form part of the integrated approach to life science advancement. This programme's activities are designed to seamlessly integrate the learning areas in such a way as to excite the participants to the opportunities and possibilities available and to stimulate innovative, out-of-the-box scientific thinking, leading to actions that are of benefit to not only the individual, but to society as well.

13. **Chemistry, CAPS and Trying to Capture a Generation Lost In-between**

MJ Schwartz

Unizul Science Centre

Chemistry has been taught using the three levels of chemical representation of matter as outlined by Johnson, comprising the macroscopic, symbolic and particulate levels. Research that has shown that the macroscopic level is the easiest to comprehend and suitable for almost all ages although the age at which the other two levels are to be introduced is more subjective to the developmental level of the child/children. A pilot study will be conducted with rural South African pupils to evaluate their competence with regard to their understanding of the 'matter concept' at the macroscopic, symbolic and particulate level. This will be compared with students of the same grade from a township and urban environment. These findings will be compared to international trends. A further study will be conducted to compare the impact CAPS has had on how the students are able to comprehend the different levels of chemical understanding by comparing grade 10 NCS students, who previously had been tested with the identical exam, to current Grade 10 CAPS students. These surveys will be used as an indicator to how the different levels are being communicated and what role science centres can take to improve this. Further the impact of the newly revised CAPS curriculum to both schools and science centres will be addressed, both challenges and opportunities explored.

14. **Early Childhood Development Programme**

Alinah Masobela

ArcelorMittal Science Centre (Sebokeng)

South Africa is in need of more Scientists and Engineers, but student numbers in these disciplines are not increasing. This is due to the fact that not enough learners take science and mathematics in grade 12. There are intervention programmes aimed at high schools pupils, but for many learners this is too late, because they lost their interest in science while still young.

If we want to encourage learners to become scientists we need to target them while still in primary school. Programmes should be introduced like the 'Early Childhood Development programme' to assist primary schools to develop interest in Science and Mathematics at a young age and to address problems experienced in numeracy and literacy in foundation and intermediate phase. Methods that are fun and still communicate a form of learning to the learners should be used and each grade should have its own level of curriculum to learn. The department of education facilitators should be involved in monitoring the methods that are used and performance evaluated on a monthly basis with written tests. Methods should include the following activities for an example: numeracy games, maths puzzles, science shows or science puppet shows.

15. **Perceptions of science educators in teaching science with integration of computers and online virtual technology tools**

Pumezo Kwinana

FOSST Discovery Centre, University of Fort Hare

Research has shown that the use of technology coupled with good teaching can positively impact on improving students' understanding of scientific concepts. This is due to the fact that science, unlike other subjects, is not easily understood due to its intricacy. Also, it is evident that the way nowadays students prefer to learn conflicts with the way they are taught in most high schools. Questionnaires were surveyed to a sample of 50 science educators from the Alice region (Eastern Cape) to examine use of technology. Educators voluntarily filled out the questionnaires but this study was subject to the limitation that the responses to the survey items could be subject to unknown personal biases and perceptions. Educators were then exposed to the use of a variety of technology tools and evaluation forms were employed. Results revealed that a bigger percentage of them were

frequently using traditional technology tools whereas modern technologies like online resources, computers or virtual laboratory technology tools are not effectively used.

The conclusions of the study revealed that science educators are reluctant in using educational technology due to computer illiteracy. 71% of the total educators were not keen to use computers. They cited the fact that schools they work in are under-resourced. Younger teachers were more enthusiastic than older teachers but still most of them did not frequently use a variety of educational technology. Although there were some differences between groups of educators according to their perceptions, they were all eager to make use of educational technology resources to explain complex scientific concepts. It is recommended that the technology tools and internet access should be made available to schools to enhance teaching of science. Also, science educators should undergo training in computer literacy to effectively teach 21st century students.

16. **Continuous evaluation: The safeguard for a sustainable science centre**

Rudi Horak
SciEnza Science Centre

The Sci-Enza science centre is based at the University of Pretoria and is there for part of the academic environment of the university. To ensure the quality of the programmes and courses that are offered, each department has to be evaluated externally in a four to five year cycle. During 2006 the science centre was externally evaluated for the first time. As the centre was then part of Physics Department, it was evaluated using criteria of the projects of an academic department and not of an informal learning facility. During 2011, the University approved an independent evaluation for the science centre using criteria specifically developed for science centres. This paper will reflect on the evaluation criteria for science centre Policies, Processes, Projects, People and Premises. The valuable lessons learned from this evaluation and the impact of this process for the sustainability of science centres in South Africa will be discussed.

17. **SANSA Techno Program**

Msizi Khathide
SANSA

The SANSA Techno Youth Program was initiated in 2012 at the SANSA Science Centre. The main objective was to introduce electronic technology to science learners. The program was also developed to make youth aware of stimulating and rewarding career opportunities that will exist for them later on if they opt for science and technology subjects at school. This presentation will focus on the development and implementation of the SANSA Techno Youth Program. Key issues to be presented are the role of volunteers, development of the program and skills development using technology as the context.

18. **Assessing an exhibition and hands-on Fossil Fuel workshop at Sci-Bono Science Centre as a tool to promote students understanding of fossil fuels and climate change**

Ian McKay
School of Geosciences, Wits

Public understanding of the possible role of human activities in causing climate change and the need for sustainable energy sources to mitigate this change is related to their understanding of the origin, use of, supply and hazards associated with fossil fuels. However, a proper understanding of fossil fuels requires a basic knowledge of Earth history, geological time, evolution, and chemistry which is taught at schools. In South Africa palaeontology, climate change and fossil fuels is covered at both primary and secondary levels. This paper describes the efficacy of a programme on fossil fuels presented to grade 8, 9, 10 and 11 high school pupils at Sci-Bono Science Centre as part of Sustainable Energy Week. The programme consisted of a fossil fuel exhibition with a five minute overview on fossil fuels presented by a postgraduate student. In addition there was a hands-on

workshop consisting of a demonstration, handling off samples of fossil fuels, and modelling of hydrocarbons using sweets and toothpicks. There was also a power point presentation explaining the origin of fossil fuels, future supplies, and their probable role in influencing climate change. Students compared crude oil with engine oil, as well as peat with different types of coal. Pre and post workshop questionnaires were used to assess the programme. The results suggest that the students all learnt a great deal from the demonstration, handling of fossil fuel samples and modelling of hydrocarbons. However, the older learners gained more from the power point presentation. Results also suggest that the learners' understanding of fossil fuels and their possible relationship to climate change was poor resulting in their opinions being shaped by societal pressure rather than actual understanding of the concepts involved. Finally the results suggest a focussed method for achieving learning in a hands-on workshop.

19. **The Bloodhound Project is an attempt at the World Land Speed Record in South Africa but with the number one aim of inspiring the next generation of scientists and engineers.**

Dave Rowley

BLOODHOUND SSC Education Programme

The BLOODHOUND SSC car will be attempting to increase the World Land Speed Record by a staggering 31% in South Africa in 2013 and 2014. To enable the target of 1,610 km/h (1,000 mph) to be achieved, the very latest research, design and manufacturing technologies will be employed to develop a car that will incorporate an EJ200 jet engine, Falcon Project hybrid rocket and Cosworth CA2010 F1 engine, producing 135,000 hp to power the car.

The number one aim however of the Bloodhound Project is to inspire the next generation of scientists and engineers as there is a dearth of learners enjoying their science and mathematics at school. To achieve this aim the project will share all the research, design, manufacture and testing with schools, colleges and universities worldwide. This is unique in the world of advanced engineering.

The presentation will include an insight into the research and design challenges faced by the team of engineers, the manufacturing decisions taken and the planned testing of the car, plus why South Africa has been chosen to run the car.

Topic : Sustainability of Exhibitory

Session 4

(Chair : Jan Smit)

20. **Science – Boys or Girls?**

Diane Stacey Naidoo

Unizul Science Centre

2011 was a significant year for the Unizul Science Centre. We celebrated our 25th birthday and we also opened the first children's museum in Africa. Our children's museum is also a science centre for little people and was the brain child of Derek Fish and Terry Hutter (from the USA) who with the help of BHP Billiton made this possible.

Why a children's museum/science centre?

Research shows that children who do not receive adequate stimulation at an early age do not reach their full potential therefore the USC has embarked on a project to try and make a change in the area of ECD and make a difference in the lives of our children. Freda and Fred in Austria have made a major contribution by donating to us a whole exhibition entitled Ramble Around the World. 90% of our visitors are rural children and for most of these children opportunities to travel the world are a distant dream. With this exhibition children are able to experience other cities and cultures without leaving Richards Bay.

Research shows that at the FET phase girls stray away from maths and science however at ECD level girls develop faster than boys. A research study will be done to show how long

girls and boys spend at the various exhibits and which exhibits and activities stimulate them. Pointers will also be given on how to adapt a Science Centre visit to meet the unique needs of pre-schoolers.

21. **The evolution of exhibits: a behind the scenes tour of the science of building world class exhibits.**

Trevor McGurk

Sci-Bono Discovery Centre

A presentation on maintaining and building science exhibits to meet the changing needs of a growing audience of science centre visitors.

The exhibitry team at Sci-Bono is responsible for maintaining, upgrading and developing exhibitions to ensure maximum learning and engagement from our audience.

In our work we've discovered that existing exhibits need to be evolved to ensure: more effective time spent on maintenance; maximum amount of operational exhibits; most effective use of limited budgets and staff time and resources. Exhibits cannot be developed if we don't actively engage with them ourselves.

In this interactive presentation audience will be taken through the creative and critical thinking process in the evolution of the following two exhibits:

- **Square wheel (slide presentation)**

What it was, how it is evolved and how can we further progress the evolution?

- **Pyramid Puzzle (practical presentation)**

Brief description of the JICA project and the challenges encountered while manufacturing the tetrahedron.

"You can't develop a world class exhibit if you don't play with it" Trevor McGurk.

22. **Dialogue in the Dark**

Stuart Hopwood

Sci-Bono Discovery Centre

In the last year Sci-Bono Discovery Centre partnered with Andreas Heinecke from Dialogue in The Dark from Germany and the South African Council for the Blind to present an exhibition called Dialogue in the Dark. This exhibition made it possible for a visitor the fully experience what it can be like to be blind. For about 45 minutes the visitor is immersed in total darkness and she has to navigate her way through real life scenes, fully constructed so as to elicit the actual experience, complete with the actual objects, textures, sounds, smells and the natural elements. The experience was enhanced by the facilitator or guide being a blind person. The process and the challenges around the manufacturing and simulation of the three real life scenes that made up this world renowned exhibition will be shared.

23. **Student models in Science Centres: a win win situation, especially for small Science Centres**

Tanja Reinhardt and Kumesh Naidoo,
STEC, UKZN

On the one hand we have Science Centres that face many different challenges, one of them being the constant change and upgrade of their exhibits. Not many Science Centres, especially small Science Centres can afford the permanent change of exhibits.

On the other hand we have the University environment, in this case geology students with a focus on mining engineering, where the teaching fraternity has been plagued with issues in terms of coming to grips with various concepts in science. One of the major drawbacks is that students cannot seem to understand the three dimensional concept, an important aspect when studying geology. The lack of 3D-visualisation and the need for new Science Centre exhibits resulted in the idea to let the students build models for the Science Centre as a teaching tool.

It created an opportunity for the students to visualise the concepts being taught, and also to exhibit their models in the Science Centre showing various mining engineering concepts. The benefits to students and the Science Centre are quite obvious. It encourages students the use of doing research, working in groups so that they are exposed to what it would be like when they start working and more importantly, allows them to imagine the problem and create it in three dimensions. As for the Science Centres... they have the benefit of getting new and interactive mining exhibits on a regular base at no cost.

24. **The development of a game based application (App) for a zoo**

Lezanne van der Walt, Rudi de Lange and Marcel Mare
TUT

The science of edutainment borrows from the gaming and entertainment industries in order to enhance the appeal value of educational material (Casey, 2003; Kinzie and Joseph, 2008; Chen, 2010). This paper utilised the science of edutainment and developed a mobile application as an interactive, educational zoo exhibition.

The game based virtual zoo is a mobile application aimed at young people and children from Generation Y and Z (Ho, 2008; Kane, 2012; Schroer, 2012). This application allows players to navigate through a part of the zoo, and interact with zoo exhibitions in a manner similar to edutainment and gaming techniques. The application is based upon the content and outcomes of the zoo's educational curriculum. The aim of this virtual zoo is to present a model that could enhance zoological and conservation education; to introduce a new approach towards conservation possibilities; to awaken patronage among a younger target market; and to educate the younger generation in such a way, that they will inadvertently enjoy the experience.

The mobile application consists of a virtual animal exhibition, an educational game, video footage and a comments page. The virtual animal exhibition will contain a section with information on the exhibited animal, along with a three-dimensional (3D) representation of the animal. Visitor can orientate the animal to his/her needs. The edutainment application focusses on the protection and conservation of the rhinoceros. Application users are able to play as conservationist characters, acting against poachers and their traps to free captured rhinoceros.

(Also presenting a poster on this topic - The structure of a game based educational APP for a zoo)

25. **What happens when an exhibition becomes outdated or loses relevance?
Reduce, re-use and recycle, of course!**

Jani DeBruin
Cape Town Science Centre

The Cape Town Science Centre (then MTN Sciencentre) was the proud host of the PBMR exhibition - Pebble Power for the People - for almost 3 years in its Canal Walk home, showcasing nuclear energy with a focus on the scientific advancement made by South Africans with regards the PMBR technologies.

Early 2010 the SA Government decided to stop funding the PBMR project, and although the technologies were still something to showcase, the exhibition was now outdated. With the relocation of the Cape Town Science Centre (CTSC) at the end of 2010, the most relevant parts of this exhibition was packed up and kept in storage. As this was a permanent installation, many of the components could not be re-used, and materials were recycled. With funding from the South African Agency for Science and Technology Advancement, the CTSC team is now taking parts of this exhibition to re-use in a new exhibition – Energy for All, which will showcase the energy mix in South Africa. The exhibition will address the sustainability of the different sources of energy, and visitors will be given the facts to explore and discover the best energy mix. This presentation will take a look at using components from an outdated exhibition to recreate something new, incorporating materials and parts that can easily be re-used again.

26. **Interactive exhibits in a community context: are we relevant?**

Michael Ellis

Sci-Bono

Science centres should “not glorify science, or scientists, or praise the fruits of science, but rather testify to the excitement of the activity of science, and teach people to take part in it.” – Frank Oppenheimer

The effectiveness of interactive exhibits is depended on the context and communities in which they are found. We need to ensure that the interactive exhibits in South African science centres, museums and educational facilities effectively enable visiting communities to take part in the activity of science and to benefit from this experience. The communities which engage with the exhibits are generally diverse both in age and cultural background which makes the question of effectiveness even more complex.

Here I explore some tools that Sci-Bono Discovery Centre has used to address the question of exhibit effectiveness. We try to determine the amount of knowledge that our visitors are gaining from the interactive exhibits and whether they undergoing any significant attitudinal shifts. I will look at details such as apprehendability, physical interactivity, conceptual coherence and engagement time. I will look at use of an exhibition guide and staff training as modes to improve visitor engagement with interactive exhibits. I conclude by suggesting that the design and selection process of interactive exhibitions should be supported by a strong programme of research and evaluation.

Topic : Sustainability of Science Centres

Session 5

(Chair : David Kramer)

27. **Lessons learned from establishing a science centre in Bahrain**

Mike Bruton

MTE

Whenever we establish a new science centre, we need to overcome new challenges and take advantage of new opportunities. We can all learn from one another’s experience. Starting a new science centre in a small but rich Arab country was almost a mirror image of the challenges that we face in South Africa and elsewhere in Africa – funding was not a constraint but other factors stretched our resourcefulness to the limit. A key to our success was that we put strict management procedures in place, identified the unique characteristics of our host country, did our homework on the demography of the potential audience, formed win: win partnerships, set high standards in everything we did, and investigated and fulfilled the needs of our target audience. Supplementing facilitated visits to permanent interactive exhibits with a wide range of people-centred activities was a key to our success. Also, the introduction of age-differentiated arts and crafts activities, in addition to scientific activities, was a key success factor. Playing off ‘Opening day syndrome’ against long-term sustainability was another challenge. Other successes and failures will be shared with the audience.

28. **"Give me a dollar please, actually make that a Rand"- a look at introducing an Individual Giving Strategy as part of your overall fund-raising strategy to help secure long term sustainability for your centre.**

Julie Cleverdon

Cape Town Science Centre

Most science centres worldwide are non-profit organisations that rely on donors of some sort to operate. Support could be from government, corporate organisations, universities, local education departments or a combination of these. Finding funds in today’s struggling worldwide economy is becoming increasingly challenging. Enough said!

As the Cape Town Science Centre thrives in its new home, it is also struggling to ensure long

term sustainability. We are fundraising from the usual sources (corporates and the different government departments), working at increasing our gate revenue and constantly exploring other creative ways of establishing new income revenue streams such as sub-letting, venue hire, exhibit hire etc. and for the very first time have started to implement an Individual Giving Strategy. We are ASKING our publics to give us money to support us... to sustain us!

By no means a new approach but a new approach for us. Individual giving and fundraising are two sides of the same coin – most individual giving is a response to an ‘ask’, takes several years to really get going and very successful in countries like the US who have a well-known spirit of philanthropy.

A fundraisers’ skill is knowing which methods will yield the most in which circumstances - combining the how, who and what of individual giving. We were offered free assistance from SA’s Individual Giving guru, Charles Maisel (Men on the Side of the Road), to formulate an individual giving strategy and to implement it. In this presentation, I will present our IG strategy and evaluate the successes and failures of our efforts to date.

Perhaps our experiences will be useful to other SC’s in South Africa?

After all, according to a report compiled annually by the American Association of Fundraising Counsel, figures on American philanthropy in 2010 showed that Americans gave more than \$290.89 billion to their favourite causes despite the economic conditions, which means gifts from individuals represented 73% of all contributed dollars to charity!

Is the individual South African ready to support science centres?

29. **Centres or Festivals? What’s the best way to promote Science?**

Derek Fish

UniZul Science Centre

In a context where many projects compete for a small funding cake, there is often competition between Science Centres and Science Festivals. Whom should government (and other sponsors) fund? Which is the best method to get the message across? Or is there room for both? But how should these strange bedfellows coexist?

Derek Fish was privileged to participate in the Beijing Science Festival in September, and the Abu Dhabi Science Festival in October, and has previously visited the Edinburgh Science Festival. He has also visited over 70 Science Centres on every continent. He will report back on his experience at these three large international festivals and how festivals and Centres co-exist (or compete) overseas. Suggestions will be made for how our Centres and Festivals can work together for maximum impact.

Session 6: Sustainability of Science Centres (cont.)
(Chair : Alison Ruiters)

30. **Astronomy as a tool to stimulate science centres across Africa**

Kevin Govender

IAU Office of Astronomy for Development

There is a glaring lack of science centres in much of the African continent. There are, however, several big astronomy projects which have caught the imagination of several African countries. The International Astronomical Union has established the Office of Astronomy for Development in Cape Town, South Africa. This office looks to use astronomy as a tool to stimulate development, specifically in the areas of university level research, school level education and public outreach. Since this office has a special focus on sub-Saharan Africa, we will explore ways in which astronomy can be used to stimulate the development and enhancement of science centres in the sub-continent.

31. **Evaluating the impact of Sci-Bono’s programmes: What we learnt along the way**

Michael Peter
Sci-Bono Discovery Centre

Sci-Bono has embarked on a process of evaluating its programmes so as to:

- Understand the impact of the programmes
- Make decisions around how to make the projects more effective and sustainable
- Report to funders and the Board of Management

This has been an interesting journey of understanding what an evaluation process entails, how we prepared for it, what tools we chose to use, how we collated the data and what resulted from that. This is not a success story but a look at how we started this process and what we learnt along the way.

32. **South African science centres in perspective**

Lorenzo Raynard
SAASTA

From a review of international literature discussing the potential for Science Centres and Museums, it is evident that these institutions have the potential to fulfil a variety of roles in addressing the interface between science and society. This paper will explore the various challenges faced by science centres in South Africa that is preventing them from functioning at these ideal levels. This paper aims to identify further areas of research needed for the science advancement sector to optimally employ and support science centres in achieving their respective mandates.

Session 7 Sustainability of Science Centres (cont.)
(Chair : Mike Bruton)

33, **Dealing with the dark side of SET awareness**

David Kramer
Sci-Bono Discovery Centre

Science centres are engines of SET awareness, particularly for youth and school learners. Contact with schools often exposes us to things in the school system that undermine SET human capital development in South Africa. Schools are dissuading learners from doing maths and encouraging them to do maths lit; Schools are limiting learners doing science; Schools are culling learners with poor pass probabilities; Technical education continues to have low appeal despite a critical shortage of artisans.

What should science centres do to address these issues? How do science centres take an active stand to promote maths and science education and to support achievement in these areas?

The presentation will look at some strategies and actions that science centres may consider and look at what SAASTECC could do in this area.

34. **Programmatic Support Grant Intervention (PSGI): A better way for sustaining your science centre**

Thandi Mdluli
SAASTA

Science centres share a common goal on advancement of science across the country. It is through these centres that learners are inspired into choosing science careers. PSGI that aims at enhancing programmes run at science centres has been running for three years and

it is implemented by the South African Agency for Science and Technology Advancement (SAASTA) for the Department of Science and Technology (DST). Come and learn how other centres have developed from this beneficial programme, see how you can bring new ideas suitable for the community you serve in an innovative way.

35. **Planning a multi-functional digital planetarium in an old telescope building: optimal diameter, seating and acoustics**

MJH Hoffman, JH Greyling, PM Lamusse, C Erasmus and HJ van Heerden
Boydon Observatory

Central South Africa does not have a planetarium at present, but that will soon change. A partnership has been established between the Free State Department of Economic Development, Tourism and Environmental Affairs (DETEA), the Mangaung Metropolitan Municipality (MMM) and the University of the Free State (UFS) through the UFS Two Observatories Project. The plan is to convert the old Lamont Hussey Telescope Building -- which falls under the MMM -- into a multi-functional digital planetarium. DETEA has made available a grant for the renovation and conversion of the building. The support of the Department of Science and Technology through the Boyden Observatory Science Centre has also ensured that we are much closer to the dream of establishing the first full dome theatre en digital planetarium in South Africa and sub-Saharan Africa.

In order to make the facility more sustainable, it will be as multi-functional as possible. A committee with representatives from the three partners (UFS, DETEA and MMM) worked with a professional team of architects, engineers, a quantity surveyor and specialists from the USA, to design a state of the art and unique digital planetarium for central South Africa. The acoustics and seating arrangement within a 12.19-m tilted planetarium dome were carefully considered. A plan is in place for the operating phase to ensure that maintenance and other expenses are covered.

36. **A sustainable science and nature centre in the making**

Marine Soichot
Arda – Réunion Island

CED is a new science and nature centre that will open in 2014 in La Reunion island (French island near by Madagascar). Developing a sustainable course of actions at every level is one of our priorities. We don't focus only on low energy buildings, eco-designed exhibitions and environmental education. We think smart governance, ethical management, accessibility to disabled people and engagement in the local community are also part of a sustainable strategy. This is theory. In practice, many questions are raised. Should we build paths on the grass to minimise the impact on the environment or concrete paths suitable for wheelchairs? The main building will work without air-conditioning but how long will exhibits resist under a tropical climate? Organic and faire-trade products in the store will be more expensive, will visitors buy them and will we be able to reach receipts objectives? We should hire people from the local community but what if we don't find skilled workers?

At every management level, we need to find trades-off between environmental, economic and social criteria. We have to take the centre as a whole so every choice makes sense in the overview of what our missions and values are. After all, engaging the team will be crucial. A strategic plan can be the best but if the team doesn't make it its own, it is useless. Therefore one of the keys of the success would lie in the everyday management.

37. **Science Centres and the Press**

Lynne Smit
Hippo Communications

You are doing some great things at your science centre, but how do you get the media as excited as you are? Lynne Smit will provide some tips and tricks of the trade, as well as lessons learned from promoting SAASTEC members over the past three months.

38. **Science communication is going places – why it matters and how we can do better!**

Marina Joubert
Southern Science

While some scientists are born communicators, others need encouragement, training and incentives to share their work with public audiences. The institutional culture in organisations where scientists work determines the communication climate and can make or break science communication efforts. Thinking strategically about the value of science communication – i.e. focusing on how it could benefit organisations and individual scientists – could make all the difference. This talk will look at the rationale for strategic science communication and the motivations for investing more time, brainpower and resources in planning, implementing and evaluating science communication – at an organisational level, but also integrated with every research project. The interaction and synergy between key role players in the process will also be discussed and the talk will conclude with a discussion of recent resources that provide examples, inspiration and practical advice on latest trends and best practice in science communication.

39. **Mobile science: sustainable science communication using mobile technology.**

Thandi O’Hagan & Fikiswa Majola
HartRao

"The digital divide is beginning to close. The flow of digital information through mobile phones, text messaging, and the Internet is now reaching the world's masses, even in the poorest countries, bringing with it a revolution in economics, politics, and society." Jeffrey Sachs, Director of the Earth Institute at Columbia University

Africa has one of the highest uptakes of mobile technology in the world. There are 42 million mobile phones in operation in South Africa: 15 million youth have access to smart phones; while social media platforms like Mxit (which don't require smart phones) have over 10 million active users. Mobile technology is widely used by leading corporates as a cost effective means to communicate with a wide audience. Can mobile technology lead a revolution in science communication in South Africa? Can it be used to sustainably communicate science?

Facilitated by Fikiswa Majola and Thandi O’Hagan, both passionate believers in the potential power of mobile technology (and fervent mobile users), this presentation will explore global and local trends in the use of mobile technology to communicate, network, collaborate and educate. The presenters aim to answer the following questions: Can mobile technology be used to communicate with and actively engage South African audiences in maths, science and technology? And if so, is the South African science communication sector making the most effective use of mobile technology. The presentation will include research conducted with South African science communication stakeholders to investigate what platforms are being used (Mxit, internet, twitter, facebook, sms, LinkedIn); how and to target which audiences.

Mobile Science: extending outreach and raising awareness beyond the walls of science centres.

Topic : Sustainability of the Outreach and Awareness Sector
Session 10 (Chair : Eliza Fraser)

40. **Bread, Milk and Biotechnology**

Irene Schoeman
Sci-Enza Science Centre

Biotechnology is defined as the use of living organisms, processes or systems to make products that can improve the quality of human life. But to what extent is South Africans aware of these improvements being the result of Biotechnology? In this paper the various groups of South African's perception towards biotechnology will be surveyed. The efficiency of efforts done by Sci-Enza during a biotechnology focus month to improve biotechnology awareness amongst visitors will be assessed. Three types of science centre interventions: exhibits, workshops and a science shows, will be discussed as methods to improve the perception of and understanding of basic concepts in biotechnology. Five secondary school groups who attended a biotechnology-programme at Sci-Enza - consisting of all three the above mentioned interventions - were asked to complete pre and post workshop questionnaires. The questions evaluated how the programme influenced the a) knowledge of biotechnological concepts, b) attitude towards biotechnological concepts and b) potential career choices. The learners were also asked to rate which activity did they find most educational. The findings of the research conducted and the perceived value of the components of the workshop by learners and educators will be discussed in the paper. . The information presented here can be applied to any topic or theme, not only biotechnology, to help science centres to develop cost effective high impact science awareness programmes.

41. **The roles of Anglo American science centre in promoting science literacy in schools and the public**

Jan Seopa
Anglo American Science Centre

Science learning occurs outside the school in a range of environments characterized as informal sector e.g. museums, zoos, science centers etc. According to Crane, Nicholson, Chen and Bitgood (1994) :Informal science learning refers to activities that occur outside the school setting, are not developed primarily for school use, are not developed to be part of the school curriculum, and are characterized as voluntary as opposed to mandatory participation as part of a credited experience.

The paper presents how AASC science centre in Mpumalanga Province engages schools and the public in science literacy through fun experiments, exhibits and science practicals. Some research has been conducted on these concepts worldwide. Both selective observation and systematic observation were used e.g. tables, concepts maps, observations and interviews in a pre and post visit to the science centre. Suggestions in the literature, school children and adults were very excited. The findings show that collaborative inquiry learning is one of the most challenging and exciting ventures for today's learning with people of all ages. The paper argues that themed related to the role of promoting science literacy in people of all ages can account for improvement, recommends that this and more innovative activities should be at science centers and other informal sectors.

42. **Outreach programmes for Sustainable Awareness**

Given Ratsoma
Sci-Enza Science Centre

Outreach programmes are like volunteer missions and intend to supplement education and provide professionals with additional essential information. I had the opportunity to be part of several outreach projects during my NYS volunteer ship at Sci-Enza namely SciFest, the SEEDS programme in the Western Cape, Sasol TechnoX and local outreach activities to the Mae Jemison Science Reading Room in Mamelodi.

With this paper/poster I want to share my experience of outreach programmes in primary and high schools, mostly in disadvantaged areas. The role of outreach programmes to increase the confidence of educators regarding their knowledge of scientific content and the introduction of fun activities to deliver content to learners will be addressed via my personal experience.

43. **Sustaining science through Sci-Enza/Mae Jemison outreach programme**

Affinity Muzhinduki
Sci-Enza Science Centre

This study intends to evaluate the effectiveness of engaging the grade 8 – 12 students with science through Sci-Enza/Mae Jemison outreach program in influencing their choice in studying science. The investigation is conducted through random sampling of learners attending the programme. Using a combination of closed ended questionnaires and face to face interviews, the data will be collected and analysed. The conducting of this outreach programmes helps in keeping contact with learners and community hence sustaining science.

One of the objectives of the Cape Town 2011 Declaration state that science centres should “work together to ensure that they share their joint experience and knowledge of the most effective methods of engaging with science and technology with other local, regional and international bodies that promote science and technology awareness”. To achieve this objective, Sci-Enza science centre in conjunction with American Embassy support science education in Mamelodi Township, Pretoria, Gauteng.

44. **Exploring IKS ideas for Science Centres: Possibilities, Observations, Ideas and Suggestions**

Mdumiseni Nxumalo
UniZul Science Centre

It has taken long for IKS to be seen at Science Centres in SA. Many have no idea what to do about IKS while some science centres, like Unizul Science Centre have had their initiatives. IKS has recently been praised by researchers on issues of sustainability, biodiversity ... These issues still pose a big question to our society today and a scientifically literate society is in a better position to IKS will facilitate the link between indigenous ways of sustainable use of resources and today's needed innovation....

This paper aims to share what has been done at Unizul Science Centre where a lot of interest for astronomy was developed through traditional Zulu astronomy shows. The question is, if the Southern hemisphere communities do not see Orion as a human figure in the sky what significance does it have to them? If the Greek mythology through which we have come to know many constellations by their names is so much used in astronomy, why can't we Southerners view them in our own knowledge of them? The same can be said about our biodiversity, local communities have to view the importance of their biodiversity through their own knowledge which will then facilitate their interest in scientific understanding of it.

A recent study by Derek Fish has shown that different learners of different backgrounds, that is townships, rural schools and urban have different experiences the science shows... Could this be bridged by IKS promoting in Science Centres? This is worth exploring...

45. **Technical Skills Development Through Science Centre Projects**

Akash Dusrath

Sci-Bono Discovery Centre

Over the years science centres have become known as institutions for creating science awareness and promoting innovation. However, what are the other opportunities that can be provided by science centres? With South Africa experiencing a shortage of skills particularly in the technical area, could this possibly be a means to salvage the many promising youth. These youth aren't exposed to technical skills due to the lack of resources available at their schools or even at the institutions where they choose to further their studies. Could science centres step in and provide this technical skills development while still fulfilling their main goal providing platforms for science awareness? Through the many projects science centres run, this could prove to be the avenue through which students can pick up valuable technical skills which will assist them if they decide to take up careers in for e.g. Electronic engineering or Computer programming. This no doubt will provide a meaningful foundation towards increasing their chances of being accepted at recognised tertiary institutions as well as being awarded bursaries and learnerships. Often students are crammed with the theoretical knowledge without having the experience of physically interacting with the equipment to accompany this knowledge. This as a result, puts them at a serious disadvantage when it comes to competing in the job market, as potential employers are more willing to invest in students with practical skills. Can science centres through their projects equip the youth with technical skills to be able to overcome these challenges?

46. **Building Human Capacity with the Sci-Bono Science Career Stream**

Thami Mangena

Sci-Bono Discovery Centre

Do you remember the first time you walked into a Science Centre, maybe as a visitor or potential employee? Many of us actually still vividly recall the day we were inspired as we walked through the doors of science centres. Imagine the experience of a young graduate; ambitious and looking for a good salary. They walk through the doors of a science centre with the hope of both developing a new set of skills and earning a good living. The reality however is that not all of them will be able to get a permanent position in a science centre or similar institution. Our science centres should therefore expect that there will be a high staff turnover and should develop strategies to help graduates develop specific skills which will make them useful in science centres but also marketable in other careers.

In this paper I explore how Sci-Bono Discovery Centre has designed a career stream that aims at developing staff that are more driven, more passionate and willing to learn new skills. The stream has a predefined set of developmental levels and each level has specific skills and criteria which enable staff to move forward in the stream. A staff member is therefore always challenged to develop their skills and thereby develop the human capacity of our centre and the industry as a whole.

47. **Sustainability of Human Capacity**

Tebogo Habedi

ArcelorMittal Science Centre, Newcastle

The development of human capital is the critical determinant of ensuring a sustainable future. Human capacity development is very important for SA to address the skills shortages and the increasing demands of expertise for our growing economy. Contributions to this development include a wide range of human capabilities that will be discussed in detail and the role science centres can play in this endeavour to transform the country into a knowledge-based economy.

48. **Role of Arcelormittal Science Centre In Engineer Development**

Daniel Motsapi and Khuliso Makungo

Arcelormittal Science Centre

The aim of this project is to assist all the bursary holders that are currently enrolled at Vaal University of Technology to settle in and adapt to life at a university assist them to develop good study practices complete the course in record time. This will give a throughput rate that is required by ArcelorMittal South Africa. We currently have 48 learner technicians at Vaal University of Technology of which 30 are currently doing their 2nd year modules, 18 just started in the current calendar year and two are currently doing their practical training at Vanderbijlpark Works. Intake for this programme is independent on the budget from recruitment and training.

Current measures to ensure the success of the project include the assistance by the Engineering Technical Association; members of this association have pledged to assist with tuition and extra classes. The project coordinator will in turn follow up on every meeting with the students on the regular basis to ensure smooth running of the project. Each student is expected to fill in an attendance register and before each meeting they are to send their problematic areas to our attention. They should submit the progress report in form of scripts each time they write a semester test.

The project is in line with the requirement of the country's development of engineers. The science centre caters for over 500 grade 12 learners who perform well in their studies. These learners can be absorbed for in any of their engineering spheres.

Final Word by Minister Derek Hanekom, DST

Session 12 (Chair : Julie Cleverdon)



Abstracts of Posters

1. **E is for Energy**

Irene Schoeman
Sci-Enza

Throughout 2012, Sci-Enza celebrated International Year of Sustainable Energy. Several projects were undertaken to generate awareness around this topic. This poster shares some of the delightful moments with visitors that energised the team and kept them going throughout this year.

2., **Sustainable Energy Technologies**

Marsha Kalika (nee Ramburran)
Brian Boswell Circus, Natal Zoological Gardens and The Lion Park

Due to the increasing demand in electricity, Eskom had failed to supply sufficient amounts of electricity which had led to the energy crisis in South Africa. According to research, the energy crisis was inevitable due to the inferior quality of coal, skills shortage and technical faults compounded by heavy rain falls in 2008. As a result of demand exceeding supply, energy interruptions became imminent.

This poster focuses on renewable energy sources which promote sustainability. South Africa must minimise their use of non-renewable resources such as oil, coal and gas which emit high levels of CO₂, pollutants and degrade the natural environment. Alternate sources of energy that supplement the present day electricity supplied by Eskom include solar, wind, hydroelectric, ocean, geothermal and bio energies which may be fed back into the grid.

These renewable energy technologies are feasible and beneficial in the long term in that they reduce CO₂ emissions, reduce pollution, provide energy security, create employment opportunities and raise environmental awareness on issues of sustainability. For these sustainable energies to be successful in South Africa, further research and monitoring is required as they do have several limitations such as high initial and set-up costs for equipment and installation, theft, geographic locality, climate dependence. In addition, Renewable Energy Technologies (RET) may negatively affect aquatic ecosystems and natural biodiversity.

3. **Sustainability, Enrichment and Inspiration through Girls Science Club**

Adrienne Louw, Phinah Manamela, Madoda Rani
ArcelorMittal Science Centre (Saldanha Works)

A key focus of science centres is to engage, empower and stimulate interest in science. Research into the impact of extra-curricular STEM activities has shown that these activities go a long way in increasing knowledge and skills and encouraging the pursuits of STEM careers. This poster will illustrate how the ArcelorMittal science centre seeks to achieve these objectives through the activities of its Girls Science Club, The Club, which starts in the lower grades, seeks to stimulate an interest in science and provides a system of support and encouragement as the girls progress through the school system.

4. **Trash to Treasure Science**

Helettia Danster,
Sci-Enza Intern

Science in many South African schools is often restricted to information in textbooks without any practical experience. In such contexts it makes sense that children may view science as difficult and even irrelevant to their lives. When science is learnt as a noun,

simply a thing written about in books, it can be quite difficult to understand. Science as a verb is far more dynamic and effective.

Many schools in South Africa do not even have proper buildings let alone equipped labs. In an environment where resources are limited it makes sense to use materials that are either free (e.g. recycling plastic drinks bottles), that teachers may have at their disposal (e.g. cd's from outdated computer programs) or can be bought fairly cheaply (e.g. bicarbonate of soda and vinegar; in order to explain science. We use such materials in our science shows on a regular basis.

My aim with this poster is to illustrate examples of how we can teach scientific principles, while encouraging recycling and sustainability.

5. **Sibo questions Quinoa – 2013 is the Year of Quinoa**

Ginny Stone

SAASTEC / Author

Sibo does a little sleuthing and finds out all the benefits of quinoa (including how exactly to pronounce it!). Who knew that this chewy, crunchy, nutty tasting ancient old grain is one of the few plant foods that is a complete protein (as in – it provides all of the essential amino acids that our bodies need). And wait there's more... it contains half the period table of elements too... healthy stuff like calcium, phosphorous, magnesium, potassium, copper, zinc and iron.

Sibo goes one step further and will provide some snatch and grab recipes too.

6. **Popular Exhibits at NWU Mafikeng Science Centre**

L.Y. Molebatsi, T. Majele, K. Masenya & L.F. Metswamere

North West University (Mafikeng)

Modern Science Centres emphasize a hands-on approach with the primary goal of contributing to scientific literacy of the visitors. Most learners of school going age visit science centres as part of their school curriculum as well as interacting with exhibits to learn more about science. It has been recognised that children's learning occurs from a variety of sources outside the classroom and that these learning sources have a potential to interact with classroom science learning, hence the science centre emphasis on informal learning outside the classroom. Interactivity has been seen as a vital characteristic of Science Centres, hence it is also associated with better learning and recall of information. Several authors have indicated that hands-on experiences are crucial for children learning science. The aim of this study was to identify those exhibits that visitors find interesting and entertaining within the North-West University (Mafikeng Campus) Science Centre. We also wanted to find out if interaction with these exhibits is relevant to their school curriculum and if it contributes to their scientific literacy. A hundred learners of different grades and age-groups were used in the study to collect data during their visit to the Science Centre. They specified their favourite exhibits as well as the ones which entertain them during interviews and in the questionnaires. Observations were also used as part of collecting data. The findings revealed that majority of the children/learners visiting the centre had some favourite exhibits irrespective of their age or gender. Those exhibits are Bernoulli's blower, rotating chair, rolling man, block bridge, sterling engine and air cannon. Furthermore, the learners could relate what they have experienced at the Science Centre with their school curriculum. The results revealed that learners after visiting the centre tend to be stimulated and encouraged to participate in science related issues.

7. **The structure of a game based educational APP for a zoo**

Lezanne van der Walt, Rudi de Lange, Marcel Mare
Tshwane University of Technology

The science of edutainment borrows from the gaming and entertainment industries in order to enhance the appeal value of educational material (Casey, 2003; Kinzie and Joseph, 2008; Chen, 2010). This paper utilised the science of edutainment and developed a mobile application as an interactive, educational zoo exhibition.

The game based virtual zoo is a mobile application aimed at young people and children from Generation Y and Z (Ho, 2008; Kane, 2012; Schroer, 2012). This application allows players to navigate through a part of the zoo, and interact with zoo exhibitions in a manner similar to edutainment and gaming techniques. The application is based upon the content and outcomes of the zoo's educational curriculum. The aim of this virtual zoo is to present a model that could enhance zoological and conservation education; to introduce a new approach towards conservation possibilities; to awaken patronage among a younger target market; and to educate the younger generation in such a way, that they will inadvertently enjoy the experience.

The mobile application consists of a virtual animal exhibition, an educational game, video footage and a comments page. The virtual animal exhibition will contain a section with information on the exhibited animal, along with a three-dimensional (3D) representation of the animal. Visitor can orientate the animal to his/her needs. The edutainment application focusses on the protection and conservation of the rhinoceros. Application users are able to play as conservationist characters, acting against poachers and their traps to free captured rhinoceros.



Exhibitors

Amorcom

BK Publishing (A division of Pasiwa (PTY) Ltd)

Boydon Observatory Science Centre

Johannesburg City Parks

Lets Look Publishers

PERT Industrials (Pty) Ltd

Penreach

ScienceSation

The Teens Nest of Technology SA Pty (Ltd)
(TNOTSA)

University of Limpopo Science Centre

Delegates

Surname	Name	Organisation	Email
O'Hagan	Thandi		thandi@sci-bono.co.za
Mathebu	Terrence	Amorcom	terrencem2@telkomsa.net
Seopa	Jan	Anglo American Science Centre	janseopa@gmail.com
Maphumulo	Eric	Anglo American Science Centre	emaphumulo@mpg.gov.za
Habedi	Tebogo	ArcelorMittal SC (Newcastle)	tebogohabedi@webmail.co.za
Manamela	Phinah	ArcelorMittal SC (Saldanah)	phinam@mailbox.co.za
Louw	Adrienne	ArcelorMittal SC (Saldanah)	adrienne.domorog@gmail.com
Rani	Madoda	ArcelorMittal SC (Saldanah)	mrmadrani3@gmail.com
Maqubela	Busi	ArcelorMittal SC (Saldanah)	bqubs22@gmail.com
Mpokela	Thami	Arcelormittal SC (Sebokeng)	tmphokela@webmail.co.za
Motsapi	Daniel	Arcelormittal SC (Sebokeng)	daniel.motsapi@gmail.com
Masobela	Alinah	ArcelorMittal SC (Sebokeng)	alinah.masobela@mssc.co.za
Soichot	Marine	Arda – Réunion island	marine.soichot@gmail.com
Bruton	Mike	Bahrain Science Centre, Bahrain	mike@mtstudios.com
Knox	Benoit	BK Publishing	benoit@bkpublishing.co.za
Rowley	Dave	BLOODHOUND SSC Education Programme	dave.rowley@bloodhoundssc.com
Maxwell	Wendy	BLOODHOUND SSC Education Programme	
Moraka	Morudu	Bokamoso Science Centre (BOSTEC)	morakam@webmail.co.za
Hoffman	Matie	Boyden Observatory Science Centre	hoffmamj@ufs.ac.za
Kalika	Marsha	Brian Boswell Circus, Natal Zoological Gardens and The Lion Park	marshamburrana@vodamail.co.za
DeBruin	Jani	Cape Town Science Centre	jani@ctsc.org.za
Cleverdon	Julie	Cape Town Science Centre	Julie@ctsc.org.za
Crossland	John	Cape Town Science Centre	johnc5585@gmail.com
Luwaca	Nanga	Cape Town Science Centre	nanga@ctsc.org.za
Jacobs	Muneerah	Cape Town Science Centre	muneerah@ctsc.org.za
Louw	Amy	Cape Town Science Centre	amy@ctsc.org.za
Salie	Yusrah	Cape Town Science Centre	
Ramovha	Isaac	Department of Science & Technology	Isaac.Ramovha@dst.gov.za
Gule	Tebogo	Department of Science & Technology	Tebogo.Gule@dst.gov.za
Madiga	Mokgadi	Department of Science & Technology	
Selepe	Koki	Department of Science & Technology	
Lesch	Bersan	Department of Science & Technology	
Nyawose	Bona	DITSONG Nat Museum of Natural History	bona@mitsong.org.za
Mogorosi	Bongi	DITSONG Nat Museum of Natural History	bongi@mitsong.org
Ruiters	Allison	Durban Natural Science Museum	Allison.Ruiters@durban.gov.za
Okao	Kazumasa	FOSST Discovery Centre, UFH	luv.ps.msc.glb.com@gmail.com
Kwinana	Pumezo	FOSST Discovery Centre, UFH	PKwinana@ufh.ac.za
Mvunge	Madondandile	FOSST Discovery Centre, UFH	mmvunge@ufh.ac.za
Ngobeni	Thompson	Giyani Science Centre	ngobenibt@webmail.co.za
Mthembi	Norman	Giyani Science Centre	gscentre@worldonline.co.za
Thormeyer	Thilo	GIZ	
Majola	Fikiswa	HartRAO	fikiswa.majola@gmail.com
Govender	Kevin	IAU Office of Astronomy for Development	kg@astro4dev.org
Magolo	Sinah	Johannesburg City Parks	smagolo@jhbcityparks.com
Moonyane	Moliehi	Johannesburg City Parks	moliehi@gmail.com
Shikweni	Freddy	Johannesburg City Parks	fshikweni@jhbcityparks.com
Nkgapele	Ignatia	Johannesburg City Parks	inkgapele@jhbcityparks.com
Moodley	Kogie	Johannesburg City Parks	kmoodley@jhbcityparks.com
Ramsuran	Jaiprakash	KZN Science Centre	jpr@kznsc.org
Kast	Nazley	KZN Science Centre	nazleyk@kznsc.org
Potgieter	Candice	KZN Science Centre	Candice.potgieter@kznsc.org
Chauca	Celiwe Precious	KZN Science Centre	celiwec@kznsc.org
V D Westhuizen	Egbert	Lets Look (Pty) Ltd	letslook@netactive.co.za
Simon	Generosa	Ministry of Education, Namibia	Generosa.Simon@moe.gov.na

Surname	Name	Organisation	Email
Kambonde	Lovisa	Ministry of Education, Namibia	
Taetsane	Joseph	Moipone Academy	taetsanelj@gmail.com
Mnguni	Mondli	Mondi Science Centre	mmngunim@gmail.com
Mathebula	Mangaliso	Mondi Science Centre	hcmahlangu@yahoo.com
Masenya	Flavia	Mondi Science Centre	flavy@mailbox.co.za
Moatshe	Chrisencia	Mothibistad Science Centre	chrisencia@webmail.co.za
Keninda	Nomusa	Mpumalanga Dept. of Education	nomusakenindan@gmail.com
Mohlakane-Mafereka	Tebogo	National Museum, Bloemfontein	tebogo.mohlakane@nasmus.co.za
Mashakeni	Armstrong	National Zoological Gardens	
De Jager	Elize	National Zoological Gardens	elize@nzg.ac.za
Oberprieler	Ulrich	National Zoological Gardens	ulrich@nzg.ac.za
Leshaba	Parks	National Zoological Gardens	
Bilankulu	Justice	National Zoological Gardens	justice@nzg.ac.za
Chooka	Phyllis	National Zoological Gardens	
Tshivhase	Khumbelo	National Zoological Gardens	
Ndavha	Bryan	National Zoological Gardens	
Mashamba	Tendani	National Zoological Gardens	
Dire	Maxwell	National Zoological Gardens	
Mabasa	Patience	National Zoological Gardens	
Kunene	Qhubekani	National Zoological Gardens	
Tau	Leavy	National Zoological Gardens	
Fordred	Claire	National Zoological Gardens	
Erlank	Marita	National Zoological Gardens	
Lekwe	Gilbert	NECSA	Gilbert.Lekwe@necsa.co.za
Rutters	Robyn	Nelson Mandela Bay S & T Centre	robyn@uddi.co.za
Smit	Jan	North West University SC	Jan.Smit@nwu.ac.z
Smit	Rene	North West University SC	
Majele	Thato	North-West (Mafikeng) University SC	
Molebatsi	Lerato	North-West (Mafikeng) University SC	16296761@nwu.ac.za
Volschenk	Elsa	Octopus (Quality Unit)	
de Roos	Diederik	Octopus (Quality Unit)	
Duma	Spar	Olwazini Education & Develop. Centre	Spar.Duma@tsogosun.com
Nakano	Nakano	Osizweni Education & Develop. Centre	hnakano@osizweni.org.za
Tsipa	Alfred	Osizweni Education & Develop. Centre	atsipa@osizweni.org.za
Gear	Dave	Penreach	dgear@Penryn.co.za
Nkuna	Bailey	Penreach	bailey@Penryn.co.za
Tafireyi	Lawrence	Penreach	
Horszowski	Peter	PERT Industrials (Pty) Ltd	peter@pert.co.za
Van Dyk	Kobus	PERT Industrials (Pty) Ltd	
Scholtz	James	RoofTop	
Khumalo	Buzani	SAAO	buzani@saa0.ac.za
Willem	Prins	SAAO	wsp@saa0.ac.za
Raynard	Lorenzo	SAASTA	lorenzo@saasta.ac.za
Mkansi	Shadrack	SAASTA	mkansis@saasta.ac.za
Mtsweni	Thandamazi	SAASTA	thandi@saasta.ac.za
Riley	Joanne	SAASTA	joanne@saasta.ac.za
Mthethwa	Mncedisi	SAASTA	mncedisi@saasta.ac.za
Stone	GINNY	SAASTECC	squigglez@telkomsa.net
Van Heerden	Garth	SAIAB	g.vanheerden@saiab.ac.za
Baliwe	Ndiviwe	SAIAB	n.baliwe@saiab.ac.za
Rouhani	Vanessa	SAIAB	v.rouhani@saiab.ac.za
Lentswana	Selape	SANBI	lentswanasm@gmail.com
Fraser	Eliza	SANSA	efraser@sansa.org.za
Khathide	Msizi	SANSA	mkhathide@sansa.org.za
Hopwood	Stuart	Sci-Bono Discovery Centre	Stuart.hopwood@sci-bono.co.za
McGurck	Trevor	Sci-Bono Discovery Centre	
Kramer	David	Sci-Bono Discovery Centre	David.Kramer@sci-bono.co.za
Peter	Michael	Sci-Bono Discovery Centre	michael.peter@sci-bono.co.za
Matumba	Fannie	Sci-Bono Discovery Centre	Fannie.Matumba@sci-bono.co.za
Ellis	Michael	Sci-Bono Discovery Centre	michaele@scibono.co.za
Dusrath	Akash	Sci-Bono Discovery Centre	akashd@sci-bono.co.za

Tips for Chairing a Session Well



Make Contact –

Contact your speakers before the conference to answer any questions they may have and to make sure they know when and where their presentation will take place.



Be Prepared -

Familiarize yourself with the general topic of the session and read abstracts (and full papers if they are available) to familiarize yourself with the content of the individual presentations. If you think two speakers are in danger of covering the same issues contact them in advance to give them an opportunity to tailor their presentations.



Face-to-Face -

Arrange to meet your speakers at the conference venue to ensure they know the time and venue of their presentation, and that they bring any problems or special requirements to the attention of the conference organizers.



Think and Plan -

Plan the general format of your session, think about how to introduce the speakers and state that questions will be taken at the end of the session.



Introduce Session -

Get the attention of the audience, introduce the topic of the session and present the format of the session.



Introduce the Speakers -

Prepare some information to introduce each of the speakers. Keep the introductions short and accurate.



Timing -

Monitor the timing of each speaker closely, speak up and remind them they have only 2-3 minutes of speaking-time left if they show no sign of concluding their presentation. 10 minutes for questions at the end of each session.



Discussion -

Have a few questions ready in case the audience doesn't. If questions are too long, or complicated interrupt and suggest that the issue is discussed after the session.



Closing -

Conclude the session with a short summary of the content of the session, acknowledge the speakers and announce the next sessions.



The End -

Before they leave the room, thank each of the speakers for their contribution.

Thank you for chairing the session.

