

SCIENCE COMMUNICATION IN A DIVERSE WORLD

CAPE TOWN SOUTH AFRICA

4 - 7 DECEMBER 2002

SCIENCE COMMUNICATION IN A DIVERSE WORLD



7TH INTERNATIONAL CONFERENCE
ON PUBLIC COMMUNICATION OF
SCIENCE AND TECHNOLOGY (PCST)



SECOND ANNOUNCEMENT

CALL FOR PAPERS

**FOUNDATION FOR EDUCATION,
SCIENCE AND TECHNOLOGY**

AN AGENCY OF SOUTH AFRICA'S DEPARTMENT OF
ARTS, CULTURE, SCIENCE AND TECHNOLOGY

7th International Conference on Public Communication of Science and Technology (PCST)

PROGRAMME

4 December 2002, Wednesday

- 07:30 - 13:00 **Eclipse event at MTN ScienCentre**, Canal Walk Mall with Eclipse Theatre presentation, **i-KLIPS! African myths about the Moon in the Sun**, produced by the MTN ScienCentre.
- 18:30 - 20:00 **Opening cocktail and networking event** at the Two Oceans Aquarium, directly opposite the Conference hotels in the V&A Waterfront
Welcome & Registration
- Two Oceans Aquarium open for PCST delegates until 22:00 - an opportunity to explore this magnificent facility!**

5 December 2002, Thursday.

Kramer building, Middle Campus of the University of Cape Town

07:30 - 08:30 **Final registration**

Plenary Session 1

Room: LT 1

Opening session

- Chair:** Rob Adam, Department of Science and Technology, South Africa
- 08:30 - 09:00 Women Unite - Xhosa Dance Group
- 09:00 - 09:15 Welcome by Conference Chair, Marina Joubert
- 09:15 - 09:30 Opening address by Dr Ben Ngubane, Minister of Arts, Culture, Science and Technology, South Africa
- 09:30 - 10:10 Science communication in a diverse world: Professor David King, Chief Scientific Adviser to HM Government and the Head of the Office of Science and Technology, United Kingdom
- 10:10 - 10:45 Public understanding of science - pick your favorite flavor: Dr Alan Leshner, CEO of the American Association for the Advancement of Science (AAAS)

Parallel Session 1

11:00 - 13:00
Room: LT1
Ideas sharing session

Theme: Using technology to communicate science (A)

Chair: Hyman Field, National Science Foundation, USA

- *The Why Files* as a laboratory for studying the role of the World Wide Web in public understanding of science: Sharon Dunwoody, University of Wisconsin-Madison and William Eveland, Ohio State University, USA
- A web database of the European science museums, with path configurator and path search tool: Marco Bianucci, Roberto Fieschi and Silvia Merlino, INFN - University of Parma, Italy
- Science Centers facing virtual dimension: Pierre-Marie Fayard and Tania Arboleda, Université de Poitiers, France
- Mass participation experiments: reaching new audiences through internet based experiments: Jill Nelson, British Association (the BA), UK
- The Internet as a tool - *Science in Africa* showcasing African science: Janice Limson, *Science in Africa*, South Africa

Parallel Session 2

11:00 - 13:00
Room: LT2
Panel discussion

Theme: Trends in teaching and learning science communication

Chair: Winfried Goepfert, Free University of Berlin, Germany

- Sharing expertise: The European Network of Science Communication Teachers (ENSCOT): Jeff Thomas, Centre for Science Education, The Open University, UK
- Teaching science and technical communication online: Kenneth Friedman, Lehigh University, USA
- The Stanford Research Communication Program: Carolyn Gale, Stanford University, USA

Parallel Session 3

11:00 - 13:00
Room: 2B
Ideas sharing session

Theme: Science on the road - mobile outreach programmes

Chair: Fiona Barbagallo, British Association (the BA), UK

- Taking science to the community - The Shell Questacon Science Circus: Sharyn Errington, The Australian National University, Australia
- An Aquarium Mobile Unit - A case study of communicating natural science: Russell Stevens, Two Oceans Aquarium, South Africa
- Mobile screening clinic uses innovative health promotion to help minorities: Richard Atkins, Skip Lockwood and Jamie Bearse, National Prostate Cancer Coalition, USA
- Science on the highway - Taking science to the people: Makhwênkwe George Mvalo, Cape Technikon, South Africa
- Communicating "SET" to deep rural: Pack a punch by going mobile interactive: Johan van der Merwe, Discovery Centre, South Africa

Parallel Session 4

11:00 - 13:00
Room: 2A
Paper presentation

Theme: Science communication and narrative

Chair: Massimiano Bucchi, University of Trento, Italy

- Science via narratives: communicating science through literary forms: Aquiles Negrete-Yankelevich, University of Bath, UK
- The naturalists and the popularisation of science: Ildeu de Castro Moreira, Federal University of Rio de Janeiro and Luisa Massarani, Museum of Life, Brazil
- 'How is Your Stomach?' - Sharing stories as a form of science communication: Will Rifkin, Alan Morris, Briony Pavel, Jessica Bell, Vi Nguyen, Dominic Leung, Sei Nishimura, Linda Ong and Ho Thi Hien, University of New South Wales, Australia
- Learning how to tell the story: a workshop presentation: Peter Thomsen and Michael Duffy, Cooperative Research Centre for Aboriginal and Tropical Health, Australia

Parallel Session 5

11:00 - 13:00
Room: LT 3
Panel discussion

Theme: Environmental communication (A)

Chair: Jenni Metcalfe, Econnect Communication, Australia

- A study of communication plans for natural resource management: Anne Leitch, CSIRO and James Everett, Queensland University of Technology, Australia
- Testing public (un)certainty of science - Media representations of global warming: Julia Corbett, Jessica Durfee, Roger Gunn, Maja Krakowjak and Jeffrey Nellerme, University of Utah, USA
- Reaching out - marine science and resource management training for rural coastal communities: Judy Mann-Lang, Sea World Education Centre, South Africa

Parallel Session 6

11:00 - 13:00
Room: 4A
Paper presentation

Theme: Public perceptions and knowledge of science

Chair: Cheng Donghong, Chinese Academy of Science and Technology, China

- Questions the public asks of science: Suzanne de Cheveigne, CNRS, France
- Science and society in Europe: Michel Claessens, European Commission, Brussels
- Public understanding of science and technology in Japan: Masamichi Ishii, National Institute of Science and Technology Policy, Japan
- Current scientific literacy of Chinese citizens - Findings from 2001 National Survey: Li Daguang, China Research Institute for Science Popularization, China

Parallel Session 7

14:00 - 15:30
Room: LT 1
Paper presentation

Theme: Using technology to communicate science (B)

Chair: Lisbeth Fog, Colombian Association of Science Journalism, Colombia

- Communicating science in cyberspace: Margaret Corbit, Cornell University, USA
- Webcasting for scientific communication: Silvano de Gennaro and Paola Catapano, CERN, Switzerland
- Reading and understanding a science report through paper and hypertext - an experimental study: Mônica Macedo-Rouet, Methodist University of São Paulo, Brazil, Jean-François Rouet, CNRS and University of Poitiers, Pierre-Marie Fayard, University of Poitiers, France and Isaac Epstein, Methodist University of São Paulo, Brazil

Parallel Session 8

14:00 - 15:30
Room: LT 3
Paper presentation

Theme: Dialogue in science communication (A)

Chair: Hilda van Rooyen, National Research Foundation, South Africa

- Should we continue to pursue dialogue? Fiona Barbagallo, British Association (the BA), UK
- The Wellcome Trust and public engagement with bioscience: Sarah Bronsdon, The Wellcome Trust, UK
- Public communication of S & T - German and European Perspectives: Ekkehard Winter, Stifterverband, Germany and Euroscience Association

Parallel Session 9

14:00 - 15:30
Room: LT 2
Paper presentation

Theme: Reaching out to rural communities (A)

Chair: Hak Soo Kim, Sogang University, South Korea

- Communicating science to rural communities requires boundary crossing: Hester Meyer, University of South Africa, South Africa
- Project oriented learning as a communication tool of environmental sciences in the community of Soshanguve - a case study: Verena Meyer, Technikon Northern Gauteng, South Africa
- Improving communication between farmers and scientists: Belinda Clarke, Norwich Research Park Science, UK

Parallel Session 10

14:00 - 15:30
Room: 2A
Ideas sharing session

Theme: Showtime at science centres

Chair: Shadrack Mahapa, University of the North, South Africa

- Science - The magic of publicly communicating and inspiring students to study it: Robert Friedhoffer, The Graduate Center of the City University of New York, USA
- Science "Magic" Shows - Communicating science in an unforgettable way: Derek Fish, Unizul Science Centre, South Africa
- From Cardiff to Cape Town: Intercultural experiences with informal science learning: Wendy Sadler, Science Communication Consultant, UK

Parallel Session 11

14:00 - 15:30
Room: 2B
Ideas sharing session

Theme: Science-media interfaces - building capacity in science journalism

Chair: Toss Gascoigne, FASTS, Australia

- Mass Media Fellowship Program - An innovative way to communicate science: Judy Kass, American Association for the Advancement of Science (AAAS), USA
- Building capacity in science radio journalism in South Africa: Kelebogile Dilotsotlhe, Department of Science and Technology, South Africa
- Television weathercasters as science communicators - An examination of the advantages of accessing these specialists and explaining why a gender gap persists: Kris Wilson, University of Texas, USA
- Impact of media-science roundtables and training programs for researchers: Mary Woolley, Research!America, USA

Parallel Session 12

14:00 - 15:30
Room: 4A
Workshop

Theme: A model for communicating HIV/AIDS awareness

Chair: Karen Wallace, University of Cape Town, South Africa

- Practical workshop presented by Karen Wallace and Bette Davidowitz, Chemistry Department, University of Cape Town, South Africa

Parallel Session 13

16:00 - 17:30
Room: LT 3
Ideas sharing session

Theme: Dialogue in science communication (B)

Chair: Dexter Mahlangu, National Research Foundation, South Africa

- Making technological democracy work - Deliberative models of public consultation: Edna Einsiedel, University of Calgary, Canada
- From science centre visitors to responsible citizens: Walter Staveloz, ECSITE, Belgium

Parallel Session 14

16:00 - 17:30
Room: 2B
Panel discussion

Theme: Communicating astronomy

Chair: Derek Fish, Unizul Science Centre, South Africa

- A survivor's guide to the public understanding of science: Sandra Preston, McDonald Observatory, USA
- Planetariums - beyond the naked eye: Tony Fairall, University of Cape Town and Planetarium at the SA Museum, South Africa
- Doing it without electrons - Innovative resources for promoting astronomy: Case Rijdsijk, South African Astronomical Observatory

Parallel Session 15

16:00 - 17:30
Room: LT 2
Paper presentation

Theme: Reaching out to rural communities (B)

Chair: Bruce Lewenstein, Cornell University, USA

- Science and technology communication oriented towards China's rural population: Cheng Donghong, Lou Wei and Wang Huimei, China Association for Science and Technology, China
- Communicating with rural communities to improve quality of life: Cheryl McCrindle, University of Pretoria, South Africa
- Story of the larger grain borer: Communicating science to rural communities: Christelle Swart, Technikon Southern Africa and Marianna Theyse, Department of Agriculture, South Africa

Parallel Session 16

16:00 - 17:30
Room: 2A
Ideas sharing session

Theme: Celebrating science

Chair: Ndashinga Chasakara, Foundation for Education, Science and Technology, South Africa

- UK Science Year - working to a pre-defined government brief: Jill Nelson, British Association (the BA), UK
- New communication concepts for the UK during Science Year: Bobby Cerini, Science Year, UK
- Promoting a culture of science in a festive way: Brian Wilmot, SASOL SciFEST, South Africa
- Voices of teachers and learners about SASOL SciFEST - from "spectators" to players in science communication: Kenneth Ngcoza and Matole Reuben Maselwa, Rhodes University, South Africa

Parallel Session 17

16:00 - 17:30
Room: LT 1
Paper presentation

Theme: Communicating with decision makers

Chair: Farouk Cassim, MP, South Africa

- Talking to Members of Parliament about the importance of science: Toss Gascoigne, Federation of Australian Scientific and Technological Societies, Australia
- Science needs good public relations: A marketing approach to science-industry relations: Andrzej Jasinski, University of Warsaw, Poland
- Communication, creativity and commercialisation of science in Australian research institutions: Beryl Morris, Vaccine Solutions Pty Ltd, Australia
- Is there a mandate for science? Examining science policy debates during a UK general election: Elizabeth Vidler, Richard Holliman, Jeff Thomas, The Open University, United Kingdom

Parallel Session 18

16:00 - 17:30
Room: 4A
Paper presentation

Theme: Perspectives on communicating HIV/AIDS

Chair: Michelle Galloway, Medical Research Council, South Africa

- Public communication's impact on the history of science and societies - The 20 years media coverage of AIDS in a cross-cultural study: Gemma Revuelta, Núria Pérez, Elisa Almeida França, Maria Roura and Vladimir de Semir, Universitat Pompeu Fabra, Spain
- Agenda setting politics - An analysis of main stream newspaper reports on HIV/Aids: Gideon de Wet, Potchefstroom University, South Africa
- Tswana speaking students' awareness of HIV/Aids and poverty: Paul Schutte, Potchefstroom University, South Africa
- A critical analysis of reproductive health information in South Africa: Nolwazi Mbananga, Medical Research Council, South Africa

17:30 - 18:00

Poster presentation sessions in Lecture Theatres 1, 2 & 3

Room: LT 1

Boring science radio and other educational dilemmas

1. Boring science - the challenge for educational radio: Robert Firmhofer, Polskie Radio, Poland
2. INFM partner in an exciting European education project: Silvia Merlino, Roberto Fieschi, Marco Bianucci and Brian Davies, University of Parma, Italy
3. Mad about maths and science - Stepping the way for the future: Nonceba Shoba and Joyce Sewry, Albany Museum and Rhodes University, South Africa
4. Marketing the essence - A passionate strategy to address the MST [Mathematics, Science and Technology] crisis: Sue Southwood, Rhodes University, South Africa
5. Teaching science and technology using African and European illustrations drawn from everyday life: Kevin Rochford, University of Cape Town, South Africa

Room: LT 2

Doing it differently: New research and methods for science communication

6. Biographies of scientists to promote public interest in science and technology: Shigeo Sugiyama, Hokkaido University, Japan
7. Development in science communication - The need for crossing borders of sciences: Maarten van der Sanden, Delft University of Technology and Frans Meijman, VU-University Medical Center, The Netherlands
8. Pondering a process approach to writing - An action research project: Jennifer Wright and A Solomon, Peninsula Technikon, South Africa
9. Science awareness and knowledge of first-year students at the University of the North - A ten-year perspective: Rolf Becker, Kirsten Lucas, University of the North and Rudi Laugksch, Department of Education, South Africa
10. Communicating science through art in the workplace: Shirley Koller, American Association for the Advancement of Science (AAAS), USA
11. Perceptions of science in rural and urban communities: Using marketing tools as an aid for differentiation: Sarah Pearson and David Pearson, University of New England, Australia

Room: LT 3

From volcanic eruptions to the missionary complex - the seductive power of the media

12. Echoes of the Nyiragongo volcanic eruption in the European media: Tiziana Lanza, Istituto Nazionale di Geofisica e Vulcanologia, Italy
13. The missionary complex - American perspective of China over a hundred years - A critical analysis of National Geographic Magazine between 1888-1998: Xiao Xinxin and Li Xiguang, Tsinghua University, China
14. Analysis of science and technology reporting in the South African media: Carine van Rooyen, University of Stellenbosch, South Africa

18:00 - 19:00

British Council Reception and poster viewing

20:30

PCST Committee meeting

6 December 2002, Friday

Plenary Session 2

Theme: Science and art

Room: LT 1

Chair: Adi Paterson, Department of Science and Technology, South Africa

08:30 - 09:15 Dan Dare at the Cosmos Ballroom - Contemporary art takes on science: Siân Ede, Gulbenkian Foundation, UK

09:15 - 09:45 New ways of taking science to people: Frank Burnet and Ben Johnson, University of West England, UK

09:45 - 10:15 Communicating science through visual art: Eric Heller, Harvard University, USA

10:15 - 10:45 Communicating with the public through symposia and other events on science and the arts: Brian Schwartz, The Graduate Centre of the City University of New York, USA

Parallel Session 19

Theme: Networking and collaboration

11:00 - 13:00

Room: LT 1

Paper presentation

Chair: Paola Catapano, CERN, Switzerland

- EUSCEA: A quantum leap for European science communication: Mikkel Bohm, Danish Science Communication, Denmark
- Collaboration creates the difference: Peter Burke, Foundation for Research, Science and Technology, New Zealand
- Physics without borders - A global model for physics communication: Judith Jackson, Fermilab, USA
- Promoting science awareness in the Pacific - The creation of the Pacific Science Communication Network: Roderick Lamberts, The Australian National University, Australia

Parallel Session 20

Theme: Science communication and health

11:00 - 13:00

Room: LT 2

Paper presentation

Chair: Charleen Daries, Medical Research Council, South Africa

- 'In Cipro we trust' - *Bacillus anthracis* in the United States: Andrew Pleasant, Cornell University, USA
- Communicating about radiation: Problems with complex science, distrust and journalistic constraints: Sharon Friedman, Lehigh University, USA
- Risk estimation in rural social networks - The BSE case: opinion making in a community in northern Germany: Markus Lehmkuhl, Free University of Berlin, Germany
- Social engagement with health research - An outcome based assessment approach: Shyama Kuruvilla, World Health Organisation, Switzerland, Andrew Pleasant and Bruce Lewenstein, Cornell University, USA

Parallel Session 21

Theme: Environmental communication (B)

11:00 - 13:00

Room: LT 3

Panel discussion

Chair: Mike Bruton, MTN ScienCentres, South Africa

- Communicating the Coelacanth Initiative: Margot Collett, South African Institute for Aquatic Biodiversity (SAIAB), South Africa
- Hot at the South Pole? Discover the adventure of polar and marine research: Margarete Pauls, Alfred-Wegener-Institut für Polar- und Meeresforschung, Germany
- The evolution of state of rivers reporting South Africa: Wilma Strydom, Ernita van Wyk, Gillian Maree and Tinyiko Maluleke, CSIR, South Africa
- Science @ Environment Canada: Paul Hempel, Environment Canada

Parallel Session 22

11:00 - 13:00
Room: 2B
Ideas sharing session

Theme: Inspiring the young

Chair: Wendy Sadler, Science Communication Consultant, UK

- Science communication at the CSIRO: Chris Krishna-Pillay, CSIRO Education, Australia
- Science communication, public understanding versus professional careers: Hendrik Snijders, Stichting Weten, The Netherlands Foundation for Public Communication on Science and Technology
- Brighter future in mind for science education in Australia: Tony Sadler, Bright Minds Project, The University of Queensland, Australia
- Physics on the Move - Taking hands-on science to South African high schools: Jeremy Dodd, Columbia University, USA

Parallel Session 23

11:00 - 13:00
Room: 4A
Paper presentation

Theme: Conceptual developments in science communication (A)

Chair: Vladimir de Semir, Pompeu Fabra University, Spain

- Knowledge management challenges for PCST in the knowledge-based society: Pierre-Marie Fayard, University of Poitiers, France
- Engagement - A new conceptual key of PCST: Hak-Soo Kim, Sogang University, Korea
- Two cultures - an uneasy alliance between education and communication: Jeff Thomas, Centre for Science Education, The Open University, UK

Parallel Session 24

11:00 - 13:00
Room: 2A
Ideas sharing session

Theme: Communicating biotechnology and biomedical sciences

Chair: Helen Malherbe, Foundation for Education, Science and Technology, South Africa

- Development of best practice communication strategies for public awareness on biotechnology issues: Sarah Brooker, Biotechnology Australia, Australia
- Experiences in communicating biotechnology: Mary Vail, Science Education Partnership, Fred Hutchinson Cancer Research Center, Thomas DeVries, Vashon Island High School, Esther Levy, Biología Para Todos, Rachel von Roeschlaub, DNA Adventures, Inc., USA
- Does information matter? Media exposure, information and attitudes to biotechnology in the Italian public: Massimiano Bucchi, Università di Trento and Federico Neresini, Università di Padova, Italy
- Transgenic futures - Narratives of the medicine cow: Esa Väliverronen, University of Helsinki, Finland

Parallel Session 25

14:00 - 15:30
Room: 2A
Ideas sharing session

Theme: Communicating biotechnology and biomedical sciences

Chair: Jennifer Thomson, University of Cape Town, South Africa

- Evaluation of presentations to the general public with a biomedical focus: Khalipha Ramahlape and Valerie Corfield, Medical Research Council, and Francois Cilliers, University of Stellenbosch, South Africa
- Reporting contested science - Comparing media coverage of genetic explanations for sexuality and intelligence: Richard Holliman, Eileen Scanlon and Elizabeth Vidler, Open University, United Kingdom
- PubliForum - A bridge between science and society: Sergio Bellucci, Swiss Science and Technology Council, Switzerland

Parallel Session 26

14:00 - 15:30
Room: 2B
Paper presentation

Theme: Links to education

Chair: Simon John, Consultant - North West Province, South Africa

- Strategies for effective communication of environmental science to rural communities: John Odiyo and PH Omara-Ojungu, University of Venda, South Africa
- International perspective of environmental education - Applied research in the Philippines and Japan: Merle Tan, The University of the Philippines and Hiroki Fujii, Hiroshima Women's University, Japan
- Communicating science in the rural areas: Matsontso Mathebula, World Books, South Africa

Parallel Session 27

14:00 - 15:30
Room: 4A
Paper presentation

Theme: Conceptual developments in science communication (B)

Chair: Pierre-Marie Fayard, University of Poitiers, France

- What are we communicating to the SA public? Maritha Snyman, University of Pretoria, South Africa
- From the 'two cultures' towards the '(multi)cultural' paradigm in science communication: José van Dijck, University of Amsterdam, Netherlands
- Science centres in the Dutch stakeholder society: Ben Kokkeler and Theo Kemperman, Dutch Science Centres Association, Netherlands

Parallel Session 28

14:00 - 15:30
Room: LT 1
Panel discussion

Theme: Scientific uncertainty and science communication

Chair: Sharon Friedman, Lehigh University, USA

- Panel discussion led by Sharon Friedman, Lehigh University, with Sharon Dunwoody, University of Wisconsin-Madison, Julia Corbett, University of Utah, USA and Edna Einsiedel, University of Calgary, Canada

Parallel Session 29

14:00 - 15:30
Room: LT 2
Paper presentation

Theme: The changing face of science museums and centres (A)

Chair: Anusuya Chinsamay-Turan, Iziko Museums of Cape Town, South Africa

- Integrated and customized science communication - Reaching diverse audiences through diverse projects: Erik Jacquemyn, Technopolis, Belgium
- Sustainable development bridges the gap between zoos and science centres: Walter Staveloz, ECSITE, Belgium
- The Multi-Platform approach - The vision, the science, the outreach and the presentation: Terry Hutter, Exploration Place, USA

Parallel Session 30

14:00 - 15:30
Room: LT 3

Workshop

Chair: Suzanne King, People Science and Policy Ltd., UK

- Social sciences and science communication: Suzanne King, People Science and Policy Ltd., UK
Increasingly scientists need to listen to the public as well as talk to them. This workshop is an opportunity to share your experiences and ideas and to learn from others at the conference.

Parallel Session 31

16:00 - 17:30
Room: 2A
Ideas sharing

Theme: Visualising science communication

Chair: Bernard Schiele, University of Quebec, Canada

- Design and science: Birgit Mager, University of Applied Sciences in Cologne, Germany
- Exploring linkages between science and art to communicate science: Bobby Cerini, Science Year, UK
- Representing climate change futures - Developing the use of images for visual communication: Sophie Nicholson-Cole, The University of East Anglia, UK
- IKS amongst artisans in India and South Africa: Hester du Plessis and Gauha Raza, Technikon Witwatersrand, South Africa

Parallel Session 32

16:00 - 17:30
Room: LT 1
Panel discussion

Theme: Science and media research

Chair: George Claassen, Stellenbosch University, South Africa

- Science in the news - A cross-cultural study of newspapers in five European countries: Richard Holliman, The Open University, UK
- Scientific controversy in the New Zealand mass media: Laura Sessions, University of Canterbury, New Zealand
- The "public meaning" of science: Thoughts of TV viewers during science programs: Hans Peter Peters, Research Center Juelich, Germany

Parallel Session 33

16:00 - 17:30
Room: 2B

Workshop

Chair: Terry Hutter, Exploration Place, USA

- Hands-on workshop of creative, inexpensive ideas for museums and Q&A by Nell Heyen, Museum of Ancient Treasures, Shannon Maloney-Scholler, Diana Hutter and Terry Hutter, Exploration Place, USA

Parallel Session 34

16:00 - 17:30
Room: LT 2
Panel discussion

Theme: The changing face of science museums and centres (B)

Chair: Walter Staveloz, ECSITE, Belgium

- Museums and science communication: Orest Jarh, Technical Museum of Slovenia
- Science communication at the cutting edge: Is a museum the best way to showcase research to diverse audiences? Christine Cansfield-Smith, CSIRO, Australia
- Science, museums and the public: Anusuya Chinsamy-Turan, Iziko Museums of Cape Town, South Africa

Parallel Session 35

16:00 - 17:30
Room: LT 3
Paper presentation

Theme: Cultural diversity and context in science communication

Chair: Kelebogile Dilosotho, Department of Science and Technology, South Africa

- Public understanding of ethical, legal and social issues related to genomic research: Assessing communication models in intercultural contexts: Dominique Brossard, Bruce Lewenstein and Joanna Radin, Cornell University, USA
- "The DNA Detective" makes molecular biology maximally meaningful and "Food-4-Thought" caters to all: Valerie Corfield, Medical Research Council, Masha Ainslie, Western Cape Primary

Science Programme, and Francois Cilliers, University of Stellenbosch, South Africa

- Effective communication of science in a culturally diverse society: Sibusiso Manzini, Department of Science and Technology, South Africa
- Science communication in the bilateral cooperation: Denis Phakisi, Ministry of Local Government, Lesotho; BL Morolong, Institute of Extra Mural Studies, National University of Lesotho and Molisana Molisana, Maloti Development Trust, Lesotho

Parallel Session 36

16:00 - 17:30
Room: 4A
Panel discussion

Theme: Focus on scientists

Chair: Janice Limson, *Science in Africa*, South Africa

- Emerging scenario of science and technology journalism in India: Manoj Patariya, National Council for Science and Technology Communication, India
- Views of distance education science students on the social responsibility of scientists: Dürten Röhm, Nthabiseng Ogude and Marissa Rollnick, University of South Africa
- Are science students interested in science? Rolf Becker and Kirsten Lucas, University of the North, and Rudi Laugksch, University of Cape Town, South Africa
- MRC scientists and the media - Attitudes to and experiences of reporting their findings to the public: Leverne Gething, Medical Research Council, South Africa

17:30 - 18:00

Room: LT 1

Poster presentations in Lecture Theatre 1, 2 and 3

Science e-communication - media services, infant health care, e-science mags and more

15. Computer literacy in the world of business: Susanne Taylor and Johan Vorster, Technikon Witwatersrand, South Africa
16. The INFM's initiatives for the educational field and for the public awareness through multimedia instruments: Paolo Bussei, Roberto Fieschi, Marco Bianucci, Silvia Merlino, INFM- University of Parma, Italy
17. MicroWorlds - Electronic science magazine: Elizabeth Moxon and Arthur Robinson, Lawrence Berkeley National Laboratory, Berkeley, USA
18. The HSRC's Human Resources Development Data Warehouse project - Disseminating research information for government and for the public domain: Robin Naude, Arjen van Zwieten and Andrew Paterson, Human Sciences Research Council, South Africa
19. Traditional and online media - how the Internet has changed the reporting of medical news: Keiko Kandachi, University of Maryland and Newsweek Japan, USA
20. How to create a web based national media service: Tina Zethraeus, Swedish Research Council, Sweden

Room: LT 2

Learning or communication - that is the question!

21. Communication within the health sciences - An integrated approach for students: Bridget Wyrley-Birch, Peninsula Technikon/Groote Schuur Hospital, South Africa
22. Development of an environmental physics undergraduate major course: Dirk Knoesen, University of the Western Cape, South Africa
23. Mechanical technology for the classroom and for PUSET exhibitions: Jeff Bindon, Natal University, South Africa (display)
24. Project Oriented Learning as teaching methodology in the teaching of science and technology: Charlotta Coetzee, Technikon Northern Gauteng, South Africa
25. Project Oriented Learning in the Faculty of Engineering at TNG - An example: Charlotta Coetzee, Technikon Northern Gauteng, South Africa
26. Project Oriented Learning (POL) as a tool for communicating environmental chemistry in the department of chemistry, TNG:

- Corrie van der Linde and Verena Meyer, Technikon Nothern Gauteng, South Africa
27. The joy of learning - Skills vs. Challenges: Johan Benade and Mike Colley, The Big Picture, Brent Hutcheson and Philip Haas, Hands on Technologies, South Africa

Room: LT 3

Exploring cultural diversity

28. A comparison of 340 participants' performances on a compact programme of 17 science practical tasks according to their English language proficiency and geographical areas: Aydin Inal, University of Cape Town, South Africa
29. An evaluation of the drawings in a new South African textbook for science and technology: A large scale comparison of the assessment responses of different cultural groups: Keith Jacobs, University of Cape Town
30. Experiences of widowhood and beliefs about the mourning process of the Batswana people: Minrie Greeff, E Manyedi, MP Koen, Potchefstroom University, South Africa
31. Infusing science and technology from the ground up - A systematic approach applied in Lesotho: Dennis Phakisi, TechnoLed, Lesotho
32. The patient relationship and therapeutic techniques of the South Sotho traditional healer: Minrie Greeff, E Manyedi, MP Koen, Potchefstroom University, South Africa

18:00 - 18:30

Refreshments and poster viewing in foyer

7 December 2002, Saturday

Plenary Session 3

Theme: Different cultures and new challenges

Room: LT 1

Chair: Anastassios Pouris, Foundation for Education, Science and Technology, South Africa

- 09:00 - 09:30 Science communication perspectives from the African-Caribbean Network: Elizabeth Rasekoala, African-Caribbean Network for Science & Technology, UK
- 09:30 - 10:00 Science communication to rural communities - An experience from Uganda: Alex Tindimubona, Network of Ugandan Researchers and Research Users, Uganda
- 10:00 - 10:30 Rethinking the role of the information officer in S&T communication: Rick Borchelt, Whitehead Institute, MIT, USA

Parallel Session 37

Theme: Indigenous science communication

11:00 - 13:00
Room: LT 1
Paper presentation

Chairs: Peter Thomsen and Michael Duffy, Cooperative Research Centre for Aboriginal and Tropical Health, Australia

- Sharing indigenous knowledge at Questacon: Neil Hermes, Questacon, Australia
- Planting the seeds of science and technology within a Maori community: Mark Laws, Auckland University of Technology, New Zealand
- The Ashkui Project - Using cultural landscapes to link Labrador Innu knowledge and Western science: Geoff Howell, David Wilson, Environment Canada and Jack Selma, Innu Nation, Canada
- PCST and Local Wisdom (LW) - Could ICT bridge PCST and LW for the knowledge-based society? Yuwanuch Tinnaluck, NSTDA, Thailand
- Science public - Spreading the case of Elhuyar: Leire Canico Orueta, Elhuyar, Spain

Parallel Session 38

11:00 - 13:00
Room: LT 3
Ideas sharing session

Theme: Communicating science through theatre & dance

Chair: Chris Krishna-Pillay, CSIRO, Australia

- Human cloning - A soap opera as a science communication tool: Luisa Massarani, Museum of Life, and Ideu de Castro Moreira, Federal University of Rio de Janeiro, Brazil
- Using drama to communicate science: Gillian Pearson and Bridget Holligan, The Oxford Trust, UK
- Communicating ideas of science through the language of Classical Indian Dance: Tonie Stolberg, University of Birmingham, UK

Parallel Session 39

11:00 - 13:00
Room: 2A
Panel discussion

Theme: Evaluating science communication programs

Chair: Suzanne de Cheveigne, CNRS, France

- Inside the big black box - Evaluating the impact of the public visits programs in five major research laboratories in Europe: Paola Catapano, CERN, Switzerland and Giuseppe Pellegrini, Italy
- The challenges of evaluating public understanding of science events in South Africa - Paving the way for ensuring meaningful evaluations: Colleen Hughes, Foundation for Education, Science and Technology, South Africa
- Evaluating European public awareness of science initiatives - A review of the literature: Chris Edwards, The Open University, UK

Parallel Session 40

11:00 - 13:00
Room: 2B

Workshop

Chairs: Toss Gascoigne, FASTS, Australia and Jenni Metcalfe, Econnect Communication, Australia

- Training scientists to use the media effectively: Jenni Metcalfe, Econnect Communication, Australia and Toss Gascoigne, Federation of Australian Scientific and Technological Societies (FASTS), Australia

Parallel Session 41

11:00 - 13:00
Room: 4A
Workshop

Theme: 25 Ways to spot an expert

Chair: Will Rifkin, University of New South Wales, Australia

- 25 Ways to Spot an Expert - How people decide who is worth listening to: Will Rifkin, University of New South Wales, Australia

Parallel Session 42

11:00 - 13:00
Room: LT 2
Facilitated discussion

Theme: Science education

Chair: Michael Kahn, University of Cape Town, South Africa

- BMW Centers for excellence in mathematics, science and technology: Esther Langa, BMW, South Africa and Sadha Moodley, Boston University, USA
- School innovation in science - The development, education and public communication of science in Victorian schools: Jane Harvey, Department of Education and Training (Victoria), Australia
- How did the Japanese science curriculum impact on the public knowledge of science and technology: An empirical analysis of a recent survey: Kinya Shimizu, Hiroshima University, Japan
- Innovations in Australian science education: Paula Taylor, Department of Education and Training (Victoria), Australia
- On TRAC in science education: Wayne Duff-Riddell, Stellenbosch University, South Africa
- SA learners learn basic hands-on electronics as facilitated by an IT learning environment: Miranda Myburgh, Stellenbosch University,

South Africa

- What are the key elements for ensuring an effective materials awareness programme? Jane Pritchard and Caroline Baillie, UK Centre for Materials Education, Liverpool, UK

Meeting

13:30 - 14:00
Room: LT 1

Looking towards the future of PCST

Chair: Marina Joubert, Foundation for Education, Science and Technology, South Africa

- Preview of PCST-8 in Barcelona, Spain in 2004: Vladimir de Semir, Universitat Pompeu Fabra, Spain
- Announcement of host country for PCST-9 in 2006

Parallel Session 43

14:00 - 15:30
Room: LT 1

Discussion session

Chair: Bruce Lewenstein, Cornell University, USA

- Discussion session on public understanding of science and research in the developing world context led by Bruce Lewenstein, Cornell University, USA

Parallel Session 44

14:00 - 15:30
Room: LT 3

Workshop

Chair: Chris Krishna-Pillay, CSIRO Education, Australia

- Theatre in science communication: Chris Krishna-Pillay, CSIRO Education, Australia

Parallel Session 45

14:00 - 15:30
Room: LT 2

Workshop

Chair: Rick Borchelt, Whitehead Institute, Massachusetts Institute of Technology, USA, and a representative from the University of Cape Town, South Africa

- The development of science communication strategies in public institutions

Parallel Session 46

14:00 - 15:30
Room: 2B

Workshop

Chair: Lily Whiteman, Consultant, USA

- Signs of intelligible life in the scientific community - the sciences begin to embrace plain language: Lily Whiteman, USA (hands-on workshop and tips on communicating science in plain language)

Parallel Session 47

14:00 - 15:30
Room: 2A
Panel discussion

Theme: Communicating science in the savannas

Chair: Jenni Metcalfe, Econnect Communication, Australia

- The use of weather stations in science communication in the US savannas: Terry Hutter, Exploration Place, USA
- Matching western science with indigenous knowledge systems: Caroline Selepe, Technikon Northern Gauteng, South Africa
- Communicating science to diverse audiences in Australia's northern savannas - with examples of effective communication tools: Kate O'Donnell, CRC for Tropical Savanna Management, Australia



Department of Science
and Technology

4 December 2002
Cape Town, South Africa

Dear Delegates to PCST-7

PCST-7 WELCOMES YOU

It is my pleasure to welcome you to South Africa, to Cape Town and especially to the 7th International Conference on Public Communication of Science and Technology (PCST-7), held for the first time in Africa!

Since announcing the bid to host a PCST Conference in South Africa, we have been overwhelmed by the support and goodwill from the international science communication community. Your response to our "Call for Papers" has ensured a very full conference programme, where I'm sure every delegate will find presentations and workshops that they will benefit from greatly.

A record number of delegates have registered for this conference, proving that the importance of public communication of science and technology is increasingly recognized internationally and in our region.

The delegates at this conference represent more than 30 countries from around the globe, ranging from countries with a long tradition of science communication to those where a few individuals are involved in starting up activities in this field. With the emphasis on "communicating science in a diverse world", we hope to build lasting networks between science communicators in the developed and developing world.

I trust that each delegate will leave PCST-7 with newly inspired ideas, creativity, and enthusiasm, ready to tackle the unique challenges and opportunities facing science communication around the globe. We trust that PCST-7 will be a milestone in the development of science communication in southern Africa and that a strong and active network of professionals in this field will remain after the conference.

I would like to thank the following:

- The Department of Science and Technology for their sponsorship that made it possible to host this conference in South Africa
- My current employer at FES, Dr Anastassios Pouris, and my former employer at the NRF, Dr Khotso Mokhele, for their support regarding this conference
- The PCST Committee for their help in developing and finalizing the conference programme
- Deborah McTeer and her team at Conference Management Centre at UCT
- My colleagues in the science communication group at FES, especially Michelle Riedlinger who joined us from Australia to help as a volunteer since August this year
- The British Council for their contribution to speakers and the conference
- All the chairs, presenters and participating PCST delegates. You are ultimately making this conference possible!

I hope that you will all enjoy every aspect of PCST-7 and that those staying on to explore more of our beautiful country will have a wonderful time and have a safe journey home.

Marina Joubert

PCST-7 Chair & Manager: Science Communication Strategy
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PCST-7 Programme Outline

Timing	Thursday, 5 December 2002
8.30 - 10.45	<p>Plenary Session 1: Welcome and Opening (LT 1) (page 1) Chair: Dr Rob Adam</p> <p>Women Unite – Xhosa Dance Group Welcome by Conference Chair, Marina Joubert Opening address by Dr Ben Ngubane, Minister of Arts, Culture, Science and Technology, South Africa Science communication in a diverse world: Professor David King, Chief Scientific Advisor to HM Government and the Head of the Office of Science and Technology, UK Public understanding of science – Pick your favourite flavour: Alan Leshner, CEO of the American Association for the Advancement of Science (AAAS), USA</p>
10.45 - 11.00	Tea, coffee and refreshments
11.00 – 13.00	<p>Parallel sessions running concurrently (Sessions 1-6)</p> <p>Session 1: Technology A (Ideas sharing: Hyman Field: LT 1) (page 2-3) Session 2: Trends in teaching and learning (Panel discussion: Winfried Goepfert: LT 2) (page 4) Session 3: Science on the road (Ideas sharing: Fiona Barbagallo: 2B) (page 5-6) Session 4: Narrative (Paper presentation: Massimiano Bucchi: 2A) (page 6-7) Session 5: Environmental communication A (Panel discussion: Jenni Metcalfe: LT 3) (page 8) Session 6: Public perceptions and knowledge (Paper presentation: Cheng Donghong: 4A) (page 9-10)</p>
13.00 – 14.00	Lunch and networking
14.00 – 15.30	<p>Parallel sessions running concurrently (Sessions 7-12)</p> <p>Session 7: Technology B (Paper presentation: Lisbeth Fog: LT1) (page 10-11) Session 8: Dialogue A (Paper presentation: Hilda van Rooyen: LT3) (page 12) Session 9: Rural communities A (Paper presentation: Hak Soo Kim: LT2) (page 13) Session 10: Showtime at science centres (Ideas sharing: Shadrack Mahapa: 2A) (page 14) Session 11: Science-media interfaces (Ideas sharing: Toss Gascoigne: 2B) (page 15-16) Session 12: HIV/AIDS awareness (Workshop: Karen Wallace: 4A) (page 16)</p>
15.30 - 16.00	Coffee, tea and refreshments
16.00 -17.30	<p>Parallel sessions running concurrently (Sessions 13-18)</p> <p>Session 13: Dialogue B (Ideas sharing: Dexter Mahlangu: LT 3) (page 17) Session 14: Communicating astronomy (Panel discussion: Derek Fish: 2B) (page 18) Session 15: Rural communities B (Paper presentation Bruce Lewenstein: LT 2) (page 19) Session 16: Celebrating science (Ideas sharing: Ndashinga Chasakara: 2A) (page 20) Session 17: Decision makers (Paper presentation: Farouk Cassim: LT 1) (page 21-22) Session 18: HIV/AIDS communication (Paper presentation: Michelle Galloway: 4A) (page 23-24)</p>
17.30 - 18.00	<p>Poster presentation sessions – 3 concurrent sessions</p> <ul style="list-style-type: none"> • Boring science radio and other educational dilemmas (LT 1) (page 25-26) • Doing it differently: New research and methods for science communication (LT 2) (page 26-28) • From volcanic eruptions to the missionary complex – the seductive power of the media (LT 3) (page 29)
18.00 - 19.00	British Council reception and poster viewing
20.30	PCST Committee Meeting

Timing	Friday, 6 December 2002
8.30 - 10.45	<p>Plenary Session 2: Science and Art (LT 1) (page 31-32)</p> <p>Chair: Adi Paterson Dan Dare at the Cosmos Ballroom – Contemporary art takes on science: Siân Ede, Gulbenkian Foundation, UK New ways of taking science to people: Frank Burnett and Ben Johnson, University of West England, UK Communicating science through visual art: Eric Heller, Harvard University, USA Communicating with the public through symposia and other events on science and the arts: Brian Schwartz, City University, New York, USA</p>
10.45 - 11.00	Coffee, tea and refreshments
11.00 – 13.00	<p>Parallel sessions running concurrently (Sessions 19-24)</p> <p>Session 19: Networking and collaboration (Paper presentation: Paola Catapano: LT 1) (page 32-33) Session 20 Health communication (Paper presentation: Charleen Daries: LT 2) (page 34-35) Session 21: Environmental communication B (Panel discussion: Mike Bruton:, LT 3) (page 35-36) Session 22: Inspiring the young (Ideas sharing: Wendy Sadler: 2B) (page 37-38) Session 23: Conceptual developments A (Paper presentation: Vladimir de Semir: 4A) (page 38-39) Session 24: Biotech and biosciences A (Ideas sharing: Helen Malherbe: 2A) (page 40-41)</p>
13.00 – 14.00	Lunch
14.00 - 15.30	<p>Parallel sessions running concurrently (Sessions 25-30)</p> <p>Session 25: Biotech and biosciences B (Ideas sharing: Jennifer Thomson: 2A) (page 42-43) Session 26: Links to education (Paper presentation: Simon John: 2B) (page 43-44) Session 27: Conceptual developments B (Paper presentation: Pierre-Marie Fayard: 4A) (page 44-45) Session 28: Scientific uncertainty (Panel discussion: Sharon Friedman: LT1) (page 45) Session 29: Science museums A (Paper presentation: Anusuya Chinsamay-Turan: LT2) (page 46) Session 30: Keys to engagement (Workshop: Suzanne King: LT3) (page 47)</p>
15.30 - 16.00	Tea, coffee and refreshments
16.00 -17.30	<p>Parallel sessions running concurrently (Sessions 31-36)</p> <p>Session 31: Visualising communication (Ideas sharing: Bernard Schiele: 2A) (page 47-48) Session 32: Media research (Panel discussion: George Claassen: LT1) (page 49-50) Session 33: Museums – creative ideas (Workshop: Terry Hutter: 2B) (page 50) Session 34: Science museums B (Panel discussion: Walter Staveloz: LT2) (page 50-51) Session 35: Cultural diversity (Paper presentation: Kelebogile Dilotsolthe: LT3) (page 52-53) Session 36: Focus on scientists (Panel discussion: Janice Limson: 4A) (page 54-55)</p>
17.30 - 18.00	<p>Poster presentations – 3 concurrent sessions</p> <ul style="list-style-type: none"> • Science e-communication – media services, infant health care, e-science mags and more (LT1) (page 55-57) • Learning or communication – that is the question! (LT2) (page 57-59) • Exploring cultural diversity (LT3) (page 59-61)
18.00 - 18.30	Refreshments and poster viewing
20.00	Conference Dinner at Marco's African Place and SA Science Lens Awards

Timing	Saturday, 7 December 2002
9.00 - 10.30	<p>Plenary Session 3: Different cultures and new challenges (page 62-63)</p> <p>Chair: Dr Anastassios Pouris (LT 1) Science communication perspectives from the African-Caribbean Network: Elizabeth Rasekoala, African-Caribbean Network, UK Science communication to rural communities – An experience from Uganda: Alex Tindimubona, Network of Ugandan Researchers and Research Users, Uganda Rethinking the role of the information officer in S&T communication: Rick Borchelt, Whitehead Institute, MIT, USA</p>
10.30 - 11.00	Coffee, Tea and Refreshments (viewing of posters presentations)
11.00 – 13.00	<p>Parallel sessions running concurrently (Sessions 37-42)</p> <p>Session 37: Indigenous Science Com (Paper presentation: Peter Thomsen and Michael Duffy: LT 1) (page 63-65) Session 38: Theatre and dance (Ideas sharing: Chris Krishna-Pillay: LT 3) (page 65-66) Session 39: Evaluation (Panel discussion: Suzanne de Chevene: 2A) (page 66-67) Session 40: Media skills (Workshop: Jenni Metcalfe and Toss Gascoigne: 2B) (page 68) Session 41: Spotting experts (Workshop: Will Rifkin: 4A) (page 68) Session 42: Science education (Facilitated discussion: Michal Kahn: LT 2) (page 69-70)</p>
13.00 – 13.30	Lunch
13.30 – 14.00	Future of PCST (Chair: Marina Joubert, LT 1)
14.00 – 15.30	<p>Parallel sessions running concurrently (Sessions 43-47)</p> <p>Session 43: Developing world communication (Facilitated discussion: Bruce Lewenstein: LT1) (page 71) Session 44: Science Theatre (Workshop: Chris Krishna-Pillay: LT3) (page 72) Session 45: S&T communication strategy (Workshop: Rick Borchelt and UCT: LT2) (page 72-73) Session 46: Embracing plain language (Workshop: Lily Whiteman: 2B) (Page 73) Session 47: Communicating in the savannas (Panel discussion: Jenni Metcalfe: 2A) (page 73-74)</p>
15.30 - 15.45	Coffee, tea and refreshments
16.00	Penguins tour to Boulders Beach, Simons Town. Busses leaving Kramer Building (must book!)

ABSTRACTS

5 December 2002, Thursday

Kramer building, Middle Campus of the University of Cape Town

07:30 - 08:30 Final registration

Plenary Session 1: Opening Session

Room: LT 1

Chair: Dr Rob Adam, Department of Science and Technology, South Africa

08:30 - 09:00

Women Unite - Xhosa Dance Group

09:00 - 09:15

Welcome by Conference Chair, Marina Joubert

09:15 - 09:30

Opening address by Dr Ben Ngubane, Minister of Arts, Culture, Science and Technology, South Africa

09:30 - 10:10

Science communication in a diverse world: Professor David King, Chief Scientific Adviser to HM Government and the Head of the Office of Science and Technology, United Kingdom

10:10 - 10:45

Public understanding of science - pick your favourite flavour: Dr Alan Leshner, CEO of the American Association for the Advancement of Science (AAAS). USA

NB: No abstracts are supplied for Plenary Session 1

10:45 - 11:00



Coffee, tea & refreshments

Parallel Sessions 1-6 are run concurrently

Parallel Session 1

Theme: Using technology to communicate science (A)

11:00 - 13:00

Room: LT1

Ideas sharing session

Chair: Hyman Field, National Science Foundation, USA

The Why Files as a laboratory for studying the role of the World Wide Web in public understanding of science: Sharon Dunwoody, University of Wisconsin-Madison and William Eveland, Ohio State University, USA

In a series of studies spanning some seven years, a team of researchers at the University of Wisconsin-Madison has used a science website, The Why Files (<http://whyfiles.org>), as a laboratory to explore a variety of questions about how individuals use the World Wide Web (www) to learn about science. The Why Files is an award-winning site that provides the "science behind the news." This presentation will summarize some of the results of this programmatic research. The studies have included:

- Surveys of frequent users of The Why Files at two time points in order to study changes in demographics of individuals who seek science information on the WWW. These surveys suggest that the WWW is "democratizing" the audience for science at a fairly slow pace.
- Audit trail analyses at two time points in order to explore changes in the ways individuals move through the site. These analyses have determined that Why Files users move through the site in a linear mode, much as they would read a magazine article.
- Think aloud studies at two time points in order to track individual coping patterns as they negotiate the site. These studies suggest that individuals are devoting less and less time to "orienting" behaviours, a good thing for those interested in learning.
- A series of experiments to compare learning on the site with learning via traditional print and to examine the ability of the WWW to nurture particular behaviours that either encourage or detract from learning. These experiments have offered a number of insights, among them that individuals' more idiosyncratic processing of web information produces learning that "looks" different from learning measured from print sources.

A web database of the European science museums, with path configurator and path search tool: Marco Bianucci, Roberto Fieschi and Silvia Merlino, INFN - University of Parma, Italy

The Italian National Institute for the Physics of Matter (INFN) coordinates and supports the research of atomic, molecular and condensed matter systems. However, they are aware of the fact that researchers can no more withdraw into an "ivory tower", but must be open to the problems of the society around them.

INFN is also actively engaged in the didactic of physics at pre-university level and in the public awareness of the scientific culture. Some of the

actions in this direction consist of producing multimedia courses, tools or facilities for teachers, students and/or people interested in science.

The INFN web-based service "Database of the European science museums, with path configurator and path search tool" is one such multimedia instrument. This service allows the visitor to automatically build a personal cultural path through the EU science museums, giving as entry key words on scientific topics of own interest or necessity. The output of this tool is not only a list of the science museums in Europe that satisfy the "query", but a multimedia guide with a professional journalistic cut.

This service will be particularly useful for teachers and students that are looking for didactic itineraries, for tourists interest in science and technology, and for science professionals looking for new sources for their work.

PCST in the knowledge based society - Bringing global and local to interact in the virtual dimension: Pierre-Marie Fayard and Tania Arboleda, Université de Poitiers, France

As for most activities worldwide involving communication processes, organisations in charge of developing processes of Public Communication of Science and Technology (PCST) have to confront the consequences of globalization and the arrival of *virtual dimension* with the Information and Communication Technologies (ICT). Science, although developed locally, is global and in order to be efficient, its mediation needs to be done locally taking into account cultural backgrounds. For surviving in this new context, PCST organisations may take advantage of local specificity and scientific human resources to propose specific ways and topics for communicating within the publics at a global level.

The *interaction inherent to virtual dimension* makes it possible for people of different cultural and knowledge backgrounds (physically dispersed) to create bonds (virtual concentration) around common shared interests, as scientific topics and issues. Are shared and common interests enough for communicating between PCST actors? Information and Communication Technologies open up various possibilities allowing *local* (cultures) to appropriate *global* (science) for its own profit. How far will PCST processes be determined by ICT? It will depend on PCST actors as 'clickers': they are the ones who give birth and maintain the life of virtual dimension.

To explore these changes and challenges, this communication will present some of the results of an international study about websites of science museums and centres developed by the Labcis

within the European consortium ISCOM (Improving Science Communication for Science Museums and Centres) animated by ECSITE (European Collaborative for Science, Innovation and Technological Exhibitions).

Mass participation experiments: reaching new audiences through internet based experiments: Jill Nelson, British Association (the BA), UK

Lots of people, young and old, like finding things out whether or not they regard that as science. Involving people in the process of scientific experimentation can be a powerful way of engaging them with science. Devising experiments that are scientifically meaningful, operate outside the confines of the lab, that can deal with data collected by non-specialists is – to say the least – challenging. But the potential impact of mass experiments is huge.

The BA has been involved in a number of mass participation experiments. But it was not until the internet was widely accessible to the target audience that the experiments really started to take off.

Walking with Woodlice (a UK biodiversity survey of woodlice run by The Natural History Museum and launched in association with the BA) and LaughLab (an investigation into the psychology of humour run with the University of Hertfordshire) are both successful examples of this genre in terms of the quality and quantity of the data collected and in effective feedback to the contributors. Both were designed using the web for two reasons. The web is the only realistic means of collecting and collating the vast amounts of data necessary for the experiments to be useful. And the web is the most cost effective in terms of its potential for engaging many people. Careful attention was paid to the design and content of the websites. But how do you get people to go and look at your website? Is there anybody out there?

Drawing on several examples, but concentrating on LaughLab, we will show how millions of people took part in the largest scientific experiment in the world to find the world's funniest joke and critically assess its scientific validity.

The Internet as a tool - *Science in Africa* showcasing African science: Janice Limson, *Science in Africa*, South Africa

In order to make the transition from a third to first world attitude towards science, we need to take ownership of African science. A positive impact on the national psyche can be achieved through better reporting of excellence in African science and African scientists through the Internet, print, television and radio media. Providing meaningful, relevant and understandable information and showcasing those African role models in science can change perceptions, can flip the switch.

Success requires a change in attitude from scientists, university and company marketing divisions and journalists. Where does the Internet fit in? What is the role of the Internet in the public understanding of science? In this presentation Dr Janice Limson, a scientist, draws on experience as founder and editor-in-chief of *Science in Africa*, Africa's first on-line science magazine (www.scienceinafrica.co.za).

Parallel Session 2

Theme: Trends in teaching and learning science communication

11:00 - 13:00

Room: LT2

Panel discussion

Chair: Winfried Goepfert, Free University of Berlin, Germany

Sharing expertise: The European Network of Science Communication Teachers (ENSCOT): Jeff Thomas, Centre for Science Education, The Open University, UK

The European Network of Science Communication Teachers (ENSCOT) was established in early 2000, with the support of European Union funding. It will provide a flexible *workshop* that addresses the diverse needs of EU based scientists for training in different forms of communication and a *module* comprising written materials that would be used by EU-based teachers responsible for delivering science communication courses. The paper looks (with a sometimes critical eye) at the philosophy underpinning the establishment of ENSCOT and the way in which it has developed its three-year production period.

A major aim of ENSCOT is to provide a unique European dimension to key issues, tailoring our approach to respond to what we perceive as an increasing interest throughout the EU in teaching science communication.

The paper looks at the extent to which science communication straddles the national boundaries of the European Union and asks whether cultural diversity has proved a help or a hindrance to the process of identifying a common core of good practice.

The Political Initiatives module of ENSCOT is used as a focus for questions related to the 'Europeanisation' of science communication. Is there a common pattern amongst awareness-raising programmes in the EU and is there any evidence that their ambitious aims can be achieved? The paper ends by moving from an EU to a global perspective. Might ENSCOT materials and approaches have wider application? More broadly, how might science communication teachers throughout the world best use networking to share resources and ideas to support best practice?

Teaching science and technical communication online: Kenneth Friedman, Lehigh University, USA

For many years, professors of science and technical writing have struggled to find new ways to help students learn to organise and present technical information so that lay audiences can understand it. The more complex the material, the harder it is for students to write effectively because they must not only comprehend the science, but also learn multiple writing skills concurrently.

This paper describes a new web-based course that overcomes some teaching and learning hurdles while marrying science content with writing skills. Many years of teaching experience contributed to development of this approach, which encourages students to explore individual learning styles,

including both verbal and visual learning techniques, while developing writing skills.

Using the web to provide a virtual classroom of resources in science and in writing concepts, styles and techniques, the course provides a learning template within which students can write about fields of science that interest them. It also innovates by using various software applications such as Active Server Pages and a database on its website to enable students to learn from one another by sharing exercise examples.

Since the course is taught completely online, its use in distance learning could benefit students in areas where there is no formal science or technical writing instruction.

The Stanford Research Communication Program: Carolyn Gale, Stanford University, USA

The Research Communication Program at Stanford University is designed to help researchers develop new ways of communicating their ideas to a broad audience, and to help lay people understand more of what is happening in the world of academic research. The programme consists of two components, I-RITE and ISPEAK, where researchers develop brief written and oral statements of their work that are succinct and jargon-free.

I-RITE is the writing-based portion of the programme. Its goal is to provide researchers with a method to express their work, in 750 words or less, to a lay audience. The core I-RITE programme is a six-week experience, with three face-to-face meetings. Most work is completed online using a prototype peer-review system. We have a partnership with the National Communication Association and the Stanford Program in Writing and Rhetoric to provide external reviews for I-RITE participants.

I-SPEAK is the oral communication component, where researchers take their I-RITE statement and adapt it for a one-minute "elevator talk" and 15 minute presentation - again, accessible to a lay audience.

We are piloting a dissemination model by providing select I-RITE and I-SPEAK statements to educators for use in high school and university classrooms, and to Stanford undergraduates to create a University research magazine. Finally, we are testing different models to expand the I-RITE and I-SPEAK programs nationally and internationally, with select testbeds in the United States and Sweden.

11:00 - 13:00

Room: 2B

Ideas sharing session

Chair: Fiona Barbagallo, British Association (the BA), UK

Taking science to the community - The Shell Questacon Science Circus: Sharyn Errington, The Australian National University, Australia

As science centres have developed around the world, so too have outreach programmes that take science exhibits and shows into regional areas. Questacon, Australia's National Science and Technology Centre and the Australian National University have developed a unique travelling science circus that combines an outreach programme with an academic qualification, leading to a Graduate Diploma in Scientific Communication.

Australia is geographically a large country but with the major population centres around the coastal regions, particularly the eastern seaboard. As both institutions are national bodies, the outreach programme is not restricted to the local area around Canberra, but endeavours to travel to all states of the country every three years visiting schools and community centres. While touring regional areas the students also participate in the School of the Air which allows them to reach school aged children in extremely remote areas who otherwise would be unable to benefit from this programme. When possible, at least one tour each year is dedicated to remote indigenous communities. This requires considerable preparation so as to make the science relevant and appropriate for the culture of Australia's indigenous people.

Evaluations of this outreach programme have indicated that it is highly successful in taking science into Australia's regional and remote areas and provides a unique learning environment for the young science graduates who are selected for the programme.

An Aquarium Mobile Unit - A case study of communicating natural science: Russell Stevens, Two Oceans Aquarium, South Africa

The South African community is comprised of people from an extreme diversity of backgrounds, experiences and knowledge. Meaningful communication about the natural sciences is one of the greatest challenges which faces environmental educators.

The Environmental Education Centre at the Two Oceans Aquarium provides an intriguing case study of communicating natural science. The Aquarium is a privately funded institution reaching out to a wide range of visitors. International tourists, the general public, pre-school and tertiary learners visit the aquarium and in many cases become involved in our education programmes. They arrive with experiences which are multi-cultural, multi-linguistic and they enter debates from very different levels of experience and understanding. Within this range there are people who have never visited the seashore, others who regularly illegally exploit our marine resources and those who as part of their recreation appreciate the beauty and the sensitivity of the ecosystems.

In this paper the challenges experienced in communicating with this diversity of visitors will be shared. Communication methodologies that have not worked will be examined against those that have been very successful. As an example, the outreach programme utilising a mobile education unit will be used to illustrate how experiential learning facilitates the communication of the fascinations of our natural world, generating an appreciation of the intricate ecosystems in which we live. The need for ongoing re-evaluation of successful methodologies will assure that the communication strategies remain relevant and meaningful.

Mobile screening clinic uses innovative health promotion to help minorities: Richard Atkins, Skip Lockwood and Jamie Barse, National Prostate Cancer Coalition, USA

The National Prostate Cancer Coalition's one-of-a-kind mobile screening clinic travels the nation raising awareness through specific outreach to underserved minority communities by offering free screening for the disease to men; particularly to those at high risk, including African Americans who have the highest prostate cancer mortality rate in the world.

While for most men, any excuse is a good one to avoid taking care of their health, *The Drive Against Prostate Cancer* vehicle not only serves as a conduit to relay the message that early detection saves lives but creates a comfortable environment that lowers men's anxieties associated with health care.

A group psychology among men of "we're in this together" prevails inside as men who are uninsured or otherwise easily embarrassed with the procedure are put at ease with a free, quick and confidential screening. On board, men are treated to "the game of the week" on a large flatscreen television as they wait, offered snacks and are invited to email their member of Congress from NPCC's onboard satellite-linked laptops asking for more research funding to cure prostate cancer.

The Drive Against Prostate Cancer continues to be a novel use of technology to communicate science and health promotion in communities often difficult to reach through conventional methods. Countless lives have been saved in communities all over the United States including rural Louisiana and Georgia, metro Detroit and Jackson, MS – all places where prostate cancer incidence rates are astronomically higher than the rest of the nation as a whole.

Science on the highway - Taking science to the people: Makhwenke George Mvalo, Cape Technikon, South Africa

The Discovery Centre is a "virtual science centre" that has been in existence for the past ten years. Based in Cape Town, South Africa, the Discovery Centre is actively involved in communicating the public understanding of science and technology

principles to, predominantly, learners in primary and high schools. The main purpose of this paper is to present a systematic communication of science and technology through interactive exhibits in the first decade of the existence of the Discovery Centre. This will be one of the range of activities aimed at celebrating a decade of translating the Discovery Centre's mission of "putting science in the hands of the people".

Communicating "SET" to deep rural: Pack a punch by going mobile interactive: Johan van der Merwe, Discovery Centre, South Africa

The Discovery Centre based in Cape Town has designed various bus-sized interactive mobile units. Design aspects of the latest vehicle are discussed in this presentation.

To communicate science, engineering and technology (*SET*) to rural communities in a striking but cost effective way, the vehicle design is based on a number of trade-offs. The *energy budget*, for example, dictates appropriate exhibit design and requires that different energy sources can be accommodated to charge on-board batteries: grid AC, generators and solar panels. The burden of *maintaining* complicated technical systems is reduced by depending on automated microcontroller units for supervision, diagnosis and for raising alarms when required.

The *space budget* requires that both the interior and exterior of the vehicle be utilised optimally, allowing extended visitor groups to participate. All side windows are used for experiments, mini-LAN terminals are accessed in exterior compartments, and solar panels share the roof with radar and satellite antennas. The contribution of the *supervisor/tutor* is optimised by including a larger fraction of autonomous interactive exhibits, and a smaller fraction of demonstrations which require tutor involvement.

By providing explanations in *several languages*, communication with the target groups is enhanced. The *exhibits* are a mix of syllabus-related topics, cutting edge technology and items related to the *SET careers* promoted by the mobile exhibition. Detailed information can be accessed on Intranet and Internet LAN's inside the vehicle, and brochures are distributed.

Parallel Session 4

Theme: Science communication and narrative

11:00 - 13:00

Room: 2A

Paper presentation

Chair: Massimiano Bucchi, University of Trento, Italy

Science via narratives: communicating science through literary forms: Aquiles Negrete-Yankelevich, University of Bath, UK

In this work I suggest that fictional narratives can be used to communicate scientific ideas to society. My objectives were to measure the success of a literary work in communicating scientific ideas, to investigate the extent to which people can understand and remember science included in a short story compared to traditional factual texts, and to explore

the motivational dimensions of literary stories as a tool for communicating science.

A study was carried out to determine the efficacy of a collection of short stories with scientific content as means for communicating scientific ideas. Questionnaires were used to evaluate the amount of scientific information that individuals recognise, memorise or learn from the story.

The individuals in the study were able to identify and remember, in different degrees of accuracy, the

scientific information contained in the stories. Moreover, some of the participants displayed an ability to apply, and extrapolate, the information provided in them. The two groups (narrative and factual) performed differently in remembering the scientific information over the one-week period. The results suggest that narrative information lasts longer than the factual one in long term memory.

The naturalists and the popularisation of science: Ildeu de Castro Moreira, Federal University of Rio de Janeiro and Luisa Massarani, Museum of Life, Brazil

Naturalists' travels were an important process for the acquisition of information and had a significant role for the development of natural history. In their travel books, several naturalists described personal adventures and local cultures, but also gave interesting and instructive sketches of the main results of their observations and reflections. These books had a high level of acceptance in Europe at that moment. Frequently they were written in the hope of exciting an interest in several issues related to natural history, for instance, the origin of species and their geographical distribution.

One aspect less considered is the role they had as a tool for science popularization in the countries visited by the naturalist. There are few studies on the direct interaction of natural scientists with the local people. In some cases, especially where close interactions with natives were a necessary condition for the fieldwork, it occurred as an actual process of diffusion of scientific knowledge.

Under this perspective, we analysed voyage books, letters and other works of some of the most important naturalists that went to South America in the century XIX: Karl von Martius and Johann Spix, Henry Bates, Alfred Wallace and Louis Agassiz. We detected also the transmission of knowledge and skills in the inverse direction: naturalists getting information and varied knowledge from native peoples. In addition, some of them have also contributed to local science popularization activities. Louis Agassiz, for example, in 1865/66, presented public lectures in Brazil - on the Amazon and the origin of species - with women present in the lecture room for the first time. He and his wife Elizabeth made interesting comments on the Brazilian audience's behaviour.

'How is Your Stomach?' - Sharing stories as a form of science communication: Will Rifkin, Alan Morris, Briony Pavel, Jessica Bell, Vi Nguyen, Dominic Leung, Sei Nishimura, Linda Ong and Ho Thi Hien, University of New South Wales, Australia

Can stories build mutual understanding between 'experts' and the people who consult them? We have undertaken a project to test stories, but not as a way to improve clarity or technical understanding. Rather, they would build each side's view of the personal impact of the problems they share - one as client/sufferer, the other as specialist. In our test, we are gathering lay person's accounts of their stomach and digestive problems, much as Studs Terkel gathered stories about people's jobs for his classic, Working: People Talk about What They Do All Day and How They Feel about It. In our 30 interviews to date, we have heard how people have come to terms with their stomach problems, the impact on their social lives and families, and how they feel they are treated by doctors.

The research team of undergraduate science and science communication students will also collect stories from medical practitioners. The stories will concern experiences of interacting with patients who have stomach problems, from conveying an indefinite diagnosis to dealing with a lack of compliance with a treatment regime.

The conference session will be an experience in storytelling about our stomachs, observation of how it feels to have a receptive audience for such a story, and reflection on the impact of these stories on one another, on our families and friends, and on medical practitioners. Participants will also draw implications of this storytelling approach for other types of science communication, particularly forms that involve reaching a mass, public audience.

Learning how to tell the story: a workshop presentation: Peter Thomsen and Michael Duffy, Cooperative Research Centre for Aboriginal and Tropical Health, Australia

The Cooperative Research Centre for Aboriginal and Tropical Health (CRCATH), like all other CRCs in Australia, practises research transfer - applying research findings to policy, service delivery and people's behaviour.

We operate in a cross-cultural environment, which places additional demands on research transfer. We have to deal with mistrust by Aboriginal people, which is the result of their experience of being marginalised by researchers in many disciplines.

As the researched but rarely the researchers, they have not been asked to determine research priorities and they seldom get to hear what the outcomes might be.

The CRCATH practises and promotes a reform agenda of research collaboration with Aboriginal people. This also means finding ways to disseminate research findings to people who have rich oral traditions, but whose own language literacy is rare and whose literacy in English - often a third or fourth language - may be poor.

Effective dissemination is not simply a matter of finding a way to explain complex issues in plain language or using audio-visual technologies to present them. Participants from each culture must first articulate their own stories and then share each other's stories before incorporating them for the information to have meaning.

It is process of two-way learning and real communication, not just researchers telling Aboriginal people what they have found.

We will outline a number of successful projects demonstrating our understanding that research partnerships and processes are key characteristics of research and effective dissemination for cross-cultural settings.

11:00 - 13:00

Room: LT 3

Panel discussion

Chair: Jenni Metcalfe, Econnect Communication, Australia

A study of communication plans for natural resource management: Anne Leitch, CSIRO and James Everett, Queensland University of Technology, Australia

There is a plethora of communication plans developed by natural resource groups in Australia, however there has been little work done to review the effectiveness of such plans or their outcomes. This is despite anecdotal evidence that communication professionals have little confidence in the plans they develop (Michelle Riedlinger 2000, *pers.comm.*). However, like communication professionals in other fields (c.f. Pinkleton *et al* 1999, p. 85) communication professionals in natural resource management are subject to multiple internal and external forces to examine their practices and justify their activities and existence. The most significant of the external forces is the need to manage dwindling and degrading resources (Australia has many significant natural resource problems such as salinity, soil acidity, vegetation management, and degradation of air and water quality), the lack of uptake of known solutions, and the need to justify the significant investment of public funds that occurs through the development and implementation of the plans.

The purpose of this research project is to explore a sample of communication plans developed by communication professionals involved in management of natural resources and to describe the goals, objectives and communication mix proposed, and also to describe the relationships of these elements in the plans.

This study will also explore the use of this methodology as a way to evaluate the effectiveness of natural resource management communication plans to determine if this evaluation framework provides a useful way to investigate the broad aims and proposed activities of these groups.

This study will also assist with the development of an improved understanding of how natural resource management groups outline their goals, objectives and subsequently plan their activities and will contribute to an identification and development of improved practices that can be adopted by communication professionals in natural resource management.

Testing public (un)certainty of science - Media representations of global warming: Julia Corbett, Jessica Durfee, Roger Gunn, Maja Krakowjak and Jeffrey Nellerhoe, University of Utah, USA

Although numerous studies have documented the mass media's role as an important source of scientific information for the public, research is lacking that tests whether readers' assessments of scientific findings depend on the way reporters construct news stories. An experimental design tested whether adding controversy and/or context to a news story about global warming influenced readers' perceptions of its certainty. A baseline story ("control") reported a

recent scientific finding of thickening ice in Antarctica, which by itself might imply that global warming is uncertain. The "controversy" treatment included a paragraph about scientists disputing the finding. The "context" treatment said previous research had found both thickening and thinning ice but the balance of evidence supported global warming. The fourth treatment included "controversy" and "context." Respondents (N=209) were randomly assigned to read one treatment and answer a questionnaire.

Overall, there was a significant difference in readers' assessment of the certainty of global warming across treatments ($F=12.59$, $p=.00$). The "context" treatment produced the highest level of certainty about global warming and differed significantly from "control" (the lowest level of certainty) and "controversy" (the next lowest level of certainty). Combining "controversy and context" had a moderating effect. There was an interaction effect between treatment and environmental ideology upon certainty ($F=1.64$, $p=.03$) and a correlation between environmental ideology and prior certainty about global warming ($F=.35$, $p=.01$), suggesting that those with stronger environmental sensibilities were less swayed by the treatments.

Reaching out - Marine science and resource management training for rural coastal communities: Judy Mann-Lang, Sea World Education Centre, South Africa

Changes in the South African government's approach to the utilisation of marine and coastal resources (fish, mussels, crabs, etc.) in South Africa have meant that many previously marginalised, rural communities now have legal access to coastal resources. Recent policies make provision for a separate category of subsistence marine resource users and stress the involvement of local communities in co-management structures. However, due to the legacy of the past, these communities have had little or no involvement in marine resource management and have had no access to marine science. Recognising this, the policies emphasise the need for capacity building in marine science and resource management. An understanding of fundamental concepts in marine science is essential if rural communities are to be able to actively participate in the management of marine resources.

Recognising this need, in 1997, the Sea World Education Centre pioneered the development of capacity building courses on the sustainable utilisation of marine resources for rural communities. Since then, the Education Centre has worked with a wide variety of different coastal communities and has gained considerable experience in the field of marine science and resource management training. A wide variety of innovative teaching techniques have been designed to teach complex scientific topics simply and easily to a range of different rural communities. A number of lessons have been learnt and these will help to inform future capacity building opportunities.

11:00 - 13:00

Room: 4A

Paper presentation

Chair: Cheng Donghong, Chinese Academy of Science and Technology, China

Questions the public asks of science: Suzanne de Cheveigne, CNRS, France

What does the public expect of scientists today? To what questions does it want answers? Is it looking for an understanding of Nature and of the Universe? Or are more down-to-earth questions about the environment or about the human body and its malfunctions considered more important? And is the public interested in the way research is organised, who funds it and how its activity is socially controlled? Or is it only interested in the practical consequences of science and technology?

To answer such questions, the Centre National de la Recherche Française (CNRS), the French national research organisation, has asked us to carry out a number of studies over the past couple of years: a qualitative study, by interview, of public perceptions of present day science, which allowed us to define a number of characteristic questions. These were then put into a survey (run by D. Boy, Cevipof), providing a quantitative measure of the relative importance of each one. Scientists belonging to the CNRS were then interviewed to determine how prepared they were to answer such questions.

Finally, and most recently, scientific journalists were questioned about their vision of scientific communication and of the CNRS as a source. The principal results of these studies will be presented, and we shall show that the situation is evolving, that public demands are changing and that scientists are not always fully prepared to satisfy them.

Science and society in Europe: Michel Claessens, European Commission, Brussels

The European Commission published in December 2001 the results of a major survey on "Europeans, science and technology". The presentation will consist of two parts:

- Main messages and findings of the survey and in particular results related to public understanding of science
- Measures currently implemented and proposed by the European Commission to bridge the gap between science and society.

The survey ("Eurobarometer") offers a unique insight into how European citizens view science and technology. It shows in particular that:

- Two thirds of participants in the survey think that they are badly informed on science and technology although 45.3% declare that they are interested in the topics;
- Science remains a very positive value in European societies; citizens expect a lot from scientific progress and want political decisions to rely more on experts' advice;
- The majority of Europeans call for more control of research activities particularly in

terms of consumer protection, employment and social issues, energy and science;

- Although crises like BSE can strengthen the image and importance of research, scientists have an ambiguous image, especially as regards their assumed responsibility for the misuse of scientific discoveries by other people;
- There is large support for European research, in particular the call for making research become a strong positive factor for EU enlargement, so that the scientific potential of both the candidate countries and the current Member States will benefit;
- Finally, the survey shows that, as compared to 1992, when the last survey was carried out, the level of Europeans' scientific literacy is stable.

The second part of the presentation will provide an overview of the measures which the European Commission plans to implement with the objective of raising the awareness and knowledge of Europe's citizens for scientific issues. These measures are part of a broader action plan, "Science and society", which the European Commission adopted in December 2001 and which foresees among others actions regarding:

- Promotion of scientific education and culture;
- Bringing scientific policy closer to citizens;
- A responsible science at the heart of policy making.

Public understanding of science and technology in Japan: Masamichi Ishii, National Institute of Science and Technology Policy, Japan

The National Institute of Science and Technology Policy of the Japanese government conducted a survey in February to March of 2001 about public attitudes towards and understanding of science and technology. The purpose of this survey was to collect data on the level of public understanding of science and technology and to search for measures to improve the understanding. The number of responded samples was 2,146.

This paper has two parts. The first part provides an international comparison. The results of our survey show that Japan's public understanding of basic sciences is relatively low compared to a significant number of European countries and the United States.

In the second part, the relation between kinds of groups and the level of understanding of science and technology will be analysed. There are many ways to group these respondents, including gender, age, and education. Analysis will also be conducted on the influence of media over public understanding of science and technology.

These analyses are expected to be useful and informative to develop policy for public understanding

of science and technology not only for Japan, but also other nations.

Current scientific literacy of Chinese citizens - Findings from 2001 National Survey: Li Daguang, China Research Institute for Science Popularization

There have been great changes and developments in the latest study, compared with previous surveys.

Scientific literacy of Chinese adult citizens (18-69) has jumped to 1.4 percent, an increase of 1.2 percent over the past five years since 1996. The survey also reflects that the gap between Chinese males and females and between urban and rural residents, as well as among different occupations, has remained quite large. Those with basic scientific literacy accounted for 1.7 percent of the male population while that for females accounted for is only 0.98 percent. 3.1 percent of Chinese urban residents met the criteria, eight times the number of rural residents. The regional ratio ranged from 2.3 percent of more developed eastern China to 0.65 percent in poorer western regions. Among different occupations, students possess the highest level of scientific literacy, with a rate of 11.42 percent, and agricultural workers, such as farmers and fishermen, and the unemployed ranked at the bottom of the list, with a ratio of only 0.04 percent.

The investigation has also indicated that the mass media serve as a main channel for the public to get sci-tech information, and a key factor that influences them in acquiring the sci-tech attainment. The channels from which the public obtains sci-tech information are as follows: TV provides 82.8 percent, newspaper 52.2 percent, and conversation 20.2 percent. These are followed by broadcasting that provides 10.9 percent, and books 5.2 percent and last the Internet, accounting for only 1.6 percent.

13:00 - 14:00



Lunch and networking

**Parallel Sessions 7-12
are run concurrently**

Parallel Session 7

Theme: Using technology to communicate science (B)

14:00 - 15:30

Room: LT 1

Paper presentation

Chair: Lisbeth Fog, Colombian Association of Science Journalism, Colombia

Communicating science in cyberspace: Margaret Corbit, Cornell University, USA

As part of its outreach mission, the Cornell Theory Center (CTC), Cornell University's highperformance computing and research centre, explores the use of online digital media for communicating science to K-12 and general audiences. These virtual worlds take advantage of advances in technology driven by the gaming and home-computer sectors to enable the

design of fun and social environments online for science communication, as well as for building learning communities. Specifically, CTC has been extending emerging technologies related online multiuser virtual environments, or virtual worlds, for the implementation of a virtual hand-on science museum (SciCentr) and a complementary science fair space (SciFair). Exhibits in SciCentr feature molecular modeling, genetics, wave science, and fracture mechanics and are created by teams of

undergraduate students at Cornell and the occasional high school intern. While these exhibits are live online all the time, it is likely that they are best experienced through guided tours.

In addition to on-campus programmes for science outreach and Cornell Cooperative Extension Youth Development, CTC is establishing relationships with schools and community programmes to enable students to receive tours of these spaces from Cornell students and, when appropriate, to proceed to develop their own science fair (SciFair) content for the community through after school programmes at their remote locations. The first SciFair team was comprised of teens at a rural high school in Upstate New York. Teams from urban Richmond, Virginia joined in fall 2002. Ongoing evaluation is conducted in collaboration with William Winn from the University of Washington's College of Education and Human Interface Technology Lab (HITLab).

Webcasting for scientific communication: Silvano de Gennaro and Paola Catapano, CERN, Switzerland

Webcasting is rapidly becoming a powerful communication channel, capable of reaching niche audiences world-wide. Interaction, multimedia and archival features make it even more effective than television for scientific communication. Relying solely on Internet infrastructure, webcasts can reach audiences anywhere on the planet, making this the most effective audiovisual media to convey information, education and communication into developing countries. Starting from the multi-awarded CERN webcast project "LIVEfromCERN", the talk will present the state of the art of this technology and illustrate possible evolution scenarios, which are likely to revolutionize the future of audiovisual Media and to contribute substantially to the World's development.

Reading and understanding a science report through paper and hypertext - an experimental study: Mônica Macedo-Rouet, Methodist University of São Paulo, Brazil, Jean-François Rouet, CNRS and University of Poitiers, Pierre-Marie Fayard, University of Poitiers, France and Isaac Epstein, Methodist University of São Paulo, Brazil

Under the perspective that science communication will increasingly be done through the Internet, it is important to understand how users read and understand information in this medium. This study focuses on the Web and it examines the effects of presenting a document set (a popular science magazine report) in two different formats: print and hypertext. An experimental protocol was used to assess readers' performance in terms of comprehension of the material, perception of cognitive load, satisfaction and attention to the documents. Hypertext reading lead to poorer comprehension of complementary documents and higher perceived effort to read materials such as tables and graphics. On the other hand, satisfaction with the materials was generally high among all users, indicating that there is no prior rejection of the technology. The present data offer support for theories of disorientation and cognitive load in learning from hypermedia. We suggest that efficient hypertexts may be built, but in order to do so, authors will have to improve text legibility in the electronic medium.

14:00 - 15:30

Room: LT 3

Paper presentation

Chair: Hilda van Rooyen, National Research Foundation, South Africa

Should we continue to pursue dialogue? Fiona Barbagallo, British Association (the BA), UK

As the focus of UK science communication moves from didactic to dialogue, science communication activities and programmes need to be designed with the involvement of those taking part in the dialogue and with clear guidelines in mind to facilitate the exchange of mutual understanding. Only then will dialogue have an impact on both lay citizens and the scientific community.

The BA has developed a number of programmes that provide avenues for dialogue to occur. This paper draws on three BA examples that promote the mutual exchange of understandings. Approximately once a month we hold a *sciBAR* in a London wine bar where scientists mingle with other visitors (typically in their 20s and 30s) and discuss an issue of the day. In the evenings of the BA Festival of Science, at the *x-change*, festival-goers and presenters are able to discuss topics raised during the days' sessions in a social atmosphere.

The *media fellowships scheme* enables practicing scientists and journalists to exchange information and ideas over a period of 3-8 weeks. Our aim is to develop new programmes where the outcomes of dialogue can feed into the scientific community to increase the level of scientists' awareness of public views and opinions and highlight other ways of addressing issues that involve science.

The Wellcome Trust and public engagement with bioscience: Sarah Bronsdon, The Wellcome Trust, UK

The Wellcome Trust is an independent research-funding charity, established in 1936, with the mission of fostering and promoting research to improve human and animal health. It spends approximately £600 million annually on funding biomedical research, principally in the areas of genetics and neuroscience. As one of its four aims, the Trust is committed to public engagement through the stimulation of informed dialogue.

The Medicine in Society work at the Trust combines a grant funding programme with a complementary programme of commissioned work. Although we do commission some direct work with target audiences, we recognise that we have a greater impact and reach by working closely with policy makers and mediator organisations.

This paper uses an example of the latter – we recognised that working in partnership with the BBC would enable a far wider audience for discussion of issues around genetics and health. We commissioned a programme of regional debates around the UK linking to the BBC's Gene Stories season of television and radio programming. The debates themselves were deliberately structured to move away from traditional models of 'experts' preaching to an 'ignorant' public.

Opportunities for considering personal experience were built in alongside ethical and scientific perspectives. While fewer than a thousand people attended the debates themselves, we estimate that ¾ million people were reached through the follow-up discussions on local TV and radio.

Public communication of S & T - German and European Perspectives: Ekkehard Winter, Stifterverband, Germany and Euroscience Association

There has been much confusion as to goals and target groups of the initiative "Science in Dialogue" that started in Germany in 1999. On the other hand, this vagueness has left much room for experiments in science communication and dialogue which can now be analysed for further action. The paper will examine examples from the following areas: 1) The rapid development of informal science education at the interface of universities and schools focusing on the research process rather than on scientific facts alone; 2) the "science in fiction" format reaching broad audiences and engaging them in dialogue; 3) "responsive mode" projects, i.e. listening to the needs of the citizen and leading to more public engagement in scientific issues.

Finding a proper European approach to science communication appears to be hopeless, given the great variety of national cultures and languages in Europe. The recently founded grass-roots organisation Euroscience, however, is trying to achieve just that. A big European meeting, the Euroscience Open Forum 2004 (ESOF 2004) is being organised to present front line science, to enhance scientific awareness and to foster a debate on science and society.

14:00 - 15:30

Room: LT 2

Paper presentation

Chair: Hak Soo Kim, Sogang University, South Korea

Communicating science to rural communities requires boundary crossing: Hester Meyer, University of South Africa, South Africa

Science communication to rural communities is understood as provision at grassroots level of information about scientific inventions that originated elsewhere. The emphasis is on the manner in which the information process should be approached when boundaries between the rural communities and the outside world are crossed.

The impact of the oral tradition in rural communities and how it affects rural people's information handling skills is pointed out. Although rural people are also exposed to information from the modern information resource system, they are still heavily reliant on the indigenous knowledge system (IKS). Understanding how communication mechanisms of the IKS are used in rural communities seems to be imperative for communicating science to rural communities.

By using IKS communication mechanisms to cross boundaries between scientists and rural people, messages from the outside world need to be transformed to a level acceptable to users in rural communities. This view is supported by insights obtained from the literature and a case study where communication mechanisms of the IKS were harnessed to make information on maize growing practices understandable to people who were basically non literate. Introduction of the Merger model depicts how information from both the user's information resource system and that of the outside world can be utilised by applying the communication mechanisms of the IKS. Importance of intermediary involvement and user participation in communicating science to rural communities is emphasised. A need for properly trained field workers is pointed out and a list of requirements to be included in training is suggested.

Project oriented learning as a communication tool of environmental sciences in the community of Soshanguve - a case study: Verena Meyer, Technikon Northern Gauteng, South Africa

A project is explained *inter alia* as "a piece of work that is organised carefully and designed to achieve a particular aim" (Oxford Advanced Learners Dictionary, 1995:926). The modern workplace demands proficiency in team efforts that involve communication, planning, management, and social skills. By engaging in projects that are meaningful in learning how to interact and communicate with others in worthwhile tasks, students learn skills and knowledge with higher transfer both to community and work settings (Kearsly and Schneiderman, 2001).

The foundation of Project Oriented Learning (POL) is communication between group members, tutors and the community. This paper will present the results of a case study where POL was used to communicate

issues related to water and sanitation (environmental sciences) to the Soshanguve community.

Improving communication between farmers and scientists: Belinda Clarke, Norwich Research Park Science, UK

In our diverse world, the level of understanding of the challenges facing agriculturalists ranges from excellent (in many developing countries), to non-existent (in urban Western communities). For scientists developing new agricultural innovation, this understanding often tends towards the latter end of the scale. Similarly, many farmers have little appreciation of the potential and limitations of scientific research, nor of the process of investigation and analysis. Yet I would argue that both farmers and scientists would benefit from better communication opportunities, particularly in areas of agricultural innovation that might require new methods of husbandry. Trust in the new technology, as well as belief that the new system will be managed properly is crucial for farmers and scientists to help bring new innovations to the field.

In this session I hope to explore the different attitudes of scientists and farmers towards each other in different countries, as well as to compare the various communication mechanisms used to exchange information about new farm-based technologies. In particular the role of the extension provider as a science communicator in different countries, as well as the influence of the media could be addressed. I hope also to discuss the wider implication of stakeholder consultation in the prioritising of research agendas.

14:00 - 15:30

Room: 2A

Ideas sharing session

Chair: Shadrack Mahapa, University of the North, South Africa

Science - The magic of publicly communicating and inspiring students to study it: Robert Friedhoffer, The Graduate Center of the City University of New York, USA

Science and math teachers compete with the hyper-reality of the everyday world to get the attention of the public at large and students in particular. The teacher and the material presented must at the very least be as interesting as video games, TV shows, Internet chat rooms, movies, radio, music of all genres, etc. In addition, the material presented must also have content. The presentation of scientific principles under the guise of magic tricks proves to be a compelling method for getting the attention of the too often disinterested audiences, both rural and urban.

Science mysteries, presented as amusements, piques the interest of many, age being no barrier. Science can seem mystical and is often poorly understood by the average, non-science-literate person. Our approach has been shown to draw their interest through entertainment values, and allows them to construct their own knowledge of science in a visceral sense. Students, teachers and the public always want to know, "how does it work?" or "how do you do that?"

General concept:

- A "(science-based) magic trick (experiment)" is demonstrated - frequently with audience participation
- The demonstration is discussed, analysed and deconstructed by the students and the teacher/performer/lecturer
- The demonstration is always based upon a scientific (physics, biology, chemistry, psychology) or mathematical principle.
- (topology, algebra, binary code, arithmetic, statistics, etc.)
- In almost all cases, hands on learning by the audience members takes place
- This approach to teaching and learning allows science to be taught using no-cost/low cost equipment
- The students are inspired and gain a visceral understanding of the scientific principles.

Science "Magic" Shows - Communicating science in an unforgettable way: Derek Fish, Unizul Science Centre, South Africa

An ancient saying tells us:

"Tell me, I forget,

Show me, I remember,

Involve me, I understand."

While a hands-on experience of science is clearly the most memorable, enthralling Science "Magic" Shows have long been a popular means for communicating science to people of all ages and cultures. Mr. Wizard became a household name in America, and Julius Sumner Miller toured the world with his physics

demonstrations. Within the context of an interactive science centre, such a science show provides a unforgettable event for all visitors, and a cost-effective way to provide a new experience with each visit. Where this is followed by hands-on activity, it provides a lasting experience for visitors of all ages.

This presentation will look at some of the different trends in the development of science education (e.g. the continental vs. the Anglo-American or "heuristic" tradition, the constructivist approach etc.) and how these are reflected in different methods of science communication within the context of a science centre. The role of "gee-whizz" science shows will be highlighted and examples shown of how to make these shows both exciting and educational.

The presenter, Derek Fish, has run a science centre for over 10 years, and has visited over 40 centres around the world. He is well known for his science demonstrations, having won competitions in South Africa and in the UK. The talk will be illustrated with many examples of exciting demonstrations performed with simple materials.

From Cardiff to Cape Town: Intercultural experiences with informal science learning: Wendy Sadler, Science Communication Consultant, UK

CommQuest is a partnership project between the Commonwealth Science Council and Techniquet Science Discovery centre in Cardiff. The project was launched in 1999 and has since formed the basis of a touring exhibition in South Africa, an exhibit building workshop in Botswana and a science communication workshop in Brisbane.

Following my work with the CommQuest exhibition at three venues in South Africa I conducted a follow-up study that examined the reactions and behaviour of visitors to our exhibition and programmes. This session will outline how the CommQuest exhibition was utilised by South African visitors. Using personal experiences, observations and qualitative data, I found a number of differences in the way that these informal learning experiences were used. The results revealed many interesting cultural differences that ideally should be considered when designing informal learning experiences in the future.

From this study (and the other case studies hopefully discussed in this session) we can emphasise the importance of constant awareness of the different styles of personal learning associated with different cultures. The results also give us some insights of how to broaden the style of your exhibits and programmes so as not to exclude or isolate certain cultures. In addition they suggest that an awareness of working cross-culturally can enrich the experiences of both the designers and the learners who are involved in communicating science activities.

14:00 - 15:30

Room: 2B

Ideas sharing session

Chair: Toss Gascoigne, FASTS, Australia

Mass Media Fellowship Program - An innovative way to communicate science: Judy Kass, American Association for the Advancement of Science (AAAS), USA

The Mass Media Science and Engineering Fellows Program, administered by the American Association for the Advancement of Science (AAAS) and supported by a collection of science and media funding sources, is designed to further public understanding of science and technology by getting more accurate coverage of science and technology in the news. Post-doctoral, graduate and undergraduate (seniors) students from a variety of scientific disciplines are given the opportunity to serve as reporters, researchers, and production assistants in mass media organisations nationwide. Fellows collaborate with media professionals at radio and television stations, newspapers and magazines. Current host-sites include National Public Radio (NPR), CNN, the Chicago Tribune and Newsweek.

During the 10-week programme, fellows have the opportunity to observe and participate in the process by which events and ideas become news, improve their communication skills by learning to describe complex technical subjects in a manner understandable to the public, and increase their understanding of editorial decision making and the way in which information is effectively disseminated. The programme's impact extends beyond the 10 weeks Fellows spend at their sites.

Over the fellowship's 28-year history, fifty percent of the over 400 alumni have continued in careers in science journalism. As a result, the media gains a fresh perspective that scientists can lend to a complex story and the public benefits from the enhanced coverage of science and technology issues in the mass media. Others who continue in science do so with an enhanced understanding of the role of media and the importance of communicating ideas and advances in science and technology.

Building capacity in science radio journalism in South Africa: Kelebogile Dilotsotlhe, Department of Science and Technology, South Africa

In general, science reporting in all media forms in South Africa has been meager. Some improvement has recently been evident with the media hype around Mark Shuttleworth's trip as the first African in Space (in the time leading up to the event, during April 2002 and thereafter). The vast resources available for the Shuttleworth media campaign ensured that virtually all South Africans were exposed to information about this important event. However, in the face of limited resources, other approaches are necessary. To reach, engage, educate and influence rural and in many instances, peri-urban communities in South Africa about educational issues, the medium of radio has proved to be an extremely powerful tool. This communication medium has to date not been adequately exploited

due to the lack of capacity in science radio journalism in the country. In response to this, the South African Department of Arts, Culture, Science and Technology (DACST) instituted mechanisms to address this skills deficit.

During 2001 DACST, in collaboration with the American Association for the Advancement of Science (AAAS), initiated a unique three-year programme to support South African journalists and science professionals to undertake internships in science radio journalism at the AAAS.

During the internship, fellows with a journalism background would learn how to research, write and produce science stories to the highest industry standards, while those from the science community would learn how to effectively communicate with the media. In addition to "classroom based learning" and carrying out their own assignments in science journalism, fellows also have the opportunity of visiting other centres of science journalism in the Washington D.C. area and meeting with experts. In other words, fellows undergo intensive and rigorous training, building a broad base of both content knowledge and experience.

This paper examines the history and initiation of the project, the implementation challenges faced by DACST, and the lessons learnt in undertaking such as capacity building venture. Some of the successes of the programme are examined and recommendations are made for not only improving the outcomes of this project, but for increasing science radio journalism more broadly as a means of enhancing the public understanding of science and technology in South Africa.

Television weathercasters as science communicators - An examination of the advantages of accessing these specialists and explaining why a gender gap persists: Kris Wilson, University of Texas, USA

An important but often overlooked aspect of science communication is the potential role television weathercasters may perform. In some cases these specialists may be the ONLY source of scientific information that viewers encounter on a regular basis. Audience research indicates that the weathercast is the most-watched part of the local newscast and the primary reason people choose a local news product. But very little is known about the qualifications of weathercasters as a group and their inclinations as individuals to educate viewers about scientific topics. In this survey, one of the largest ever conducted about television weather, many weathercasters say their programmes are appropriate venues for teaching their audiences about science, but not all of them are equally prepared or willing to do so. This research specifically analysed weathercasters' knowledge, and attitudes and beliefs about climate change, and offers

strategies for working with these highly visible scientists about this important global topic.

One perplexing discovery is that women comprise an historically small number of TV weathercasters -a problematic situation in an increasingly diverse world. Possible factors behind the persistence of this gender gap and ideas to mitigate the situation are also considered.

The ultimate goal of this research then is to enhance science communication by creating synergistic relationships with some of the most influential and visible science communicators in modern media -TV weathercasters.

Impact of media-science roundtables and training programs for researchers: Mary Woolley, Research!America, USA

Research!America, the largest non-profit alliance of groups and individuals in the United States dedicated to public education about research, has recently conducted a series of media-science roundtables and training programmes for researchers, as part of its commitment to step up the frequency and effectiveness of communication about science to elected officials, the media and the public. The presenter will describe these programmes and give evidence of their impact, emphasizing how the programmes have been tailored to specific audiences and can be adapted to the interests of a broad range of communities.

Data from surveys commissioned by Research!America and Sigma Xi, the scientific honorary society, will be incorporated, and comments on the importance of such programmes, from well-known members of the science community, elected officials and distinguished journalists, will be cited. Discussion will include distinctions between science policy and the politics of science, and the importance to the science community of being both accountable and accessible to the public whose interests they serve.

Parallel Session 12

Theme: Simulated ELISA test - a model for communicating HIV/AIDS awareness

14:00 - 15:30

Room: 4A

Workshop

Chair: Karen Wallace, University of Cape Town, South Africa

Practical workshop presented by Karen Wallace and Bette Davidowitz, Chemistry Department, University of Cape Town, South Africa


HIV/AIDS is arguably the greatest challenge currently facing Sub-Saharan Africa, with statistics indicating that 1600 new infections occur each day in South Africa alone. Since only an estimated 10% of all HIV positive persons know their HIV status, people at risk of infection urgently need to be encouraged to undergo testing. There is agreement that lack of knowledge of and confidence in the testing procedure is at the root of people's reluctance to undergo testing.

The proposed workshop will present a model for communicating HIV/AIDS awareness with special attention given to demystifying the testing technique. This will be achieved by centering the workshop on a simulated HIV/AIDS test that mimics the Enzyme-Linked Immuno-Sorbent Assay (ELISA) technique used daily in medical diagnostic laboratories. The test activity is safe and easy to perform and is based on a relatively simple yet colourful chemical reaction.

There is no risk of infection with HIV from handling the reagents because no biological fluids will be used.

The workshop will also demonstrate techniques for stimulating discussion, and dispelling the myths, stereotypes and stigmas associated with the disease.

15:30 - 16:00

 **Coffee & tea**

**Parallel Sessions 13-18
are run concurrently**

Parallel Session 13 **Theme: Dialogue in science communication (B)**

16:00 - 17:30

Room: LT 3

Ideas sharing session

Chair: Dexter Mahlangu, National Research Foundation, South Africa

**Making technological democracy work -
Deliberative models of public consultation: Edna
Einisedel, University of Calgary, Canada**

The use of deliberative models for public consultation to address policy questions involving technology have become more common in the last decade and a half. These include consensus conferences, citizen juries, scenario workshops and other for a, which typically involve intensive learning on the part of lay citizens, interaction and discussion with experts, citizen deliberations and formulation of recommendations to some policy body. This paper describes these different fora, their use in different countries, examines Canadian experiences on GM food and xenotransplantation, and analyses these fora as mechanisms for making technological decision-making more democratic.

**From science centre visitors to responsible
citizens: Walter Staveloz, ECSITE, Belgium**

Science centres and museums have a considerable influence on science learning; changed attitudes to science; social experience; career direction, increased professional expertise and personal enjoyment. Visits to interactive science and technology centres, museums, aquariums, and zoos provide valuable motivational opportunities for students to learn science and they affect students' learning. There is convincing evidence that students' understanding is changed as a result of a visit to a science centre. Extracurricular science activities encourage students to study science at school and to pursue science careers. That is a major achievement of our field and should encourage initiatives that bridge the gap between informal and formal science learning. But there are new threats to the field as well. It is clear that visitors become stronger in their opinion that scientists agree with each other and that science provides definite answers - views that do not reflect an increased understanding of the way that progress in scientific knowledge is made. That is why we need to re-create favourable scientific opinion through a renewed dialogue with the public. A strategic change that affects the way we perform our professional activity. Towards the public, or behind the scenes.

Major European science centres and museums have already started to create new tools for dialogue. They include close co-operation and discussion between visitors, professional communicators and the research community. The first results indicate that both the public and the scientist learn from each other and change their practice, which results in a better understanding of the major challenges of science in the near future.

16:00 - 17:30

Room: 2B

Panel discussion

Chair: Derek Fish, Unizul Science Centre, South Africa

A survivor's guide to the public understanding of science: Sandra Preston, McDonald Observatory, USA

After 25 years of working at one of the world's major astronomical observatories, the writer offers inspirations and motivations to staying proactive in science outreach and education. Using the field of astronomy as an example, anecdotes and ideas that are transferable to other fields of science and other countries are offered in the areas of collaboration, marketing, and media to reach vast audiences cost effectively. Experiences communicating science in the U.S. to underserved audiences and through a visitors centre located in a rural site will be shared. Ties to South Africa will be made through an existing collaboration between McDonald Observatory and the South African Astronomical Observatory.

Sandra Preston is the Director of Public Information and Education for The University of Texas McDonald Observatory and Executive Producer of the StarDate (English) and Universo (Spanish) astronomy radio series that air on 500 radio stations daily in the U.S. She received the 2001 Klumpke Roberts Award from the Astronomical Society of the Pacific for outstanding contributions to better public understanding and appreciation of astronomy.

Planetariums - beyond the naked eye: Tony Fairall, University of Cape Town and Planetarium at the SA Museum, South Africa

The public seems to understand so little about what is in the night sky, because distances cannot be perceived and the sensitivity of the human eye allows only a very shallow view of the universe. The traditional planetarium, producing a replica of the night sky, does no better, save for the interpretations of the presenter. The true role of a planetarium ought to be to reveal a three-dimensional view and to show what is there but not visible to the eye, because it is too faint or lies outside the visible range of the electromagnetic spectrum.

The recent opening production of the new Hayden Planetarium in New York met this role by using 3D all-dome video to show our place in the universe. Our planetarium in Cape Town - operating on a very modest budget - has similarly used 'all-sky' projections for a similar purpose. These include three dimensional starfields (viewed with spectacles), panoramas of the galaxy, the extragalactic sky, the radio sky and the Cosmic Microwave Background.

Doing it without electrons - Innovative resources for promoting astronomy: Case Rijdsdijk, South African Astronomical Observatory, South Africa

Astronomy is the ideal vehicle to promote science: it is uncontentious and generates a wonder in all. In addition, the sky is a resource that is available and accessible to all, during both day and night, for free! However, many people in South Africa, especially in rural areas, do not have access to the many

electronic resources that are available to exploit this fact.

As result the South African Astronomical Observatory, SAAO, has developed a wide range of tactile, pedagogical resources to overcome this problem, using cheap and readily available materials. These have been used successfully for some years as teaching aids and have been an integral part of the "Starbus": the SAAO mobile outreach project.

16:00 - 17:30

Room: LT 2

Paper presentation

Chair: Bruce Lewenstein, Cornell University, USA

Science and technology communication oriented towards China's rural population: Cheng Donghong, Lou Wei and Wang Huimei, China Association for Science and Technology, China

As a large developing country in which agriculture constitutes a major part in its national economy, China supports 22 percent of the world population with no more than 10 percent of the world's total arable land. Compared with the rest of the world, the rural areas in China demonstrate its peculiar characteristics as well as similarities. The wide expanse of rural areas with somewhat too large a population, low per capita possession of natural resources, small-scale house-hold operation, low productivity and an underdeveloped rural infrastructure, all have had a serious negative impact on the communication of science and technology in the country's rural areas. Although there is tremendous demand for science and technology in the rural areas, the badly insufficient educational capacity hinders a fast and effective popularization of science and technology among the rural population.

Therefore, there is much room and broad perspective for developing informal science education that suits the conditions in China's rural areas. Entrusted by the Chinese government with the responsibility of promoting and organising science and technology popularization activities all over the country, the China Association for Science and Technology (CAST) and its local organisations have in the past 50 years and more, with the aim to enhance the scientific awareness and practical skills among the rural population, unfolded large-scale science popularization and training campaigns and made due contributions to the development of human resources in rural areas of China.

Having bidden farewell to the era of shortage of agricultural produce, China's countryside has as a whole developed into the well-to-do stage, with the primary task of economic restructuring and increasing the income of farmers. At the beginning of the new century and with the country's accession to WTO, the science and technology popularization work in China's rural areas has to meet the new challenge of further enhancing the scientific quality and skill level of the rural population so as to better serve the needs of the ongoing restructuring of rural economy and modernisation.

Communicating with rural communities to improve quality of life: Cheryl McCrindle, University of Pretoria, South Africa

A knowledge and understanding of scientific concepts can mean the difference between life and death for rural people at the grassroots level. We, who are educated, take for granted that biological principles such as hygiene and nutrition are linked to health. The children of the rural poor may die of gastroenteritis and malnutrition before they are even old enough to go to school. This paper will summarise practical aspects of the communication of

science and technology aimed at improving the quality of life of rural and peri-urban communities in South Africa.

The effect of communication of science varies according to the socio-economic and environmental situation in which it occurs. Planning of interventions is important and knowledge of the characteristics of the community, its social and material assets, perceptions and traditional practices, the level of knowledge and technology and the cost/benefit ratio of the interventions can be determined through a situational (systems or holistic) analysis. Using participatory methods, objectives can be selected, evaluated and ranked. Long term sustainability is more likely if people are motivated and empowered through capacity building. It is asked: "Is skills training a part of communication with the rural poor?" If so, it is a part often forgotten. The "deficit model" or "handout syndrome" is paternalistic and prescriptive and suppresses motivation and self-respect of the target audience who become passive recipients rather than active participants. This has a negative impact on the sustainability of a project - it falls away as soon as the funding vanishes.

This paper lists principles based on field experiences of successful veterinary extension, primary animal health care and small-scale farming. It discusses force field analysis as a method to promote change, describes adoption and diffusion curves and gives practical advice on interpersonal communication strategies to improve animal and human health and quality of life.

Story of the larger grain borer: Communicating science to rural communities: Christelle Swart, Technikon Southern Africa and Marianna Theyse, Department of Agriculture, South Africa

Social and political changes in South Africa since the 1990s have created a greater need for effective communication, particularly in science communication. Although the democratisation of science was prioritised after the democratic elections in 1994, thus promoting dialogue, transparency and consultation, science communication still faces challenges in this country. Due to the diverse cultural landscape of South Africa, aspects such as language, traditions and poverty impact significantly on the facilitation of communication and the dissemination of information, particularly in rural communities.

A case study on the **Larger Grain Borer (LGB)**, a quarantine insect pest of maize that has left a path of destruction through Africa, will form the basis of this paper. The Directorate Plant Health and Quality of the National Department of Agriculture of South Africa initiated this awareness project with the objective to empower farming through awareness and education to prevent the spread and to manage the impact of the pest. It is believed that the key to rural food safety security lies within the country's

ability to effectively disseminate information to rural communities.

This paper has a two-fold purpose namely: firstly to provide a theoretical overview of existing traditional media and the possible value thereof for this case study and, simultaneously, to explore existing challenges to communication posed by the multicultural landscape of South Africa. Secondly, it aims to investigate the communication approach followed by the Directorate Plant Health and Quality.

Parallel Session 16 Theme: Celebrating science

16:00 - 17:30

Room: 2A

Ideas sharing session

Chair: Ndashinga Chasakara, Foundation for Education, Science and Technology, South Africa

UK Science Year - working to a pre-defined government brief: Jill Nelson, British Association (the BA), UK

Teenagers are widely perceived in the UK as being a 'difficult' audience to target for science communication activities. In response to the UK Government education department's declaration that 2001/02 was Science Year, with special focus on 11 - 14 year olds, the BA devised a programme of activity to complement the formal science curriculum in schools. The programme was designed to reach young people not usually engaged in such activities - both those excluded for social or cultural reasons and also the 'gifted and talented'.

The presentation addresses the challenges the BA faced in developing programmes while working to a brief that was pre-defined by the UK Government. By using three BA examples, the presentation will explore the need to define specific audiences relevant to the age group and to develop programmes that are meaningful and sustainable. The three examples are:

- physical and virtual science clubs in schools and science centres aimed at teenagers and moderated by teachers and explainers
- a science discovery day at the Royal Albert Hall in London during the UK National Science week for teenagers accompanied by teachers
- 'Footprints' - a touring drama workshop for teenagers, their parents and teachers about the social implications of genetics.

The first phase of Science Year ended in September 2002. The BA's programme is being evaluated and Science Year continues into 2003 under the new name of Planet Science.

New communication concepts for the UK during Science Year: Bobby Cerini, Science Year, UK

Science Year has employed a large-scale approach to the public communication of science and technology which has been successful in driving awareness of and participation in this major national campaign.

In this presentation we will describe a number of scenarios in which vast numbers of people have been successfully targeted and engaged directly in Science Year programmes. Key examples will include mass participation experiments such as the

world-record-breaking Giant Jump, the award-winning Science Year website, which now records 250,000 hits per day, and the innovative advertising and short films campaigns developed by and featuring young people in action-packed experiments.

Promoting a culture of science in a festive way: Brian Wilmot, SASOL SciFEST, South Africa

The National Festival of Science, Engineering & Technology, or Sasol SciFest as it is popularly known, was launched in 1997 in Grahamstown as the first festival of its kind in South Africa. Since then six annual festivals have been held with attendance each year now exceeding 40 000.

Following the screening of a video-film on the most recent festival, Sasol SciFest 2002, attention will focus on the following topics.

Structure and Planning

Sasol SciFest, which enjoys funding from both the private and public sectors, is run by a permanent staff of five assisted by the Grahamstown Foundation's service departments, and some 60-70 temporary workers each festival. Guidance in the development of new ideas and contacts, marketing, and sponsorships, is provided by the National Advisory Committee.

Experience has confirmed the need to shift from innovative thinking in the early months of planning for each festival to the establishment and implementation of a clear organisational matrix with inflexible deadlines.

Consultation and Assessment

These two processes will be shown to be essential in getting the greater community to take 'ownership' of Sasol SciFest. The importance of visitor surveys and other mechanisms that ensure that public opinion is 'heard' and incorporated into future planning will be addressed.

Lessons Learnt and Future Thinking

After dealing with such matters as 'peer influence in action', 'the personality that makes a science festival work', 'marketing a new mind-set', and 'passion and planning' the presentation will conclude with a brief consideration of some recent developments in the project.

Voices of teachers and learners about SASOL SciFEST - from "spectators" to players in science communication: Kenneth Ngcoza and Matole Reuben Maselwa, Rhodes University, South Africa

This paper reports on the science teachers' and learners' involvement in the Scifest in Grahamstown in 2001. The main aim of Scifest is to promote public understanding of science, mathematics and technology.

The case study unit comprised of twenty one (21) grade 11 learners chosen from the schools involved in the Khula Project (sponsored by Lucent Technologies in the USA). The Khula Project is coordinated by the Education Department, Rhodes University, and it aims at empowering physical science, biology and mathematics teachers with computer skills in order to enhance teaching and learning of these subjects. This paper explores the experiences of the science teachers and learners involved in the project using data collected through questionnaires, discussions, semi-structured interviews and journals.

Parallel Session 17 Theme: Communicating with decision makers

16:00 - 17:30

Room: LT 1

Paper presentation

Chair: Farouk Cassim, MP, South Africa

Talking to Members of Parliament about the importance of science: Toss Gascoigne, Federation of Australian Scientific and Technological Societies, Australia

"Science meets Parliament" Day (SmP) brings 200 scientists and technologists into Australia's national capital Canberra for one-on-one meetings with federal politicians. SmP is organised by the Federation of Australian Scientific and Technological Societies (FASTS). It runs over a day and a half. The first part is a Briefing Day, devoted to strategy, tactics and issues. Briefing Day features a range of speakers including senior Parliamentarians and bureaucrats, journalists and successful lobbyists from other groups. The day culminates in a reception at Parliament House.

The second day is devoted to one-on-one meetings between a pair of scientists and individual members of Parliament. Normally these meetings last about 40 minutes, although some have stretched out to 90 minutes.

Australia has 224 Parliamentarians, divided between the House of Representatives and the Senate. One hundred and forty two, or nearly two-thirds, of those politicians agreed to meetings including some members of Cabinet. This sort of access to Parliamentarians is unprecedented in Australia. This is not because science and technology are so highly regarded (they're not!), but because the idea of lobbying in this way does not seem to have occurred to other groups.

The paper will describe all aspects of organisation, including budget, pre-event training, and the issues discussed at the one-on-one meetings. It will talk about how MPs and scientists responded, and look at

evaluation sheets from scientists where the overall event rated a score of 8.2 out of 10.

Science needs good public relations: A marketing approach to science-industry relations: Andrzej Jasinski, University of Warsaw, Poland

Results of the commercialisation of science may be new products, processes or services. A subject that interests me is technological innovations in a form of product/ process innovations. It is known that innovation 'stands on two legs': while one leg is still in R&D, a second already is in production. Thus, science-industry relations (SIRs) are here of crucial importance. Good (i.e. wide and intensive) co-operation between science and industry is favourable for the commercialisation of scientific achievements. Commercialisation, understood as practical implementation of results of the R&D work, is a final phase of the innovation process.

Communication of science with industry should facilitate SIRs which, in turn, should cause quicker and broader flows of scientific achievements to industrial practice. Since examples here come from Poland, I start with answering a question: What is the present state of science-industry relations in the country? The paper in short shows a poor state of affairs in this field.

The main reason for this is, of course, a legacy of the centrally planned economy where market mechanisms played only a second-rate role by the end of the 1980s. Also, a low level of public understanding of science (PUS) in the Polish society is one of the reasons, in this case - a low PUS among businessmen/industrialists. So, communication of science to industry now has a

crucial role to play in the commercialisation of scientific achievements in Poland.

One of tools that may help improve communication between science and industry is marketing communication. Generally speaking, science needs good marketing always and everywhere. When fundamental politico-economic transformations started in Poland at the beginning of the 1990s, a huge interest in marketing suddenly appeared among industrialists.

A classical concept in marketing is the idea of marketing-mix containing the so-called 4Ps: product, price, place and **promotion**. Here the final component is of interest. Nowadays, marketers speak rather about **communication** as an element of modern marketing-mix. Of course, the name here is not of importance but the nature of this tool of science communication with industry.

In turn, one of instruments of the marketing communication is public relations (PR). Without good PR actions it is impossible to ensure good publicity for science. The use of this tool in science relations with industry is developed in the paper.

Communication, creativity and commercialisation of science in Australian research institutions: Beryl Morris, Vaccine Solutions Pty Ltd, Australia

Our research endeavours are highly dependent on new ideas. But scientific laboratories in companies and institutions around the globe worry that their organisations do not necessarily present an optimal environment for the generation, capture and commercialisation or use of new ideas.

The traditional university approach is for the one institution to keep track of innovation from a wide range of departments and disciplines, each with its own markets. This can be contrasted with the establishment of specialist commercialisation vehicles within the Cooperative Research Centres to take innovation to very specific markets, allowing a deep understanding of that market to be developed within the CRC.

The research-intensive University of Queensland (UQ) is ranked as number one in Australia for its commercialisation activities. This paper shows how UQ has personalised its communication with researchers by using a distributed network of commercialisation practitioners. Drawing upon models of creativity and comparisons with a Cooperative Research Centre that has spunoff its own commercialisation company. This talk illuminates the importance of finding the optimal balance between organisational structure and rapport with scientists and practices at the local level to spark new ideas, wrap institutional policies around diverse inventions, and rapidly develop those with market potential.

Is there a mandate for science? Examining science policy debates during a UK general election.

Elizabeth Vidler, Richard Holliman, Jeff Thomas, The Open University, UK.

This paper presents findings from research which has examined the content and production of representations of science during the June 2001 UK general election. Using qualitative research methods, with a particular focus on key informant, semi-structured interviews, this paper will discuss research that has analysed both the dynamic interactions between leading actors from government, NGOs, scientific institutions and the media and, linked to this, their ability to influence the content and production of representations of science.

We will provide evidence to illustrate that although campaigning on science policy issues was a feature of the general election campaign, these policy issues were rarely a feature of mainstream party political campaigns or national media coverage. Instead, the agenda for science policy was generated largely by a minority of NGOs campaigning on specific platforms. The implications of the research findings in contributing to important current debates will be drawn out. These include debates documenting the politicisation of science, as well as those considering the relationship between representations of science and the formation of public policy. Does, for example, the exchange of ideas within the context of an election campaign influence the shape of public policy? Finally, implications of the research findings for debates examining the contemporary relationship between science and society, in particular the calls for improved dialogue and consultation as a means of enhancing levels of citizenship and engagement, will be considered.

16:00 - 17:30

Room: 4A

Paper presentation

Chair: Michelle Galloway, Medical Research Council, South Africa

Public communication's impact on the history of science and societies - The 20 years media coverage of AIDS in a cross-cultural study: Gemma Revuelta, Núria Pérez, Elisa Almeida França, Maria Roura and Vladimir de Semir, Universitat Pompeu Fabra, Spain

From the 40 cases of a "rare cancer between homosexuals" covered by the science reporter L. Altman in *The New York Times* in 1981, until the 40 million people around the world, that are living with HIV/SIDA in 2001, just two decades have passed. But this relatively short time has been enough to dramatically change the entire world. The public communication of HIV/AIDS has become one of the most influential factors to explain the evolution of public (and decision-makers') concerns about this issue, and, as a consequence, to explain the development of the epidemic.

In order to analyse the history of this disease and the influence of its public communication, a cross-cultural media analysis has been done. The study period (July 1981-December 2001) corresponds with the entire history of the public information about AIDS. Material selected for analysis included three daily newspapers, representing the international view (*The New York Times*), the national coverage (*El País*), and the regional one (*La Vanguardia*), as well as some TV programs covering the issue, from different countries (Brazil, Spain, and Thailand). The five study focuses were: 1) first news about AIDS – differences between countries, 2) key moments in the 20 years' history, 3) the media impact of international conferences, 4) the media coverage in science sections and in general information pages, and 5) AIDS as a media issue in 2002.

Agenda setting politics - An analysis of main stream newspaper reports on HIV/Aids: Gideon de Wet, Potchefstroom University, South Africa

Introduction

Newspaper reports on HIV/Aids have undoubtedly been taking up reams of print volume over the last couple of years in South Africa. A lot has been reported on. The pandemic has been well documented in terms of its devastating impact on the fabric of the South African society (Shell, 2000). Projections regarding the diminishing life expectancies of South Africans turn up horror images in terms of the impact of the disease on the economy, cultural aspects of societies and the policies of government (Smith, 2001).

It also raises a number of questions:

- When can we expect a cure for the problem?
- What is science contributing to the information and knowledge base?
- Who are the communicators of these messages?
- What do the victims say in these reports?
- What is being communicated?

Theoretical orientation

McCombs and Shaw (1972) coined the term "Agenda Setting". It is referred to as "the power to structure issues in the media in such a way that people think about what they are told, but at no level do they think what they are told". Evidence (Trenaman & McQuail, 1995) suggests that a correspondence exists between the order of importance given in the media to issues and the order of significance attached to these issues by the public.

According to MacQuail (1995) the agenda-setting hypothesis could be presented as:

- Public debate is represented by salient issues
- The agenda derives from a combination of public opinion and political choice
- Mass media news and information reflect the content and order of priority
- This representation of issues in the mass media exerts an independent effect on issues and on relative salience in public opinion.

The research question to be answered in this context deals with the reported information on HIV/Aids in selected national and regional South African newspapers with the emphasis on scientific, political, economic and cultural issues. In short, what is the HIV/Aids news Agenda like and to what extent do newspapers deal with news on HIV/Aids as source of knowledge and information? The emphasis is thus on content and not on the reader's experiences of content.

Methodology

A mainly qualitative structured research methodology has been used in the form of structured qualitative content analysis on a number of newspaper reports on HIV/Aids. The period November 2001 to February 2003 has been covered. This includes *The Sowetan*, *Sunday Times*, *Beeld*, *Mail and Guardian* and *Rapport*. The mix between national papers and regional papers, Afrikaans/English, as well as in terms of readership foci has been included.

The content analysis dealt with the following aspects:

- The communicators on HIV/Aids. Who were they?
- Message content with the emphasis on scientific, cultural, political and economic matters regarding HIV/Aids
- The role of experts in these reports
- The context of the target audiences. At whom was the original message aimed?

Tswana speaking students' awareness of HIV/Aids and poverty: Paul Schutte, Potchefstroom University, South Africa

Although medical scientists do believe they know the causal relationship between HIV and AIDS, there is a lot of ambiguity amongst the average citizen. The pronouncement of President Mbeki that poverty is the greatest cause of AIDS, worsened this ambiguity.

Although the bi-causal relationship between poverty and HIV/AIDS versus HIV/AIDS and poverty is complex, the communicated messages are not always that clear and concise with regard to the possible causes of HIV/AIDS.

To investigate the above mentioned assumption, the following research has been done:
Tswana speaking students (n=230) at three tertiary institutions have been asked to write an essay on the topic: *Poverty is the cause of the HIV/AIDS pandemic in South Africa*. A qualitative and quantitative content analysis has been applied to the essays, which represent and express their awareness of the causes of HIV/AIDS.

Content analysis has been used since it allows the researcher to construct indicators of a respondent's views, values, attitudes, opinions and stereotypes with regard to HIV/AIDS and to compare these with the views of other respondents. Comparison reveals similarities as well as "differences" that could be a sign of the ambiguity that exists and the contradicting messages that these youths have received.

The findings confirm that ambiguity and contradicting perceptions exist. This information would give scientists and agencies who want to implement HIV/AIDS programmes in secondary and tertiary institutions guidelines on where to put the focus and how to choose and phrase scientific material to address knowledge gaps and misconceptions. Thus, the agencies can adjust their messages and strategies to communicate more effectively with their target audiences.

A critical analysis of reproductive health information in South Africa: Nolwazi Mbananga, Medical Research Council, South Africa

The aim of this paper is to examine Reproductive Health Information (RHI) designed for communities in South Africa. The Social Construction of Reality (SCR) theory (Berger and Luckmann, 1967) is employed as a tool of examination. This paper attempts to answer questions which emerged from the results of the study conducted by the author. The findings of this study revealed that RHI is not understood by the target community (Mbananga & Becker 2002). Also, several studies conducted in the country have shown that despite high levels of knowledge (98%) about HIV/AIDS amongst community members, this knowledge does not translate to sexual behavioural change. The increase in HIV/AIDS and STDs rates in the country have been used as a proxy measure for poor translation of RHI into sexual behavioural change. Consequently, questions were asked: Why RHI is not understood by the target community? and Why this information appears to be failing in transforming sexual behaviour?

An analysis of RHI within SCR provides three answers to these questions. Firstly, RHI is void of the everyday reality of reproductive activity, concepts and knowledge of target communities. Secondly, RHI construction focuses mainly on the nature of reproductive health problems rather than the presence of these problems. Thirdly, RHI development neglects typifications which are progressively anonymous in the "here and now" (moral values) daily discourse and yet acceptability and utilisation are defined and scrutinised within their parameters.

Room: LT 1**Boring science radio and other educational dilemmas****1. Boring science - the challenge for educational radio: Robert Firmhofer, Polskie Radio, Poland**

Polskie Radio BIS is a nation-wide educational and cultural station, part of a public broadcasting corporation in Poland. Unfortunately our young listeners, mostly students, regarded science as boring! It was a huge challenge for the radio station, which popularise science, history and humanities four hours a day! We had to change the image of science. Our answer was The Science Picnic.

The man, who came up with the idea of Science Picnic is Prof. Łukasz Turski, of the Centre for Theoretical Physics of the Polish Academy of Science, and - from the very beginning - chairman of the Science Committee of Science Picnic. Robert Firmhofer, deputy director of the Polskie Radio BIS, has been the chairman of the Organising Committee.

The main goal of Science Picnic is better understanding of science among general public, and particularly - young public. The event takes place always in June in the Old Town of Warsaw. It is organised by radio journalists in close co-operation with researchers, who help to understand the real meaning of conducted experiments and its possible use in daily life. Every year there is a new main topic of the Science Picnic.

In the Old Town just for one day a small city of approximately 100 tents is build. At those stands for the whole day all sort of scientific experiments are performed and explained. The important thing is: almost every particular show at the stand is interactive. Visitors are advised to participate in the experiments and in fact visitors are part of the show.

Six years ago, when organising first Science Picnic, we decided to think big and create the biggest science show in Poland. As far as I know, the Science Picnic is actually the biggest open air science show in Central Europe. This year some 30.000 visitors stream through the Old Town to join this fair-like operation. Some 70 research institutions and almost 300 researchers, including the best Polish scientists, had joint the show.

2. INFM partner in an exciting European education project: Silvia Merlino, Roberto Fieschi, Marco Bianucci and Brian Davies, University of Parma, Italy

New multimedia technologies have shown their potential for providing significant steps forward both in the teaching of scientific and technological subjects, and in popularising them. In comparison with other subjects, physics and technology are often considered difficult, but interactive multimedia tools, with their simulations and video clips can be very effective for giving good preliminary intuitive approaches to scientific concepts.

The project "Multimedia on Energy and Semiconductors for European Countries", which has been selected by the Commission of the E.U. within its "Raising Public Awareness" programme, has the

specific objective to provide young students, their teachers and the general public in European countries with a courses on 'Energy and its transformations', and on 'Semiconductors and their applications' in the form of user-friendly multimedia packages both on the Internet and on CD-Roms, for both PC and Mac platforms. In developing these courses, we kept in mind the need to capture the attention, and then encourage the interest of the student, or member of the public. If diffidence and lack of confidence can be overcome, then physics, chemistry and technology become interesting and fascinating subjects.

3. Mad about maths and science - Stepping the way for the future: Nonceba Shoba and Joyce Sewry, Albany Museum and Rhodes University, South Africa

The *Khanya Maths and Science Club* was formed in 1999 when a group of concerned people formed a committee and worked on how to improve the standard of Grade 12 maths and science results. We aim to prepare the pupils for a full and satisfying life in the world of the 21st century while still providing the content and training for those who want to study Maths and science after school.

In March 2000 the first group of Grade 7s from all primary schools in Grahamstown joined the Club. We meet at the Museum on Saturday mornings for two hours - an hour of maths and an hour of science. During this time the children are engaged in fun-filled activities such as discovering mathematical patterns in nature to doing experiments using microscience kits. The learners enjoyed outings to a game reserve and the beach where they learnt how the organisms have adapted to living along the shoreline.

The Club has since grown to include grades 7, 8 and 9.

4. Marketing the essence - A passionate strategy to address the MST [Mathematics, Science and Technology] crisis: Sue Southwood, Rhodes University, South Africa

The lack of skilled scholars, in the fields of Mathematics, Science and Technology [MST] in South Africa is well known. As the NRF points out 'this paucity is partly due to a lack of quality teachers who can make these subjects accessible and promote them as profitable and rewarding career options; and partly due to a lack of popular appeal or an ignorance of the impact these disciplines have on everyday life'.

(NRF 16 May 2000 *Effective SET Education and Awareness* - www.nrf.ac.za/programmearreas/esetea)

Much work is being done in order to address this crisis. If we are going to succeed, it is argued, we need to generate not only skilled but passionate learners and practitioners. We need to be inspirational. We need to re-market these fields of education in a way that inspires passion and desire in

more people to follow these fields of study. This paper explores a perception of the 'essence' of these subjects and looks at examples of ways in which we can use this to 'market' these fields: to not only generate awareness and understanding, but to promote passionate interest and engagement in these subjects. It is acknowledged, however, that merely alluring the unsuspecting is not sufficient - we then have to echo and support this image. We must teach with passion, learn with passion and inspire those around us to do the same.

5. Teaching science and technology using African and European illustrations drawn from everyday life: Kevin Rochford, University of Cape Town, South Africa

This paper describes evidence that interested members of the public can acquire increased insights and awareness of science and technology if they experience relatively informal lessons containing stimulating science and technology practical exemplars and illustrations drawn from everyday public life situations. At UCT we have developed many successful teaching methods and techniques, using numerous supplementary real life examples, for the specific purpose of bringing science and technology textbook principles to the public, and students, and vice versa. These resources include: (1) an annual four-day field camp; (2) model construction using discarded household materials; (3) case studies of scientific moral dilemmas in the public domain; (4) creation of analogies using terminology from other areas of academic disciplines; (5) technology syllabus creation using a single item of public hardware; and (6) visits to public sites and departments to study and teach applications of scientific and technological textbook principles in other disciplines.

Room: LT 2

Doing it differently: New research and methods for science communication

6. Biographies of scientists to promote public interest in science and technology: Shigeo Sugiyama, Hokkaido University, Japan

Biographies of scientists and engineers, that acquire large reading audiences, can exert great power in revealing to the public the importance of science and technology for developing industries and modernising their society. They can raise great interest in science and technology among people, so long as the role models featured in the biographies are consistent with the social atmosphere of the day. This is shown in the changing way various biographies of Galileo Galilei, published in Japan since the end of the World War II, have been accepted among Japanese people.

For a few decades after Japan was defeated in the war, biographical stories of Galileo were enthusiastically welcomed and a considerable number of his biographies by different authors were published. Japanese people had thought, after the war ended, that they had become involved against the rational and scientific thinking in this unjustifiable war under the pressure of military authorities. Henceforth, soon after the war people stood up against various traditional authorities and endeavored to modernise Japanese society. This social milieu welcomed the image of Galileo who had bravely fought against religious authorities in

favour of scientific reasoning and helped Western countries advance from feudalistic into modern societies.

However, as Japanese society is being modernised, Galileo has become less appealing to the public and young people are increasingly losing interest in science and technology. New scientific heroes featuring new role models who better match the mood currently prevalent among people, seem to be required to take the place of Galileo.

7. Development in science communication - The need for crossing borders of the sciences: Maarten van der Sanden, Delft University of Technology and Frans Meijman, VU-University Medical Centre, The Netherlands

When talking about a diverse world, the world of scientific research could be mentioned as probably the most diverse. There are strong demarcation lines between the various scientific disciplines. Communication science is no exception to this rule. That is regretful, as there are common interests that could be used for other science disciplines. Therefore, in our opinion it is very useful to compare several fields of communication science in order to extract success factors from these disciplines, enabling the empowerment of the field of science communication. This could be a very useful method

to develop a communication discipline such as science communication. My PhD research, which is being carried out at present, is about this comparison.

The presentation at the PSCT 7 Congress will contain: (1) a short presentation on systematic literature research concerning science in general and biomedical science communication in particular. A meta method which is necessary when comparing several scientific fields; (2) a comparison between the communication field of health education and promotion on the one hand and biomedical science communication on the other hand. I will describe a few success factors which are to be obtained from health education and promotion and which could be useful for effective biomedical science communication. Both (1) and (2) reflect the first results of my PhD research.

Moreover, the results of my PhD research may help to formulate the real paradigms of science communication by discovering the borders of other disciplines. To develop a theoretical framework for a discipline one first has to know the own identity. Does science communication have its own identity compared to other communication fields? Effectively 'Communicating science in a diverse world' is probably possible through the operationalisation of the word 'diverse'.

8. Pondering a process approach to writing - An action research project: Jennifer Wright and A Solomon, Peninsula Technikon, South Africa

At Peninsula Technikon in Bellville, Communication Skills is a first year subject situated in Semester 1 of the three-year Chemical Engineering and Analytical Chemistry National Diploma courses. While part of the focus of the subject is, indeed, communication skills for the workplace, the subject also focuses on developing students' academic literacy.

In Semester 1 of 2000, attempts to improve students' academic writing through a process approach (i.e. multiple drafts with feedback on each) as part of the (Communication Skills subject) did not yield convincing results, in the opinion of the Communication Skills lecturer (J.Wright).

In Semester 2 of the same year, the Communication Skills lecturer (J. Wright), in conjunction with the Chemical Engineering lecturer (G. Hangone), conducted preliminary research in this area, focusing on only the Chemical Engineering group in their CPI subject (with the focus on learning about chemical process industries). The purpose of the 2000 study was to explore the effectiveness of a joint attempt to improve the students' results through a process approach to the writing of a Chemical Engineering assignment. It was hoped that there would be an improvement, not only of the students' understanding of the key concepts of the subject for that assignment but also in the implementation of the academic literacy skills that had been taught in the Communication Skills subject.

In the study the intention was to:

- consider the extent to which students used and valued the opportunities presented by a process writing approach;
- compare the quality of students' efforts in two drafts of the assignment; and
- try to establish reasons for any differences in quality that might be noted.

It was hoped that the findings of this study would assist in deciding whether or not to implement a process approach to the writing of student assignments more widely, not only in the Chemical Engineering Department, but also in other departments of the Faculty of Science.

In Semester 1 of 2001, this research continued, this time involving students studying Analytical Chemistry. The Analytical Chemistry lecturer (A. Solomons) and the Communication Skills lecturer (J. Wright) gave a joint assignment. The intention was to explore whether the 2001 findings confirmed the findings from the 2000 research. An additional intention was to pay more attention to student feedback on the process, an aspect not deeply explored in the 2000 study. This feedback would take the form of responses to questionnaires and tape-recorded focus-group discussions.

In this presentation, the authors will describe the research process, outline the key findings and reflections on what has been learned, as well as indicate some future plans.

9. Science awareness and knowledge of first-year students at the University of the North - A ten-year perspective: Rolf Becker, Kirsten Lucas, University of the North and Rudi Laugksch, Department of Education, South Africa

It is now widely acknowledged that it is important to stimulate interest and curiosity in the natural sciences for the continuation and development of science and technology in South Africa. This study compares the science awareness and knowledge of first-year students at the University of the North (UNIN) in 1990 with that in 2001 and assesses whether this awareness has changed over the past ten years.

The study was based on a set of questions compiled by Durant *et al.* (1989) [Nature, 340, 11-14] designed to assess the British public's awareness of science. First-year UNIN students from the Faculties of Science, Health and Agriculture, Humanities, and Management Sciences and Law were given a questionnaire in which they had to indicate whether they believed the statements to be true or false or whether they didn't know the answer. The initial survey was carried out in 1990 (n=179) and repeated in 2001 (n=640).

In general, the results indicate that the science awareness and knowledge of science among science students and nonscience students was surprisingly similar, with some exceptions relating to more complex scientific concepts. From 1990 to 2001 there was a decrease in the percentage of students answering the science content questions correctly in 58% of the 17 questions asked. This decrease was observed in both groups of this study. It thus seems that the first-year UNIN student's awareness and knowledge of science have decreased within the past ten years. This finding is cause for concern and needs to be addressed.

10. Communicating science through art in the workplace: Shirley Koller, American Association for the Advancement of Science (AAAS), USA

Science, by its very nature, is an exercise in inquiry. Thus, an association devoted to advancing science and serving society becomes a supportive environment for an art programme that explores different interpretations of scientific and mathematical principles.

Science is evolving and changing. Therefore, a work site that can offer changing exhibitions also presents a stimulating atmosphere to employees and visitors, allowing them to look at materials and objects with fresh eyes.

Science, technology, and engineering are problem-solving professions. It follows that scientists who are also artists, and artists who look for themes in science and technology, will approach creative problems in a variety of ways.

From its beginning in 1985, the AAAS Art of Science and Technology Program developed both as an outreach to the wider science and technology communities and as an opportunity to make art an integral part of the everyday work surroundings in our headquarters building in Washington, D.C. Rotating exhibits in our main Atrium, Gallery, and meeting rooms present art in all media. Exhibiting artists have come from diverse cultural backgrounds and schools. Art from Africa, Asia, Latin America, Australia, and Europe reflect the global reach of AAAS projects. Staff members meet the artists at receptions and gallery talks to exchange ideas about science, aesthetics, new techniques, and interpretations of natural phenomena via art.

The AAAS permanent collection of fine art, posters, textiles, and sculpture permits staff on all floors and every corner of the building to select art for their offices, corridors, and workstation areas, reflecting their professional and programmatic interests, their ethnic differences, or simply to create an exciting or reflective office ambience.

Through exhibitions, acquisitions, and publications, the AAAS Art of Science and Technology Program has collaborated with local galleries of art and with science organisations, such as the National Academy of Sciences, the New York Academy of Sciences, the National Institutes of Health, the National Geographic Society, and the Natural Resources Defense Council.

The primary goal of the programme is to increase the public understanding of science and the appreciation of methods of science and technology in human progress. For each individual this understanding comes in a different way. For many who work or meet at AAAS, the understanding has increased through art.

11. Perceptions of science in rural and urban communities: Using marketing tools as an aid for differentiation: Sarah Pearson and David Pearson, University of New England, Australia

The need to inform and educate the general public in the area of science and technology has long been seen as necessary for both the health of a country's economy and the strength of science itself. There have been many initiatives to meet this need in Australia but the majority of these have been aimed

at urban audiences. Many rural communities feel left out and unsure of their future in a technology based economy. The research presented here aims to begin addressing this issue by understanding differences in perceptions of science between rural and urban communities.

This research will gather empirical data from a regional university town in Australia with a population of 20,000. This population offers the opportunity to compare and contrast awareness and perception of science and technology between the urban and rural communities that contribute to the city of Armidale. The farmers within the rural community offer an interesting case study, as they are usually strong users of science and technology though many have not received a formal scientific education. These will play a significant role in our analysis of rural community perceptions of science.

This research will use in-depth personal interviews to explore individual's cognitive structures using word association and laddering techniques used in marketing. Differences between rural and urban perceptions of science will be highlighted. This will create a platform of information upon which the numerous stakeholders in science communication may build successful marketing strategies that will meet the needs of both urban and rural communities.

Room: LT 3

From volcanic eruptions to the missionary complex - the seductive power of the media

12. Echoes of the Nyriagongo volcanic eruption in the European media: Tiziana Lanza, Istituto Nazionale di Geofisica e Vulcanologia, Italy

In January 17, 2002 a destructive volcanic eruption occurred near Goma, in the Democratic Republic of Congo. "A Congolese volcanologist Dieudonne Wafula, who has spent years studying the volcano on Mount Nyriagongo, sent urgent emails to experts around the world one week before the lava began flowing on 17 January", was reported on the BBC news (23 Jan. 2002). The monitoring of the Volcano Nyriagongo is done from a small observatory building located 16 km south of the Nyriagongo crater. A collection of press clips appearing in different European media will be presented to show how they covered an emergency occurring in a country where monitoring of natural hazard is difficult and where health risks are higher than in developed countries.

13. The missionary complex - American perspective of China over a hundred years - A critical analysis of *National Geographic* magazine between 1888-1998: Xiao Xinxin and Li Xiguang, Tsinghua University, China

The *National Geographic* magazine, flagship of the National Geographic Society, has long been a lens through which the Americans view the world and has great influence in shaping public opinion. Since 1888, the magazine has established its credibility as a scientific journal and has made its readers accept whatever it reported as truth, thereby permitting the ethical assumptions embedded within it to remain unchallenged. However, the scientific journal has been involved in as much political and ideological agenda setting in its covering of China as other non-scientific journals, and has been a major force in shaping the image of China in recent history.

A critical reading of the magazine's articles about China provided a clear understanding of how the magazine had looked at China and framed the image of China according to American values. In the 192 articles covering China over the past 112 years, geographers and their professional institutions had shaped or reinforced American stereotypes and ideologies by framing the image of China according to American interest. The "missionary complex", by which Americans represented "enlightenment," the pinnacle of the hierarchy, settled as the mainstream of American ideology and reflected in the covering of China over the years.

Further more, the editorial staff of the magazine holds an obvious resentment against Chinese Communism and clings to the old expectation that America can save China, if not for Christ, at least for democracy, human rights advocacy and commercial ventures that will convert China to the American way. A thorough reading with a critical eye of the magazine's covering of China gave a view of China that was rather politically slanted than scientific.

Frame analysis was applied to the study. By studying the sample articles of the magazine between 1888 and 1998 that are related to China, we will see how the journalists had selected elements that are for a certain assumption, emphasis or designed context. Portraying a foreign country,

journalists usually bear in mind the concerns and conceptions from their home country's point of view. As to China and the U.S. whose cultures, histories, traditions and values differ greatly from each other, such framing effect is even more evident. Thereby, frame analysis helps us find out what is in the mind of the author over the topic he/she writes about.

14. Analysis of science and technology reporting in the South African media: Carine van Rooyen, University of Stellenbosch, South Africa

It is often claimed that there is a dismal lack of science and technology coverage in the South African press, but no effort has been made to quantify and analyse the amount of coverage. The Foundation for Education, Science and Technology (FEST) has funded a benchmark research project by the Department of Journalism, University of Stellenbosch, to analyse *science and technology journalism* in the *local media*.

The results of this study can provide the basis for future programmes to improve quality and quantity of science and technology reporting.

The paper will include

- The findings of an *international literature review* of previous studies re media analysis of science and technology journalism
- The findings of the *media analysis* in a number of daily and weekly newspapers and magazines over a period of three months in 2002.
- The overall amount of coverage; also expressed as a percentage of the editorial content of each newspaper/magazine.
- The subjects covered and the relative amount of coverage of various content categories (health, environment, technology, etc), expressed in percentages.
- An analysis of coverage according to the "type" of coverage, ie news-related vs features.
- The evaluative tone of the coverage (positive / negative).
- How important visuals and infographics are, and how many/what sizes are used.
- How much of the coverage is about benefits and risks respectively.
- How much deals with controversial aspects (to be defined) of science and technology.
- The prominence given to science and technology coverage.
- The incidence of "quasi-sciences" as serious science.
- The source of the story or visuals (foreign sources? news wires? local sources? Local scientists?).
- The profile of the reporters involved (how many dedicated science writers? Also, how experienced?).

18:00 - 19:00

British Council Reception and poster viewing

20:30

PCST Committee meeting

6 December 2002, Friday

Plenary Session 2

Theme: Science and art

Room: LT 1

Chair: Adi Paterson, Department of Science and Technology, South Africa

08:30 - 09:15

Dan Dare at the Cosmos Ballroom* - Contemporary art takes on science: Siân Ede, Gulbenkian Foundation, UK

Siân Ede has been long involved with encouraging artists to engage with new science. In this address she will discuss some of the most impressive ventures and a few of the less successful ones and ponder whether science isn't becoming the new art.

* The title 'Dan Dare at the Cosmos Ballroom' is taken from a poem by John Hartley Williams in new anthology of poems addressing science, edited by Jo Shapcott and produced by the Royal Institution and the Gulbenkian Foundation.

09:15 - 09:45

New ways of taking science to people: Frank Burnet and Ben Johnson, University of West England, UK

Graphic Science is a research and development unit based at the University of the West of England, Bristol UK. We develop new ways of introducing science into public domains.

Characteristics of our work are:

- Audience research and targeting
- The use of public spaces as generic venues
- Detailed evaluation
- Project transfer to new media, new locations and new communities.

We will use one project from our portfolio *Science on the Buses* to illustrate these features of our work showing how a project that originated in the UK has been taken up in China, the US and most recently every member of the European Union. The project uses posters on buses to take a message about the centrality of science to everyday life to 16 to 25 year old passengers.

Results of in-depth evaluation of the impact of the posters on their target and non-target audiences will be presented which shows the ability of colours and graphics to attract and hold the attention of a specific audience. The data also provides useful information about the most effective ways of conveying messages through text and insights into the depth at which the intended message of the posters is received by different age groups and across different cultures.

The overall aim is to combine the giving of practical help and advice to others planning similar initiatives and to explore some of the conceptual issues raised by work of this kind.

09:45 - 10:15

Communicating science through visual art: Eric Heller, Harvard University, USA

I am attempting to bring a difficult but important subject directly to non-experts through art. I am finding that physics and quantum mechanics are no different from social issues or other abstract fields: art can have a big impact on the public consciousness, communicating awareness and appreciation of relationships never seen before except by a few experts.

In recent years, I have combined my scientific and artistic urges to create large format, high resolution semi-abstract computer graphics that draw on my research and constitute art. I want the viewer to sense that the quantum world is mysterious and fascinating, a place very different from what we see with the unaided senses. The computer provides a window into this strange, often chaotic realm, where particles are so small that they can only be described, and not seen directly. An important aspect of my work is that it shows the mutual interactions between science and other humanistic activities. I am trying to convey the mystery and beauty of discovery, and the pleasure and delight of the quantum world. I am using physics as my brush.

A sizable exhibit of my work has been traveling for two years. I will report on my experience with this kind of public outreach and prospects for future public scientific discourse and dissemination through art.

10:15 - 10:45

Communicating with the public through symposia and other events on science and the arts: Brian Schwartz, The Graduate Centre of the City University of New York, USA

Over the last few years there have been major triumphs in communicating science to the public with such plays as *Copenhagen*, *Proof*, *QED*, *Fermat's Last Tango* and the Oscar winning movie *A Beautiful Mind*. This paper describes various successful public programmes aimed at communicating science using the theme "Science and the Arts". For example, to celebrate the centennial meeting of the American Physical Society in 1999 the author produced an 11-panel artistic wall chart entitled, *A Century of Physics* <http://timeline.aps.org/APS/Panorama.html>. A citywide Physics Festival was also organised under his direction. This included: the Science of Dance with the Atlanta Ballet, Fractals and Chaos with the Atlanta College of Art, the Physics of *Star Trek*, the Science of Beer and more. Very well attended public symposia were organised in New York and other cities (including Copenhagen) on Science and Theater in association with the plays "*Copenhagen*" and "*QED*". Some of the participants in these public programmes were Michael Frayn (the playwright) Michael Blakemore (the director), the actors in

Copenhagen, (actor Alan Alda from "QED"), Hans Bethe, Brian Greene, Gerald Holton, Heisenberg's son and Bohr's grandson. In 2001-2002 the public outreach programme at the Graduate Center on Science and the Arts featured dance, art and theater. The 2002-2003 season will feature music and literature. The author is currently producing a new musical based on the best selling book Einstein's Dreams by Alan Lightman. All of the activities describe above and more can be seen on the website <http://web.gc.cuny.edu/ashp/nml/artsci>.

10:45 - 11:00

 Coffee, Tea & Refreshments

**Parallel Sessions 19-24
are run concurrently**

Parallel Session 19

Theme: Networking and collaboration

11:00 - 13:00

Room: LT 1

Paper presentation

Chair: Paola Catapano, CERN, Switzerland

EUSCEA: A quantum leap for European science communication: Mikkel Bohm, Danish Science Communication, Denmark

Fifty-two professional science communicators from 39 organisations in 23 European countries founded in 2001, EUSCEA (pronounced "you see!"), the European Science Events Association. The aim of the new organisation is to exchange experiences of best practise in science communication, to exchange events, lecturers and exhibitions, to communicate across borders and to secure better financing of science events in Europe.

A science event is communicating science to lay people in new and often unusual ways, for instance standup chemistry at a central station, lectures on physics in an amusement park, guided excursions for schools to laboratories, competitions on the internet and so on. The aim is to show to the general public that science is interesting, fascinating and important.

Science events are usually organised as science weeks or science festivals. In Europe there are over 30 such events, based either in regional initiatives as for instance the Gothenburg International Science Festival or as nationwide events, such as the Science and Technology Week in Great Britain. Many new initiatives are under way, even as far north as the Iceland Science Festival.

One of the goals of the association is to give a helping hand to those countries that have not yet a tradition of popular science communication.

Proponents of EUSCEA come from the following countries: Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Slovenia, Spain, Sweden, Switzerland and the UK.

As the PCST conference is held right after the first EUSCEA general assembly in Germany in November 2002, this presentation will include a wide range of fresh ideas of how to communicate science, raise funds for science communication, exchange events and ideas across borders, languages and cultures

Collaboration creates the difference: Peter Burke, Foundation for Research, Science and Technology, New Zealand

Science and innovation have played a huge role in the growth and development of New Zealand as a trading nation. Improvements in transportation, refrigeration, pasture management; animal and plant genetics, manufacturing and technology generally have all contributed to the nations growth. Currently, the government is placing even more emphasis on the role of innovation and science as a means of creating further growth and improving the wealth and well being of the nation.

But despite the contribution that science has, and continues to make to the growth of the New Zealand economy, some members of the public are afraid, sceptical and concerned about some of the directions that science is taking and the possible consequences to them and future generations.

De-mystifying science and focusing on the benefits of education and innovation are critical to gaining public support for science. To this end the New Zealand government agencies involved in science have set up a number of formal networks so that they can collaboratively promote the benefits of science to the general public. This concept of "smart government" is being widely applied, and in a relatively short space of time some major success have been achieved.

The most significant one is the development of a national television campaign called "Innovation in a Minute". This will see the production of a series of

one-minute commercials highlighting different aspects of innovation broadcast, Monday to Friday in the main television news bulletin of the day between 6pm and 7pm. Several other projects have also taken place and others are being considered.

In a small country where resources are limited, the range of people to be communicated to is wide, collaboration and the pooling of resources is both desirable and necessary and has produced some highly successful outcomes.

Physics without borders - A global model for physics communication: Judith Jackson, Fermilab, USA

Particle physics is a thoroughly international science. For decades, the cost and scale of particle accelerators have given particle physicists no choice but to carry out experiments in large international collaborations at a handful of national laboratories in the U.S., Europe and Asia. Born of scientific necessity, these collaborations take on new significance in the post-September 11 world as beacons for open, free scientific exchange among men and women of all nations and across all borders. Yet, while the science is international, particle physics communication is almost always local. With few exceptions, each laboratory and each region communicates for itself, with little coordination or collaboration with the others. Yet, clearly, both management issues and scientific advances have profound implications for communication throughout the worldwide high-energy physics community. Cost and schedule problems at one laboratory, for example, immediately raise issues at other laboratories. Yet communicators rarely share strategic information or coordinate responses. Conversely, the triumph of a scientific discovery at one laboratory invariably builds on the work of physicists at other laboratories. Yet, the nature of discovery as a shared endeavor rarely comes through in the announcement of new results.

The paper describes a new model for international high-energy physics communication, with the formation of a world-wide collaboration of particle physics communicators from the U.S., Europe and Asia. It describes the collaboration's organisation, strategic plans and actions, with the goal not only of supporting international particle physics but also setting visible footprints for the significance of peaceful physics collaboration across all borders.

Promoting science awareness in the Pacific - The creation of the Pacific Science Communication Network: Roderick Lamberts, The Australian National University, Australia

This paper outlines phase 1 of a science communication project launched in early 2000, a collaboration between The National Centre for Public Awareness of Science (CPAS) at the Australian National University and UNESCO Pacific. The project's major goal was to scope and establish a Pacific Science Communication Network (PSCN). Related aims included;

- promoting science awareness;
- building skill sets;
- encouraging skills transfer;
- network building based on effective science; and
- communication with general audiences.

The two meetings discussed in this paper constitute phase 1, which aims at gaining an idea of the requirements of science communicators in the Pacific, and also to assess the level of interest in Pacific science communication.

The first meeting, held at CPAS in February 2001, was a skills building/transfer workshop for journalists enhancing science communication capacity and encouraging the training and mentoring of others in the region. The second, a forum for Pacific scientists (academic and Government) held in Apia, Samoa in August 2001, focused on establishing common science communication themes and facilitating networking across a number of States. An electronic discussion board is being piloted as a focal point for a fledgling Pacific Science Communication Network (PSCN).

The successes and future challenges are presented here. It is hoped that the discussion and sharing of experiences of this preliminary project at the PCST 7 conference will contribute both to stage 2 endeavours, and may also assist others with similar goals.

11:00 - 13:00

Room: LT 2

Paper presentation

Chair: Charleen Daries, Medical Research Council, South Africa

'In Cipro we trust' - *Bacillus anthracis* in the United States: Andrew Pleasant, Cornell University, USA

In the aftermath of the terrorist attacks in New York City and Washington, D.C. on September 11, 2001, an unknown source sent envelopes with the anthrax bacterium through the U.S. postal system. In a previous analysis of the BSE crisis in the United Kingdom, Sheila Jasanoff delivered an assertion that the UK reaction to BSE was "distinctively British" and that similar responses would not occur in the political culture of the United States. The acts of bioterrorism in the United States provide an opportunity for at least a limited comparison and a chance to analyse Jasanoff's assertion.

To maintain social cohesion and prevent what Jasanoff called "civic dislocation," the BSE crisis in the UK and bioterrorism in the U.S. reveal - at least in times of crisis - that the simple act of witnessing is not sufficient. A sufficient number of witnesses have to agree in order to create legitimate public knowledge. Thus, the mechanism leading to what Jasanoff calls "civic dislocation" seems to be more in line with a "tragedy of the commons" scenario. A tragedy of the information commons, with public knowledge as a common pool resource, is an outcome when the aggregate of individual witnessing fails to reach sufficient levels of agreement. A take-away lesson, be it about "civic dislocation" or a "tragedy of the commons", is that relying on insulated knowledge that ignores on the ground reality is a shortsighted approach to public policy-making.

Communicating about radiation: Problems with complex science, distrust and journalistic constraints: Sharon Friedman, Lehigh University, USA

Issues concerning radiation worry many people throughout the world. These include the health and safety effects of man-made radiation connected to nuclear power plants, nuclear waste storage sites, clean-up of nuclear weapons production facilities and global fallout from aboveground nuclear testing in the 1950s and 1960s. Naturally occurring radiation can also present health problems in the form of radon, which seeps into people's homes and is the second largest cause of lung cancer in the United States after smoking cigarettes.

This paper will review the many problems that scientists, government officials and journalists have while trying to explain the basics of radiation to the public. These include the complexity of radiation science and its terminology, and a significant communication problem related to what scientists believe and want to communicate about radiation and what lay people hear and want to believe. Another issue to be discussed in a case study will be past secrecy by the U.S. government at a nuclear weapons facility, which led to significant distrust of radiation information about the facility's impact on the health of citizens living near it. Finally, the many

problems journalists have with both understanding radiation science and policy and then explaining these issues to their audiences will be reviewed.

Several suggestions will be offered to ease some of the problems of communicating about radiation to lay people.

Risk estimation in rural social networks - The BSE case: opinion making in a community in northern Germany: Markus Lehmkuhl, Free University of Berlin, Germany

This survey in an exemplary way explores the reception of the first case of BSE in Germany. It tries to give proof of the great impact size and structure of communication groups have on the risk evaluation process and its results. The communication groups were evaluated in the framework of a network study carried out in a northern German village with 820 inhabitants.

Apart from the size of communication groups, the participation of farmers in the communication networks turned out to be of crucial importance for people's knowledge of and attitudes to the BSE subject.

The survey's result supports the theory of a "two-step flow of information". Those who have only seldom discussed BSE with others, know less about the disease than more active communicators. From this one can derive the thesis, that conversation plays a crucial part in bringing mass media information to the recipient. This is particularly true for less educated segments of society.

Social engagement with health research - An outcome based assessment approach: Shyama Kuruvilla, World Health Organisation, Switzerland, Andrew Pleasant and Bruce Lewenstein, Cornell University, USA

Over the past century, the most important advances in health care worldwide have been knowledge-driven and the health of particular national or regional populations has been shaped by how this knowledge was generated, distributed, and used. The level of utilisation of this knowledge, however, is often seen as inadequate (with "utilisation" defined as the process by which various groups in society -- including policy makers, health practitioners, and the public -- interact with health research based on their needs).

An understanding of how knowledge produced by health research is utilised and what hurdles prevent fuller utilisation is lacking. A systematic assessment of utilisation and the expected outcomes from health research -- such as health system performance, health, health equity, and social and economic gains -- is clearly warranted. There are at least three dimensions of health research utilisation -- in policy-making, in health care practice, and in social engagement. Desired outcomes of the interactions

between social engagement and health research include improved health literacy, increased trust and social support for health research, and research-informed changes in health behaviour leading directly to health gain.

This paper focuses on the development of a methodology to assess social engagement with health research; it outlines the parameters and theoretical constructs informing a broader outcome-based assessment of health research systems. This project will contribute to a better understanding of the structural and communicative relationships influencing social engagement with health research.

Parallel Session 21 Theme: Environmental communication (B)

11:00 - 13:00

Room: LT 3

Panel discussion

Chair: Mike Bruton, MTN ScienCentres, South Africa

Communicating the Coelacanth Initiative: Margot Collett, South African Institute for Aquatic Biodiversity (SAIAB), South Africa

The South African Institute for Aquatic Biodiversity is a National Facility within the National Research Foundation. Initiatives like the South African Coelacanth Conservation and Genome Resource Programme form part of the new service-driven role of the Institute where education and public programmes play an important part in disseminating scientific information.

Partners

The South African Coelacanth Conservation and Genome Resource Programme is a large, multi-disciplinary, collaborative programme, presently involving 24 partner organisations.

Public awareness strategies

The public awareness campaign includes raising science awareness nationally and internationally to create enthusiasm and positive action from stakeholders and the general public. The coelacanth is an icon for marine conservation and its presence in the South African deep waters provides an opening for research, and an increase in awareness in areas such as marine biology, oceanography, geoscience, population genetics, genome resources and environmental education.

Environmental education products and services

A purpose of the programme's environmental group is to make science popular and accessible through developing educational material and programmes which ensure change in attitudes of teachers, school children, communities and general publics.

Funding

The Department of Arts, Culture, Science and Technology (DACST) made a R10 million commitment as core funding and leverage for future fund raising. Additional funding, support and sponsorship have enabled the programme to realize two wide-ranging expeditions, various workshops, exhibitions and development of educational resources.

Hot at the South Pole? Discover the adventure of polar and marine research: Margarete Pauls; Alfred-Wegener-Institut für Polar- und Meeresforschung, Germany

Antarctic research is still an adventure that fascinates many people, on account of the critical scientific questions involved and the secrets that our planet and the sixth continent keep. Scientists from the German Alfred Wegener Institute for Polar and Marine Research (AWI) carry out interdisciplinary research in the Antarctic. How are the results of this fundamental research publicised? Examples from the German Geosciences Year 2002 and from international collaborations answer this question in an attractive presentation.

In Germany, 2002 was the Year of Geosciences with the Science Dialogue *planet erde*® - an initiative of the Ministry for Education and Research and the large science organisations, to intensify dialogue between the public and scientific communities. The AWI has been active for many years in public understanding of science. I will describe our highlights from the Geosciences Year 2002: The science show "Ice worlds" and the exhibition "Ice and Sea". Focus is also placed on Antarctic research, which is a good example of practical, comprehensive international collaboration. Particular to marine and polar research is interdisciplinary collaboration. Today, many scientists from many nations and disciplines are working worldwide in large scale, joint programs, such as the world climate research programme, to understand the earth system, climate, the ocean and the ice. The media and a lot of people are very interested in this environmental science.

The evolution of state of rivers reporting in South Africa: Wilma Strydom, Ernita van Wyk, Gillian Maree and Tinyiko Maluleke, CSIR, South Africa

The River Health Programme (RHP) is a national monitoring initiative that measures and reports on the state (or health) of South Africa's river systems. Since the first State-of-Rivers (SoR) report on the Crocodile, Sabie-Sand and Olifants River Systems, the RHP has produced another two reports and a poster.

The first report was a pioneering publication that paved the road for improved science communication within the RHP. Its publication was however, followed by the disenchanted realisation that this product did not have the desired impact on the defined target audience. The review showed that few resource managers read the report in full, and that the public at large found the level of information somewhat overwhelming. All scientific conventions were thrown overboard with the second, softer, coffee table-style report, the *State of the Letaba and Luvuvhu River Systems*.

This paper describes the reporting process, the response of the target audience and the challenges experienced during the production of soft science communications. The challenges include dealing with stakeholder expectations, the interpretation of aggregated data as well as the fears and resistance of scientists to soft communications. Key lessons were learned from the SoR report evaluations and this consequent continuous learning approach can be used to improve future RHP communications.

Science @ Environment Canada: Paul Hempel, Environment Canada

Environment Canada has created a suite of communications products to present its environmental science to a broad domestic and international audience, in English and French, through an imaginative combination of print, electronic and Internet media.

The department has developed a systematic approach to solicit and promote the myriad story ideas that flow from its scientific research and policy and public outreach initiatives. These include issues, ranging from climate change and environmental technology through to habitat stewardship and weather phenomena. A strategic editorial team determines which ideas are worked up into a print, radio and/or online magazine story.

Science and the Environment Bulletin, is published every two months in print, and rolled out every two weeks online. Each edition consists of five to eight articles, mirroring topical issues, and adding to a library of accessible science information.

EnviroZine is the department's online newsmagazine. A full edition is uploaded each month, and updated daily with weather trivia, and throughout the month with news and related links.

Planet Update, a series of four 60-second audio clips, is created monthly and broadcast on 102 radio stations and is integrated online. A web-based distribution service is being developed.

The *Green Lane*, the department's Internet presence, is the heart of science communication and integrator of *Science @ Environment Canada* products. It has helped to create a loyal and farreaching audience which can self-select the science information that suits its interests and needs.

Parallel Session 22

Theme: Inspiring the young - science communication for the future of science

11:00 - 13:00

Room: 2B

Ideas sharing session

Chair: Wendy Sadler, Science Communication Consultant, UK

Science communication at the CSIRO: Chris Krishna-Pillay, CSIRO Education, Australia

For more than 75 years, Australia's CSIRO (Commonwealth Scientific and Industrial Research Organisation) has carried out research into an extremely diverse array of fields. Our work touches just about every aspect of Australian life.

Communicating our research and its implications has been a feature of CSIRO for many years and this is achieved via several different channels. As well as employing communicators in each of its research divisions, CSIRO also operates CSIRO Enquiries, CSIRO Publishing and CSIRO Education.

CSIRO Education operates a range of exciting science education projects. These include the Double Helix Science Club (including *The Helix* and *Scientrific* magazines), the CREST Programme, the Student Research Scheme, Science by Email and Lab on Legs. Chris Krishna-Pillay manages CSIRO Education in Victoria, the largest of the CSIRO Science Education Centres. In Victoria, CSIRO Education has face-to-face contact with about 80,000 of the 250,000 people who experience CSIRO Education programs nationally each year. This contact ranges from intensive practical workshops to demonstration shows and theatre productions. Developing and promoting new educational programs is a balance between explaining basic scientific phenomena, communicating CSIRO research and meeting the needs of the school curriculum.

As curriculum content has increased, so have demands on teachers. More and more teachers are turning to extension activities to assist them and to augment their classroom activities. It is in this role, as part of greater learning units within a student's whole school experience of science that CSIRO Education programs are most powerful.

Science communication, public understanding versus professional careers: Hendrik Snijders, Stichting Weten, The Netherlands Foundation for Public Communication on Science and Technology

It is a widespread misunderstanding that the inflow in natural science and engineering is decreasing. Over the past decades this inflow has remained remarkably constant in the Netherlands, at least on the university level. This means that increasing problems in the labour market are not caused by changing interest among students, but by changing demands in the labour market. These changes in the labour market will differ from country to country. In industrialised countries transitions take place from production to service industry while developing countries are changing from agriculture to production industry.

Thy myth of the decreasing inflow in natural science and engineering was 'discovered' by independent

organisations, which are mainly financed by the government. Getting money from the government and keeping your independence is quite common in the Netherlands; some say it is a typical product of the so-called Dutch polder-model.

To fulfill the labour market needs in the fields of the natural science and engineering, educational innovations are necessary. When the product is not changed, the inflow will not improve. Organisations in the field of science communication should not focus primarily on professional careers. Bridging gaps between science and public is the main issue. As far as professional careers are concerned, science communication can help to bridge the gap between different scientific cultures.

Brighter future in mind for science education in Australia: Tony Sadler, Bright Minds Project, The University of Queensland, Australia

Students in the formal education system are turning away from science. The reasons are many and complex. The effects in our communities are already evident and are likely to be far-reaching. But there is a widespread desire to reverse the disinterest and animosity to science, so how do we address such a complex problem? Different responses are required dependent upon age, education level and location.

Come on a Bright Minds™ project journey in this talk to experience and judge for yourselves the vision and achievements of a philanthropist and a team of scientists, teachers, writers, graphic designers and students in the sub-tropical setting of the University of Queensland (UQ) in Australia. This multi-media presentation gives evocative glimpses of what is in store for primary and secondary level students and teachers in the University of Queensland catchment area over the next few years and even beyond if all goes to plan. The key to the Bright Minds™ project is that it is a multitude of projects within a project. The resulting products are engaging the students and teachers through all the formal and informal communication channels to awaken and sustain interest in the new biologies.

UQ Science Ambassador, Teacher-Scientist Partnerships, and www.brightminds.uq.edu.au are three products to demonstrate some dimensions of our iterative, all-pervasive, sustained communication of new biologies into the curriculum and homes of target students, teachers and parents. We give a glimpse of the innovations for introducing these and the other Bright Minds™ products into the education system.

Physics on the move - Taking hands-on science to South African high schools: Jeremy Dodd, Columbia University, USA

Scientists, educators and administrators from South Africa and the United States have teamed up in a new programme of physics outreach, aimed initially

at disadvantaged high school learners in the Gauteng and Western Cape provinces of South Africa. The project is based on a mobile physics laboratory, accompanied by scientists, teachers and university students, equipped to run a physics programme and to provide teacher support. The physics programme includes visually exciting and theatrical demonstrations, an "Exploratorium", and a variety of hands-on laboratory experiments targeted at high school learners. Informal sessions planned as teacher support are aimed at developing simple resources and providing training for physics demonstrations, and optimising the use of the local facilities at each school.

July and August of 2002 saw the first visits of the mobile lab, to more than thirty schools and communities in Gauteng and Western Cape. Two teams from the US, comprising scientists, teachers and students, were joined by students and staff from local universities and labs, and by local educators, in visits to township and rural schools and community centres.

The pilot project appears to have been extremely successful. A programme of activities and equipment has been developed for bringing the excitement of science into the classroom, for giving learners hands-on experience of experiments that are directly related to their high school curriculum, and for demonstrating that physics is relevant in everyday life. We are now developing plans to strengthen and expand the programme for the future, with the primary goal of making it locally sustainable.

Parallel Session 23 Theme: Conceptual developments in science communication (A)

11:00 - 13:00

Room: 4A

Paper presentation

Chair: Vladimir de Semir, Pompeu Fabra University, Spain

Knowledge management challenges for PCST in the knowledge-based society: Pierre-Marie Fayard, University of Poitiers, France

Knowledge Management (KM) is above all problem-oriented within groups, organisations and communities. It aims to mobilise diverse know-how and knowledge from heterogeneous people who gather on basis of shared and common interest. Two main orientations (non-exclusive) for conceiving and applying KM could be considered depending on focus put on explicit or tacit knowledge (cf. Nonaka I. & al. from 1991). In the first case, information technologies play a major role, though in the second, communication devices and human interactions take the lead to produce creative collaborations and useful knowledge for communities' necessities.

Current PCST activities are mainly content-oriented. The importance and interest of scientific content in itself are used to legitimate and validate the activities. So they might appear as rather isolated in society and attractive above all for people previously convinced of the importance of science and PCST, ready to participate without any fear (about risk of feeling unable to understand and to appear as stranger or excluded). The main concern for PCST should be to reveal itself as an activity devoted above all to "science literate people". Though, taking into account historical three dimensional project of PCST

that aimed: to recreate community links between the world of science and society at large, to make available specialised knowledge for non-specialists, and finally to enable people to be smart and creative, concepts and methods of KM could provide stimulating orientations and devices for PCST to act as a positive contributor in development. Being part of community processes that are problem-solving and knowledge-solving orientated, PCST might act as a less visible contributor but yet be more effective.

This paper will discuss strategic and tactical issues and implications for PCST to adapt to its so called Knowledge-based Society. Some case studies illustrate ways public communication of scientific contents is no longer an isolated and independent activity but becomes part of a social process that co-generates useful knowledge.

Engagement - A new conceptual key of PCST: Hak-Soo Kim, Sogang University, Korea

We tend to ignore how people come to be engaged in science and technology. We tend to stress how we can influence people to learn science and technology. We focus on efforts of scientists or science educators, who are information producers or providers, rather than on a process of engagement of nonscientists, who are information consumers.

The concept of engagement is based on an information consumer's perspective. Thus, engagement is a key to PUST, and so, PCST is a key to engagement. Engagement is a process of dynamic behaviour. It is not a state of involvement that is commonly identified with. If we conceptualise engagement well, we could know how to improve both PCST and PUST.

This paper will show a new conceptualisation of engagement and then how PCST can improve engagement and PUST. Further, we will show an example of how South Korea's poor PUST could be improved by new PCST activities.

Two cultures - an uneasy alliance between education and communication: Jeff Thomas, Centre for Science Education, The Open University, UK

Those classed as science educators have traditionally upheld different values, practices and cultures than those concerned with science communication. But for both communities these are anxious times. In the UK for example, most of the controversial science-based issues – GM foods or cloning for example, present to the public a version of science that is unsettling, uncertain and fast-moving. Such issues are inextricably bound up with social values and individual feelings. This is a far cry from the detached and purportedly reliable domain that comprises the fact-laden science of school experience.

Curriculum developments are now underway that offer 'science for all' – and a brand of science that is of greater relevance and value to citizens. In a parallel though disengaged process, science communicators are attempting to make the subject more appealing to adults and yet seem set upon offering top-up science that supposedly rectifies the deficiency of school education. Can these two communities have anything to learn from each other?

A shared objective is the development of science for *citizenship*. Many of the forms of dialogue with the public that are currently being developed under a revamped PUS banner have features in common with changes in classroom practice at school level – where skills of argumentation and role play for example are seen as key elements in developing science awareness. This paper argues that science communicators and educators have much to gain by yet closer collaboration – striving towards an agreement of what type of science, and for what purpose should represent a common goal.

Parallel Session 24

Theme: Communicating biotechnology and biomedical sciences (A)

11:00 - 13:00

Room: 2A

Ideas sharing session

Chair: Helen Malherbe, Foundation for Education, Science and Technology, South Africa

Development of best practice communication strategies for public awareness on biotechnology issues: Sarah Brooker, Biotechnology Australia, Australia

Biotechnology Australia's public awareness strategies have been very successful in contributing to a more balanced and factual debate on biotechnology issues in Australia over the past three years.

Biotechnology Australia conducted one of the world's most intensive studies into public attitudes towards biotechnology in 1999. This was followed up with a tracking study in 2001 to monitor changes in attitude and to highlight new concerns.

Findings and methodologies from these major benchmark studies will be presented, along with some comparable statistics from Europe and America. The research provided an understanding of ethical concerns and risk perceptions, changes in attitudes and what has been driving these changes in the Australian public. It also provided clear information as to the most effective and influential mediums to use to reach the different 'publics' within a community. This includes the media, rural communities, educators and consumers.

The presentation will cover how Biotechnology Australia tailored a communication strategy to suit the Australian public's concerns, and steered the media debate away from a UK tabloid influenced debate to a more Australian-oriented debate.

It will cover the innovative approaches used to successfully engender a broad and moderate public debate on biotechnology – including GM food and crops. We will cover methodologies for attitudinal research, media tracking and strategy development. This model can be adapted to other countries.

Experiences in communicating biotechnology: Mary Vail, Science Education Partnership; Fred Hutchinson Cancer Research Center; Thomas DeVries, Vashon Island High School; Esther Levy, Biotechnology Para Todos; Rachel von Roeschlaub, DNA Adventures, Inc., USA

The concepts behind biotechnology and molecular biology are increasingly relevant to everyday life. Individuals who remain unaware of the principles and techniques underlying rapid advances in these fields cannot make informed decisions about their health, the environment, and public policies. One avenue for introducing biotechnology to the public is as formal education at the secondary level using local resources. Another, particularly in less technologically advanced areas, is to convey concepts less formally by taking advantage of local museums, international outreach programs, and individuals devoted to science education. Both approaches require science educators to become

familiar with biotechnology. This panel represents programs that address these needs.

The Fred Hutchinson Cancer Research Center's Science Education Partnership (SEP) and the University of Puget Sound's Project GROWS are programs that introduce basic biological concepts, training in laboratory techniques, and curriculum and materials for classroom implementation of biotechnology, notably in conservation biology. In places with little or no access to local resources, the process of disseminating the information is more challenging. Biotechnology Para Todos has provided instruction, laboratory training, and materials, and implemented curriculum developed by Bio-Rad's Biotechnology Explorer programme in such settings.

Our cumulative experience demonstrates that success with biotechnology education depends on the availability of curriculum developed locally and/or internationally; the expertise of local and foreign experts in biotechnology companies and medical or academic institutions; and an infrastructure of support provided by individuals committed to science education. We will discuss our organisations, curriculum, collaborations and lessons learned.

Does information matter? Media exposure, information and attitudes to biotechnology in the Italian public: Massimiano Bucchi, Università di Trento and Federico Neresini, Università di Padova, Italy

Public hostility towards biotechnologies is frequently attributed to lack of information, due to poor and insufficient media coverage. For this reason, scientific researchers and policymakers often call for journalists to give more attention to scientific issues, for better information campaigns and for more communication of science to improve general understanding and thereby lead to greater public support for biotechnologies and other innovations. In 2000 and 2001, with partial support from the Giannino Bassetti Foundation, we carried out two surveys of Italian public opinion attitudes. These were specifically to analyse the relationships between exposure to science in the media, information on biotechnologies, trust in science and attitudes to biotechnologies. A representative sample of 1,022 Italian citizens aged over 18 was interviewed by phone in September 2000; another representative sample of 1,017 citizens was interviewed in November 2001.

Our results confirm previous suspicions that the relationship between exposure to science in the media, information and attitudes to biotechnologies are much more complex and articulate. Substantive exposure to information does not always lead to greater trust in biotechnologies. We also find that greater exposure to science in the media does not necessarily mean a higher level of understanding.

A high level of information does not guarantee a positive attitude: 49% of the better informed respondents think that transferring genes into fruit or vegetables is useless, and 54% think it is risky. Embryo research fares poorly (60% in both groups consider it unacceptable), whereas cloning for reproductive purposes is even more severely judged by the better informed than by the less well informed.

If media exposure to science does not account for different attitudes to biotechnologies, what does? Attitudes appear to be rooted at a deeper, cultural level where values (such as trust and conception of risk) are heavily involved and media information does not reach. Public awareness of biotechnologies is increasing and the level of education seems more important than other factors in explaining attitudes in this area. So it may be wise to recommend that at least as much attention is devoted to science education – both in terms of research and of programmes and investments - as to mass-media communication of science.

Transgenic futures - Narratives of the medicine cow: Esa Väliverronen, University of Helsinki, Finland

In December 1993 researchers from the University of Kuopio in Finland announced that they had developed a transgenic calf by grafting the gene for human red cell growth factor. The innovation was described as the 'world's first medicine calf'. The promise was that eventually, the cow would produce milk that contains erythropoietin, a valuable protein that is used among other things in the treatment of anemias, cancer and AIDS. A company called FinnGene was launched to commercialise the product.

Two years later, FinnGene was taken over by a Dutch company, Gene Pharming Europe. The company announced new plans to create a herd of transgenic cattle in Finland to produce lactoferrin in its milk. They signed up local cattle farmers.

From the very outset the story of the medicine cow was constructed as a hero story, a symbol for Finnish know-how and the economic prospects of biotechnology. The great promise of *Morrow the Cow* brought together the national narrative of science ('Finnish research excellence'), the notion of science as a sports-like competition, the promise of conquering diseases ('medicine milk'), and the idea of genetically modified animals as 'bioreactors'.

The paper will analyse the construction - and later the deconstruction - of the 'medicine cow' in public discourse from 1993 to the present. I am particularly interested in the rhetorics of the future: the narrative shaping of future promises, the politics of naming and the role of the news media in producing and circulating images of new genetics.

13:00 - 14:00



Lunch and networking

Parallel Sessions 25-30 are run concurrently

Parallel Session 25

Theme: Communicating biotechnology and biomedical sciences (B)

14:00 - 15:30

Room: 2A

Ideas sharing session

Chair: Jennifer Thomson, University of Cape Town, South Africa

Evaluation of presentations to the general public with a biomedical focus: Khalipha Ramahlape and Valerie Corfield, Medical Research Council, and Francois Cilliers, University of Stellenbosch, South Africa

A research scientist traditionally devoted herself to arcane pursuits, but contemporary society demands that good science be done in a social context. To ensure that school leavers are attracted to a career in science, and that the public understands how science impacts on their daily lives, novel initiatives have been developed to expose these groups to cutting edge science.

The aim was to develop mechanisms to evaluate the impact of biomedical presentations to the public at large.

A pilot study focussing on an existing workshop on DNA science and its societal relevance was performed. A questionnaire to evaluate the impact of the workshop on participants' knowledge of the topic being presented was developed and applied. The workshop was presented three times, once to learners from the Cape Town International school, twice to teachers from previously disadvantaged primary schools in the Cape Peninsula, with questionnaires in English completed before and after presentations.

Having participants complete questionnaires before and after presentations proved viable. Ten learners and 33 teachers (out of 48 participants) of between 16 and 52 years of age completed questionnaires that yielded usable data. On average, participants performed better after (6,0/10) than before (4,7/10) workshops. Improvement in achievement was independent of participant status (learner/teacher). Informal discourse highlighted the need for bilingual and/or home language (Xhosa) presentations to target groups.

The workshop impacts positively on participant knowledge in these settings. The questionnaire will be expanded and utilised with other groups and the outcome of Xhosa language presentations evaluated.

Reporting contested science - Comparing media coverage of genetic explanations for sexuality and intelligence: Richard Holliman, Eileen Scanlon and Elizabeth Vidler, Open University, United Kingdom

The "Reporting Contested Science" Project is an Open University funded initiative that aims to document the relationship between the production, content and reception of media coverage of genetic research. This paper will present findings from this project through content analysis of newspaper

coverage of contested science. More specifically, the research compared media coverage of scientific research on genetic explanations for sexuality and intelligence through analysis of a range of newspapers, including tabloid, mid-market and broadsheet examples. This sample reflects the current diversity in the UK newspaper marketplace.

The central questions that this presentation will address include: how was the scientific research on genetic explanations for sexuality and intelligence represented in this sample?; were there common themes in the coverage?; what were the key differences?; which interviewees and sources were cited in this media coverage and how were they represented?; and were there challenges made to the claims made?

The results illustrate how representations which contested genetic explanations for sexuality and intelligence introduced a range of challenges to the evidence presented (e.g. by introducing environmental explanations) or to the credibility of the research and the researchers involved. The paper will conclude by considering the influence of media coverage of contested science on public perceptions of science.

PubliForum - A bridge between science and society: Sergio Bellucci, Swiss Science and Technology Council, Switzerland

One of the core objectives of the Centre for Technology Assessment (TA-SWISS) is the democratisation of science and technology. To achieve this goal, TA-Swiss conducts interdisciplinary studies on controversial technologies in domains like "Life Sciences", "Information Society", and "Mobility". These scientifically-based studies undertake to assess the consequences of new technological developments on society.

TA-SWISS also deems it important that the opinion of the population be brought into play early on in the decision-making process. This takes place by utilising participative methods known as the "PubliForum" and the "Publifocus". Citizens are drawn into the debate at a stage in which it is still possible to generate new perspectives and new solutions together.

Participants can have their voices heard early on in the policy-development process once they have been able to intensively delve into a given topic and to discuss the issues they judge critical with the experts in the field.

One topic known for its controversial aspects is "transplantation medicine". Not only the new technologies, such as xenotransplantation, but also

the problem of regulating the donation of organs, elicit feelings of uncertainty and give rise to controversial discussions. Switzerland is presently engaged in elaborating a new legal framework for transplantation medicine.

Anticipating the forthcoming legislation, TA-Swiss organised a PubliForum to launch a debate on the potential and the limits of transplantation medicine, thereby facilitating communication between the experts and the general public.

The results and the recommendations of this PubliForum will be presented and discussed.

Parallel Session 26 Theme: Links to education

14:00 - 15:30

Room: 2B

Paper presentation

Chair: Simon John, Consultant - North West Province, South Africa

Strategies for effective communication of environmental science to rural communities:
John Odiyo and PH Omara-Ojungu, University of Venda, South Africa

This paper presents environmental science education and community outreach activities as effective means of communicating environmental science to rural communities. Environmental science education offered at the school of environmental sciences, University of Venda for Science and Technology, South Africa is used to illustrate the use of environmental science education in communicating environmental science issues to rural communities.

The curriculum and research in the school are focused on the needs of the community and community outreach strategies. The taught courses and research are aimed at protecting natural heritage or restoring past environmental degradation in a rural setting. Direct dealing with students from the local communities enhances the communication of environmental protection and restoration issues to the local community. The students are sensitised on the need to create awareness on sustainable use of the environment.

The environmental advisory and assessment unit of the school drives community outreach. This unit receives all types of environmental management concerns from the community and uses its expertise to advise the community on appropriate approaches to resolving local problems. The experts assess the magnitude of the problem and recommend the path to resolution either through commissioned research or consultancy or joint action. Joint action solutions create an interface of interaction and make the community view the University positively as a service provider.

International perspective of environmental education - Applied research in the Philippines and Japan: Merle Tan, The University of the Philippines and Hiroki Fujii, Hiroshima Women's University, Japan

The study endeavored to widen the students' views of environmental problems to an international level. It also places a great deal of emphasis on development of scientific inquiry skills to empower students to take action and be able to apply scientific knowledge to real-life issues and problems.

The study compared the results of data from the Philippines and Japan on the following:

- Do the students recognize environmental problems in their community and the global nature of these problems?
- Does recognition of the problems generate interest in Environmental Education and change attitude toward the environment?

The study developed four instructional materials focused on global environmental problems: water pollution, forest destruction, air pollution, and waste management. These materials were organised into three to four lessons and based on scientific inquiry skills by using the experimental approach. The materials were used in the trial in school lessons, science classes in elementary and secondary school, to attain the objectives of the study.

The results of the trial and the evaluations through questionnaires and the drawing of a concept-map for the students showed the following:

- In both countries most students understood close environmental problems in their daily life and the global nature of these problems.
- In both countries many student developed some positive attitudes towards living things in the environment. But it depends on the contents of instructional material and teachers' knowledge and understanding of the interconnectedness of environmental systems.

Communicating science in the rural areas:
Matsontso Mathebula, World Books, South Africa

In this paper the author shares her experiences of the disheartening conditions under which science has to be taught in the rural areas which she sees as she conducts some workshops in the rural schools. The discussion covers lack of basic infrastructure needed for teaching science in the rural schools and the challenges presented to publishers, government departments, educators, parents and the learners themselves.

The main points discussed are:

- Lack of science teachers
- Lack of laboratories for teaching science
- Fear of science and a general belief that it is a difficult and extraordinary subject

- Making science part of everyday life and of growing up for a rural child
- Teaching quality science in the rural schools.

The author shares her personal story of promoting a genuine love and interest for science within her home using simple products. They were so well designed that she could use them successfully even though she is not a scientist. Without making the paper a marketing platform for the programme mentioned, she illustrates their value in helping promotion and enjoyment of science and argues that it is the approach to teaching science rather than the availability of sophisticated equipment or facilities that will facilitate teaching science in the rural areas.

The paper concludes in praise of such programmes; acknowledging a hope they bring to all people involved in the communication of science as well as challenging publishers to publish more of such materials.

Parallel Session 27 Theme: Conceptual developments in science communication (B)

14:00 - 15:30

Room: 4A

Paper presentation

Chair: Pierre-Marie Fayard, University of Poitiers, France

What are we communicating to the SA public?

Maritha Snyman, University of Pretoria, South Africa

This paper aims to amuse, shock, horrify and hopefully drive home a few lessons about how - or how not - to communicate developmental and educational messages about science and technology to the South African public.

Informed by theories of Development Communication this paper will present prevailing problems such as the literacy-bias, top-down communication practices, the disregard for the real life situation of South African audience(s) and the lack of participatory communication in practice.

Over a period of eight years, the author was involved in a number of research projects conducted from the perspectives of reception research, reader-focused text evaluation and usability testing. The principles and views of Development Communication formed the theoretical basis of a these research projects which focused on the printed media (brochures and pamphlets) distributed by state departments and institutions, parastatals, private enterprises and tertiary institutions.

Examples of communication going haywire will be taken from studies conducted by the author and post-graduate students of the MA programme in Development Communication.

The paper will conclude by recommending possible solutions to the important questions raised by these examples. In such a way the author hopes to help improve the current level of the public communication of science and technology for developmental and educational purposes.

From the 'two cultures' towards the '(multi)cultural' paradigm in science communication: José van Dijk, University of Amsterdam, Netherlands

In his famous lecture *The Two Cultures* (1959), C.P. Snow identified an unbridgeable gap between two hostile branches of knowledge: the (natural) sciences and the humanities. Despite Snow's explicit refusal to recognise any hierarchical relationship between the two cultures, the assumed gap has long remained the basis of theories involving science communication. Public communication of science has long built its theoretical and practical cases on the assumption of a sharp divide between a knowledgeable group of scientific experts and an ignorant public, poorly trained in the facts and minimally interested in the effects of science and technology.

However, the two cultures' opposition has long dissolved since 1959; instead, a 'postmodern' paradigm of science communication has taken root. Scientific knowledge is no longer a domain of knowledge that exists separately from the dissemination of its results. As Jean-Francois Lyotard claimed in 1979, the false opposition between science and humanities has effectively hidden the fact that science is actually disseminated through narrative, a discursive modality commonly ascribed to literature. In the twenty-first century, the author would like to argue in this paper of the postmodern condition of science has given to the '(multi)cultural paradigm' of science communication - a paradigm beyond the two cultures and the narrativation of knowledge. A (multi)cultural paradigm not only acknowledges the increasing cultural diversity in populations throughout the world, but also claims that instead of two, there are many cultures or disciplines involved in the construction and communication of science. And it is precisely from this diversity that a critical public understanding of science may benefit.

**Science centres in the Dutch stakeholder society:
Ben Kokkeler and Theo Kemperman, Dutch
Science Centres Association, Netherlands**

Science education and science communication in The Netherlands organises itself along societal mainstreams that are common to Northern Europe and Holland in particular. Seen from a purely organisational point of view, we deal with an unstable and highly hybrid range of organisational forms and patterns, highly depending on the dynamic interaction with a range of stakeholders.

As from the mid Nineties, several social developments as well as policy developments on a national level have led to a certain amount of mainstreaming of science education and communication in The Netherlands. One of the main results of this process, is the Dutch application of an internationally well known phenomenon: science centres, in the Dutch context developing as nodes and hubs in a myriad of mainly bottom up, public-private initiatives.

In this paper, the authors, in their capacity as two of the cofounders of the Dutch Science Centres Association, describe and analyse the development of the science centres in the Dutch societal context. The analysis is focused on a particular feature of the Dutch context: the multifaceted context of stakeholders from as well the public as the private sector that the management of a science centre has to deal with. Resulting in a colourful network of centres, as a diversified response to a dynamic, swiftly changing environment. Each centre is shaping its own niche in order to secure access to and interaction with a wide variety of parallel micro systems.

Regarding the focus of the PCST Conference, the authors will also reflect on international developments as well as on the way in which Dutch science centres try to enhance the access for and the interaction with groups from different cultural backgrounds.

Parallel Session 28

Theme: Scientific uncertainty and science communication

14:00 - 15:30

Room: LT 1

Panel discussion

Chair: Sharon Friedman, Lehigh University, USA

Panel discussion led by Sharon Friedman, Lehigh University, with Sharon Dunwoody, University of Wisconsin-Madison, Julia Corbett, University of Utah, USA and Edna Einisedel, University of Calgary, Canada

The role of scientific uncertainty is an extremely important one in science communication and is often handled poorly by journalists attempting to simplify complex scientific issues for the public. For example, they often do not convey the complexities, ambiguities and controversies that are the visible manifestations of scientific uncertainty. Audiences often respond to such reportage in an uneasy or even angry manner. For example, when scientists advise people to avoid eating or drinking a particular substance to improve their health, some people angrily accuse scientists of changing their minds too often about such advice. People also become upset because scientists cannot offer them surety about whether they are at risk from an environmental hazard because of scientific uncertainty. In

controversial areas of science, where policies often are set before scientific verdicts are rendered, the mass media play an important role in influencing people's perceptions of uncertainty by, among other things, highlighting disagreements among scientific experts.

This panel will review some of the basic problems related to interactions among scientists, journalists and the public related to scientific uncertainty. Some issues under consideration for discussion include dioxin, anthrax, climate change and water-borne health threats. Panel members will make suggestions and encourage audience discussion on how to help journalists more effectively report about scientific uncertainty.

14:00 - 15:30

Room: LT 2

Paper presentation

Chair: Anusuya Chinsamay-Turan, Iziko Museums of Cape Town, South Africa

Integrated and customized science communication - Reaching diverse audiences through diverse projects: Erik Jacquemyn, Technopolis, Belgium

Science communication can be seen as an overall product to fulfill the mission "bringing science closer to people". It should not be one product but a range of products, each developed for a specific target group, with a target corresponding to the mission.

Different target groups (infants, youngsters, seniors, handicapped, families) must be approached with different projects according to concrete aims (sensitising, dispelling fear, raising interest, influencing career choice). Audiences are reached best when the product used, links to their natural environment and daily life.

Examples of diversity are plenty: interactive puppet theatre (infants), edutainment-show "fear of switches" (seniors citizens), Enough creativity can turn common looking things (books, puppet show, calendars) into perfect science communication instruments. Often people are surprised that the content of a product is science. This surprise leads to curiosity and learning attitude.

Science centres can be the core of a range of science communication products. In marketing terms, these centres are the core-product. All the other products are side-products or, from a science centre point of view, outreach activities. In the past decade this strategy of integrated marketing was realised in Flanders (Belgium) resulting in a unique situation:

- the science centre Technopolis, the anchor for science communication (reaching 300 000 people yearly)
- a variety of outreach activities (reaching 150 000 people)

The cross-fertilisation of science centre / side-products creates one coherent image of science being fun, educational, correct, unbiased but at the same time appealing through the diversity.

Sustainable development bridges the gap between zoos and science centres: Walter Staveloz, ECSITE, Belgium

Zoos, aquariums and botanical gardens have evolved separately from science centres/museums most of the time. Both fields seemed to have good reasons not to co-operate. Even more, we could speak about competition if not of hostility between the different institutions. Several surveys initiated by individual institutions showed evidence of the different kinds of public for the two fields. Botanical gardens for example seem to attract on average more elderly people. Science centres are the champions of the visits of school groups. But everyone has to compete in the leisure market. Some minor changes appeared through the growing interest in natural history museums, for example to complete their collections with interactive, hands-on exhibitions to attract the younger public.

Today there is a very clear trend towards greater understanding of each other and possible co-operation. From a rapid analyses of the reasons for that new trend, it seems that zoos, aquariums and botanical gardens are faced with increasing questions from their audiences about environmental issues. Of course a lot can already be found in these institutions on these matters, but we notice that many of them are looking towards science centres/museums to find available scientific answers and communication tools to adapt to these new demands. Science centres/museums are willing to learn from the ability of the other field in attracting new audiences. One of the new major ECSITE members, the Nausicaa aquarium in France, stimulates a lot of dialogue between the two fields in order to come to a common strategy and involve the public in practical campaigns for the preservation of the environment. That is a challenging strategy that needs a lot of discussion and new practice on both sides.

The Multi-Platform approach - The vision, the science, the outreach and the presentation: Terry Hutter, Exploration Place, USA

In a diverse society, science centres must be both culturally engaging, as well as supportive of scientific principle, to achieve a relevant role in their community. This awareness acknowledges community-based self self-definition and interpretation, yet, maintains a mission of still being a "place for everyone." Creative insight, as well as a multi-platform mode of displaying exhibits, programs, and presenting relevant science to the public is vital to the challenge of diversity. This approach lends to inclusiveness, credibility and approval within the community, but still maintains cogent public communication and marketability.

Life long learning begins with play - a process that is defined through culture, and educational awareness. A fundamental of this process is hands-on learning. Both the science museum and the children's museum can be effective venues for promoting sound science, educational methodology, all with a cross-cultural understanding.

Don't lose sight of the prize. An evolving trend in "museums" is to become more open and accessible to the larger community. However, the trick in accessibility is to keep a focus on inclusiveness and the basics of science, and not a free-fall into commercial marketability.

Sustaining serviceability in one's region is a challenge that can be managed through a mix of innovative programs, exhibits, educational outreach and interactive live theater. The author will share successful approaches, TESL examples, art and science linkage and display examples of engaging live theater presentations.

Parallel Session 30 Workshop

14:00 - 15:30

Room: LT 3

Workshop

Chair: Suzanne King, People Science and Policy Ltd., UK

**Social sciences and science communication:
Suzanne King, People Science and Policy Ltd.,
UK**

Increasingly scientists need to listen to the public as well as talk to them. This workshop is an opportunity to share your experiences and ideas and to learn from others at the conference. Based on examples from the UK and elsewhere we will cover: techniques to help you understand your audiences and different ways of thinking about your audience; matching the formats to the audience and your objectives; ways of listening to "hard to hear" groups in society; and how to evaluate the impact of your activities as well as the delivery process, so that you can improve what you do as well as report back to sponsors. By the end of the session you will have some new ideas on how to make your activities more sensitive to those you want to engage with so that you can listen and understand as well as talk to them.

Participants should come ready to discuss issues they want to address, so that the group can develop different ways to approach issues and the impacts of different cultural and development situations. In true dialogue style, the workshop will require full participation and involve dividing into smaller groups, using facilitation techniques, for some of the time.

15:30 - 16:00

 **Coffee & tea**

**Parallel Sessions 31-36
are run concurrently**

Parallel Session 31 Theme: Visualising science communication

16:00 - 17:30

Room: 2A

Ideas sharing

Chair: Bernard Schiele, University of Quebec, Canada

Design and science: Birgit Mager, University of Applied Sciences in Cologne, Germany

Design creates new ways of research communication that allow for a more exciting transfer of information. In order to improve the dialogue between science and the general public, design plays a decisive role in visualising research projects and results in order to make them understandable to the public.

Just last fall, the members of the Six Countries Programme (6CP) strongly suggested a fusion of the innovative areas of science and the creative community. The 6CP declared "creativity" one of the main topics for the near future.

At the design department of the Cologne University of Applied Sciences, the research project "Research

Goes Public" has been working on the development, trial and documentation of innovative strategies for research communication since June 2000.

The contribution to this congress, "design and research", presents an innovative strategy for communicating science and research projects. A selection of projects and specific examples illustrates how professional design can create new ways of research communication that allow a more exciting transfer of information.

Designers are experts on interfaces - not only for those of products, but also of the transfer of information and knowledge. They map out convincing strategies for visualisations and explain complex information, using distinct images and understandable, interactive processes.

Research communication can appear with a variety of different interfaces: It can be lightweighted and playful, humorous and impulsive, even erotic. It can also be serious or mysterious, pleasant, dangerous or trustworthy. The design of the process of visualisation and transfer strongly influences the understanding and impact on an audience. Research can become an unforgettable experience for the general public and have a lasting effect that creates enthusiasm. Design is an aspect that does significantly contribute to such processes. It will have to obtain a strong position in research communications in the future.

Exploring linkages between science and art to communicate science: Bobby Cerini, Science Year, UK

In exploring issues of accessibility and engagement, Science Year has supported a range of science-art initiatives around the UK including regional and national science theatre programmes, a professional touring science circus programme and collaborative science-art installations. The arts have been used in all these cases as a tool to communicate and debate science, rendering it accessible to even the most disenchanting of our audiences, whilst the science has served as a gateway to new forms of artistic expression and collaboration. In this session we will explore some of the key art-science programmes developed and delivered during Science Year and outline the various commitments to science art programming within the UK.

Representing climate change futures - Developing the use of images for visual communication: Sophie Nicholson-Cole, The University of East Anglia, UK

Climate change has potentially profound implications for future society. How people perceive their role and the responsibilities of others in determining future climate is of great importance for policy-making, adaptation and climate change mitigation. However, for many people it is a remote problem and not one of personal concern.

The way in which information about climate change is represented affects an individual's interpretation and uptake, and how they see their present choices affecting their future and that of others. Visual communication has the potential to encapsulate abstract ideas and may carry great affective resonance. Visualisations of climate change therefore have considerable potential as a medium for communicating messages about climate change that aim to influence people's behavioural intentions. The effectiveness of visual representations of climate change as a stimulus for behavioural change has not been tested and is likely to depend on how people interpret and respond to such images.

My research aims to evaluate how visual images can be used as a means to stimulate public willingness to engage with climate change and different policy options. Firstly I present the results from 30 semi-structured interviews designed to explore how people spontaneously visualise and relate to climate change. I then present the methodological options for Phase Two, which will take place in February 2003. A series of focus groups will investigate the extent to which people are moved by visual images of climate change. The results will have applications in environmental education, science and risk

communication and in public participation exercises related to climate change policy.

IKS amongst artisans in India and South Africa: Hester du Plessis and Gauhur Raza, Technikon Witwatersrand, South Africa

The knowledge base and indigenous technologies within which craftsmen produce their artefacts have been transmitted through generations using ancient technologies and the oral traditions. The advent of modern institutions, including western science and technology, has left these craftsmen isolated due to their marginal role in the world-market economy. The realisation that craft based knowledge systems may have ecological and economic sustainability in the modern world has led to a re-evaluation of their contribution to society.

Indigenous Knowledge Systems and Technologies (IKS and T) in the developing world have only recently been recognised as being a part of the S&T wealth of the former colonised countries. At the same time researchers realise more and more that none of these colonised countries were spared the deployment of colonial manipulation of science and technology. In an effort to de-colonise research and research methodology on IKS, the motivation for the implementation of an organised structure within which such research can take place needs to be formalised. A need exist for the documentation of these knowledge bases. Such a documentation process forms part of a debate around the re-formulation of the basic concept of what research and research methodologies entail.

The cultural gap between the socio-economical conditions of the west and the developing world is currently recognised as a problematic aspect that impacts greatly on IKS research methodologies. The inability to understand culture also inhibits the pace of acceptance of science and technology in a society.

This paper describes the development of a research methodology to study IKS in combination with the study of the public attitude towards and understanding of science (PAUS). The role of culture, tradition, colonialism and education systems within changing political dispensations was initially studied and then developed into the formulation of a suitable questionnaire to use during field surveys.

The research project consisted of two teams. The one team consisted of scientists who have experience in doing research on PAUS at the National Institute of Science, Technology and Development Studies (NISTADS), CSIR, New Delhi, India for the past 12 years. The other team consisted of artists from the Arts Faculty, Technikon Pretoria, South Africa.

A book was published as a result of this project: Raza, G & Du Plessis, H. 2002. *Science, Crafts and Knowledge*. Pretoria. Protea Boekhuis.

16:00 - 17:30

Room: LT1

Panel discussion

Chair: George Claassen, Stellenbosch University, South Africa

Science in the news - A cross-cultural study of newspapers in five European countries: Richard Holliman, The Open University, UK

This study has been generated from material constructed as part of the ENSCOT (European Network of Science Communication Teachers) project. As part of this project, researchers in five different countries are preparing teaching materials on aspects of science in the media. In the proposed paper, we will present initial findings from a "snapshot" of science reporting in French, German, Irish, Spanish and United Kingdom newspapers during April 2001. Science stories or science-based stories were collected from newspapers in each country over a fourday period. We compiled print media samples for each country that were intended to reflect some of the diversity in the newspaper marketplace. In each of the country samples there were popular or mid-market newspapers with no specialist science staff as well as (mainly) elite newspapers with science editors, science correspondents or other designated specialists in the domain. For the study, we developed an inclusive definition of a science-based story and applied it across the selected media outlets to produce a sample encompassing diverse journalism formats. After applying this selection procedure, a number of observations were made which were constant across cultures, which we will present. These results include:

- A large majority of sampled stories was based on life sciences, or biomedical sciences.
- A small minority of the sampled stories was based directly on material published in the scientific journals.

The paper will examine differences in selection and treatment of science news across these five European countries and the challenges this raises for science communication researchers.

Scientific controversy in the New Zealand mass media: Laura Sessions, University of Canterbury, New Zealand

Science journalists are frequently criticised for overplaying scientific controversy in order to increase the news value of their reporting. However, in a content analysis of New Zealand mass media science coverage, controversy was infrequent and 89% of the stories gave only a single perspective on the scientific claim. The ways that journalists think about scientific controversy were explored in a survey and through in-depth interviews of New Zealand journalists who cover science. The interviews indicated that journalists often perceive that science is a much less controversial field than other news rounds. In addition, journalists often trust scientific sources enough that they do not seek independent verification of the claim.

Finally, journalists tend to view individual news stories as just small pieces within the overall coverage of the issue through time and across diverse media. Thus, while single stories may present only one scientific perspective, journalists may perceive that the overall coverage presents alternative views or context. This research also explored the strategies that journalists use to cover scientific controversy, and particularly how ideas of accuracy, balance and objectivity influence their coverage. While most journalists did not believe that objectivity was an attainable goal, many still thought that they should strive for it by being "balanced" or "fair" or "unbiased toward either side". New Zealand journalists preferred to balance conflicting scientific claims rather than evaluating the scientific evidence themselves.

These journalistic strategies have implications for how scientists present information to the media and for how the public interpret science coverage.

The "public meaning" of science: Thoughts of TV viewers during science programs: Hans Peter Peters, Research Center Juelich, Germany

What is the meaning of science? This is not a question only scientists can answer! Millions of media users deal with this question every day while reading articles or watching TV films about scientific topics. Their answers, however, are likely to differ from the scientists' ones.

For the average non-scientist the mass media provide most occasions to think about science and its meaning for individuals and society. At the Research Center Juelich, Germany, we therefore carried out a study aimed at analyzing how the meaning of science is constructed by the audience during the reception of media stories. The study uses three large scientific projects as examples: the International Space Station, the Human Genome Project and the European Spallation Source, a new project. 106 test recipients watched a film about each of the three projects and were asked to verbalise their thoughts while viewing the films. They also were interviewed before and after the films.

Most of the 4,704 "thoughts" generated by the test recipients during the study deal with the "content" of the films and the projects described. But there are also a lot of references to the "film" as a journalistic product and to the own reactions to the film. Although the test recipients expressed many thoughts about problems of comprehension, the films led to a significant increase in knowledge. The analysis of semantic contexts revealed very different public "meaning profiles" of the three projects.

The presentation describes methodology and results of the study. Video sequences illustrate some of the general findings and give a vivid impression how the audience uses media coverage to form an opinion about scientific projects.

Parallel Session 33 Workshop

16:00 - 17:30

Room: 2B

Workshop

Chair: Terry Hutter, Exploration Place, USA

Hands-on workshop of creative, inexpensive ideas for museums and Q&A by Nell Heyen, Museum of Ancient Treasures, Shannon Maloney-Scholler, Diana Hutter and Terry Hutter, Exploration Place, USA

Life long learning begins with early childhood play and readily continues through middle academic levels. Though play and learning is universal, it may be further defined through a process of culture and educational awareness. A foundation for this process is hands-on learning, where a motivation towards science learning can be obtained through the creation and utilisation of age, educational, and culturally appropriate activities.

We will give examples of our successes, as well as hands-on examples, of how one can take anything and create something out of it through a communication of science. We will also explore inexpensive, interactive and interchangeable links between art, science and learning. Small, portable science kits will be looked into; as to how they can be used as both a path to outreach, as well as a form of exhibit R&D for the institution. Additionally, linkage to community based educational principals will be proffered.

Workshop objectives: create activities in-house, handouts and supplies provided, followed by a question and answer session.

Parallel Session 34

Theme: The changing face of science museums and centres (B)

16:00 - 17:30

Room: LT 2

Panel discussion

Chair: Walter Staveloz, ECSITE, Belgium

Museums and science communication: Orest Jarh, Technical Museum of Slovenia

Collecting and preserving heritage is beyond doubt the main task of any science and technology museum, but communication of science and technology very often stands next to it in the mission statements. Trying to keep pace with nowadays fashionable and thriving science centres more and more traditional museums introduce many interactive ingredients in their collections.

However simple the principle of interactivity may sound its application to historical collections poses museum professionals before lots of new dilemmas and problems that remain unsolved. Here I mention just a few questions:

- How much interactives should be included in museum exhibitions?
- May historical objects be used as interactive exhibits or demonstration tools?
- Is interactive approach always the best way to explain something?

Museums are joined in the International Council of Museums (ICOM) that has 26 international committees devoted to a particular type of museum or to a museum-related discipline. One of them is CIMUSET an international committee for museums of science and technology. This year's annual conference in Beijing, China will be mostly devoted to discuss interactivity in museums. The author of this abstract was in charge to prepare the agenda for the scientific part of the meeting and in this paper some of the main issues will be discussed as well as the conclusions drawn at the conference in October.

Science communication at the cutting edge: Is a museum the best way to showcase research to diverse audiences? Christine Cansfield-Smith, CSIRO, Australia

This paper will focus on the key challenges of communicating science to diverse audiences through the medium of a public science museum. The talk will centre on the reasons for research organisations to establish science museums as part of their public communication programs, and the obvious benefits

and challenges this presents. The discussion will focus on the newly established (May 2000) Discovery centre in Canberra, Australia, which is a part of the CSIRO (Commonwealth Scientific and Industrial Research Organisation), Australia's largest and most diverse research organisation.

Discovery has been designed to make CSIRO more accessible, in a physical sense, to the public, and is intentionally different in style from the traditional science centre model. Discovery has been established to showcase research and to educate and communicate to the public (both adults and children) the links between research and its benefits to society.

Discovery contains working biotechnology laboratories, public facilities, a sophisticated, interactive exhibition and hands-on science education laboratories. It is designed to communicate to a diverse range of target audiences - school children; teachers; business and industry (the unique Industry Link workshops will be explained); the public and other scientists.

Discovery aims to communicate the importance of research; to link teachers and visitors to scientists; to make a connection between research and the classroom; to use actual research tools as interactives; and to convince the public that science research is an essential, strategic industry of multimillion dollar networks.

Questions raised in this paper will include: What direct and mutual benefits can be measured in having a science museum attached to ongoing research? What are the challenges and benefits of being at the cutting edge of science? How to overcome the need for immediacy in a museum setting?

Science, museums and the public: Anusuya Chinsamy-Turan, Iziko Museums of Cape Town, South Africa

There are few places where a single visit can leave one inspired, awed and amazed. Most people do not associate museums with such a place, since they are often perceived as dull, boring and definitely not "cool". However, this perception is based on museums of the past.

Today, museums are being transformed into exciting destinations that showcase the world of science. A visit to the SA Museum will no doubt leave you inspired by the diversity of life through time, awed by the majestic size of a blue whale, moved by the world's first piece of "art" and fascinated by the sheer beauty of our natural and cultural heritage. Astoundingly what one sees on display is a small fraction of the vast collections that the museum houses. Behind the scenes, scientists are actively researching the millions of objects and specimens, generating new knowledge about them. Unlike before, this new research does not only delve in the realm of academia. Our scientists have a commitment to reach out to the public through popular articles, radio and television interviews, shadow programs, behind the scenes tours etc.

Exhibitions at this museum are no longer just about interesting collections of objects or animals. We have a real drive to make exhibitions more interactive, engaging and child-friendly. For example, a recent exhibition about bats - Go Bats! - goes beyond a

display of taxidermed bat carcasses with unpronounceable Latin names. The exhibition deals, not only with the fascinating world of bats and their adaptations to their peculiar lifestyles, but also about how bats have permeated our popular culture (e.g. Batman and Dracula), as well as through folklore, mythology and poetry. We realize that, integral to a successful exhibition that stimulates science interest, is a well-structured curriculum-based educational programme with resources for teachers, as well as fieldtrips, tours behind the scenes, and outside the museum environment.

Exhibitions at the SA Museum are now developed to ensure that the public experience the world of science, and understand the value of science in their everyday lives. A changing exhibitions programme is now adopted that showcases different facets of science, and each time offers the visitor a different window to the exciting world of science.

16:00 - 17:30

Room: LT 3

Paper presentation

Chair: Kelebogile Dilosotlhe, Department of Science and Technology, South Africa

Public understanding of ethical, legal and social issues related to genomic research: Assessing communication models in intercultural contexts: Dominique Brossard, Bruce Lewenstein and Joanna Radin, Cornell University, USA

Public discussion of ethical, legal, and social issues associated with genomics has been promoted in many countries. Recognizing the multicultural characteristics of the American population, some genomics outreach projects in the United States have sought to cross cultural boundaries, reaching Hispanic-American and African-American subcultures that are known to have attitudes toward and understanding of science that differ from the mainstream positions.

This paper uses those projects to examine the role of cultural context in shaping public understanding of science. First, the paper synthesizes research on different conceptual models of public communication of science: (1) a "lay knowledge" model that acknowledges the potential expertise of specific nonscientist audiences; (2) a "contextual" model that pays attention to specific audience needs in specific situations; (3) a "public participation" model that promotes public participation in science policy-making; and finally (4) the traditional "deficit" model emphasising linear communication between experts and less knowledgeable public(s). Second, the paper analyses specific outreach projects associated with genomics research that have been developed for different subcultures, and places them in the conceptual models identified in the first part of the paper. The analysis seeks to understand how culture shapes outreach potential and outreach achievement.

"The DNA Detective" makes molecular biology maximally meaningful and "Food-4-Thought" caters to all: Valerie Corfield, Medical Research Council, Masha Ainslie, Western Cape Primary Science Programme, and Francois Cilliers, University of Stellenbosch, South Africa

Science and technology impact on every inhabitant of the global village. Yet, for many reasons, including educational opportunities, scientists' failure to communicate and poor media reporting, many are unaware or ill-informed of technological principles. Consequently, they are deprived of enjoying the fascination of science and its applications, or of understanding the societal implications of new technology. For example, food science intrigues and is non-threatening, while increasing an appreciation of eating right and staying healthy. Understanding the DNA molecule and the nature of inheritance are not esoteric pursuits, increasingly disease diagnosis is DNA-based, and DNA-based forensic evidence is presented during cases of paternity, murder and rape.

Innovative ways to communicate science in South Africa, with its diverse cultures and previous

inequalities in education, are imperative. Consequently, I have designed and implemented two hands-on, interactive and "edutaining" workshops, "The DNA Detective" and "Food-4-Thought".

This presentation will describe the flexible modules suitable for participants from diverse cultural, educational, or age backgrounds. Each uses easily obtainable, low-cost and imaginative materials (a ladder = DNA, pairs of shoes = chromosomal inheritance). Local food manufacturers are encouraged to donate samples/ raw ingredients (potato chips, yoghurt, chocolate). The workshops emphasise relevant applications of the underlying science (paternity testing, identification of murder and rape suspects, why bread rises, why yoghurt sets, genetically-modified food). Presentations made to previously disadvantaged Cape Peninsula schools in English and Xhosa will be highlighted.

The workshops show that with imagination complex scientific principles and associated societal implications can be meaningfully transferred to a diverse audience.

Effective communication of science in a culturally diverse society: Sibusiso Manzini, Department of Science and Technology, South Africa

One of the challenges facing South Africa, and increasingly, many other countries in the rapidly globalising world, is that of building national unity in a culturally diverse society. The challenge becomes even more acute when it comes to the issue of science. The question is how can science be communicated, accessed and promoted in a culturally just and equitable manner?

What is culture and why has it become an important consideration in science communication?

Culture may be defined in different ways. Essentially culture refers to the "shared perceptions, attitudes, and predispositions that allow people to organise experiences in certain ways." (Asante, p 9, 1990)

There are other definitions of culture worth considering. Culture is used in the discourse concerning science for various reasons. A casual analysis of public debates around science and culture reveal a variety of purposes for bringing cultural considerations into debates about science.

Effective communication strategies

- Recognise the contributions of all cultures in the development of science;
- Explore how science is practised in different cultures;
- Respect other people's beliefs, values, superstitions and taboos, instead of riding roughshod on them in the name of a "value-free" science;
- Use of indigenous technology in the place of 'standard' scientific material;

- Equitable use of language in scientific discourses;
- Realise possible alternative views to what qualifies as "science";
- Equitable choice and organisation of science teaching content; and
- Mutual Critique between Culture and Science

An effective and equitable communication of science in a democratic society is not an option but an imperative. It has repeatedly been demonstrated that science and technology can play critical roles in the socio-economic development of a country. Therefore, effective communication of science and thus public accessibility into and participation in science are matters of basic human rights, justice and equity.

Science communication in the bilateral cooperation: Denis Phakisi, Ministry of Local Government, Lesotho; BL Morolong, Institute of Extra Mural Studies, National University of Lesotho and Molisana Molisana, Maloti Development Trust, Lesotho

One approach to "Science Communication in a Diverse World" begins with the recognition that "science is a universal heritage of mankind". Therefore, the pursuit of science requires shared vision and dialogue – flow of meaning among people. This is a communication process requiring, *inter alia*, (1) science transfer from 'science-rich' societies / organisations to 'science-poor' ones, (2) development / promotion of indigenous sciences to universal standard wherever possible, (3) cooperation, (4) adoption of common standards.

This paper presents a communication model inspired by the need to show "parity" between "high tech" and indigenous technologies. A version of this model, which describes science (and technology) transfer, is described below. Cooperation is implicit. We also illustrate promotion of indigenous science through use of common standards.

The elements of the model include organised groups: small and medium enterprises, farmers' associations, government agencies, research and technology organisations, etc., classified as science and technology (S&T) providers (from South Africa) and customers (from Lesotho). The processes include *Integration* of the "practices" (skills development, S&T capacity building); *Discovery* (matching providers with customers); *Delivery* (MOU's, ensuring adherence to standards); *Support* (making S&T knowledge and information accessible to customers). A team, consisting of bilingual engineer and scientist, was employed to design and implement the model.

The team communicated Lesotho's Vision 2020 (picture of the future about S&T) to South Africa's delegates. Media used included printed and spoken words (discussion papers, dialogue, radio) in a participatory process. "Traditional" lightning protectors share much in common with "standard" lightning rods. Communication and common standards would reconcile the two.

16:00 - 17:30

Room: 4A

Panel discussion

Chair: Janice Limson, *Science in Africa*, South Africa

Emerging scenario of science and technology journalism in India: Manoj Patariya, National Council for Science and Technology Communication, India

Man could well have originated science communication with the early discoveries, the most important being the discovery of fire and dissemination of its knowledge. In India, sage Atharvan is credited for the discovery of fire churning technology and its dissemination during ancient period. A whole host of scientific literature was created in India during ancient, Vedic, post Vedic and classical periods. The medieval period saw emergence of newer trends in science communication when commentaries on earlier scientific texts were written and structures like Jantar Mantar (observatory) were built, but these were accessible to a few elites in the society. The real shift in science communication in favour of the common man became evident in modern times when it was now possible to bring out publications in large numbers. Science journalism started in India in 1818 with the publication of the monthly *Digdarshan* published in Hindi, Bengali and English, carrying a few articles on science and technology. Science communication proliferated in independent India.

This paper discusses the trends now emerging in India given the efforts, the slackness in quality and moves to improve it, the plurality of mass media, and a sound science and technology base of the country; arrived at through an in-depth study intended at furthering the cause of science communication and scientific attitude. The study indicates that science coverage attributed to mass media is abysmally poor, i.e. around 3 percent, which is far below the desired level of 10-15 percent. The present work is an attempt to find out the extent of demand and supply of S&T coverage in various mass media and presenting an emerging scenario of science and technology journalism in the country.

Views of distance education science students on the social responsibility of scientists: Dürten Röhm, Nthabiseng Ogude and Marissa Rollnick, University of South Africa

Scientific developments such as genetic engineering and the human genome project can have far reaching ethical, social and political implications for human society. The HIV/ AIDS controversy in South Africa reveals basic, and as yet unanswered, questions pertaining to the role and influence of scientific knowledge in society. The investigations by the Truth and Reconciliation Commission into South Africa's Chemical and Biological Warfare Programme of the 1980's and early 1990's have cast doubt on the integrity of scientists and concern on how society views its scientists.

Against this background a study was undertaken to monitor the views of distance education science students on the social responsibility of scientists. A Views-on-Science-Technology-Society instrument,

based on interviews, open format and fixed format questionnaires was designed with the purpose of establishing attitude profiles of students towards a variety of aspects of the social responsibility of scientists.

Research results are discussed in terms of topics such as the communication between scientists and the public, education, decision making on the implementation of scientific discoveries, objectives and consequences of scientific activity, whistle blowing, values and codes of practice, cultural and gender issues.

By virtue of their highly specialised knowledge, the social responsibility of scientists extends beyond that of other citizens. Consequently, the teaching of scientific theory cannot be separated from addressing social and ethical problems. This study provides an insight into the views and attitudes of South Africa's future scientists on social aspects of science, which could be used in the design of teaching materials.

Are science students interested in science? Rolf Becker and Kirsten Lucas, University of the North, and Rudi Laugksch, University of Cape Town, South Africa

It is a challenge for scientists to keep the public informed and aware of the latest discoveries and technologies. To achieve this aim, the scientists themselves must have an interest in the subject.

This study assesses the interest of the students doing biochemistry and chemistry at the University of the North (UNIN) and correlates it to the amount of general science knowledge the students have.

The study was based on a set of questions compiled by Durant *et al.* (1989)[*Nature*, 340, 11-14]. Students in their second to fourth year of study were given a questionnaire in which they had to answer statements pertaining to their interest and their perceived state of knowledge in different subjects, as well as specific science orientated questions. The survey was performed in February 1990 (n=110), and repeated in February 2001 (n=153).

It seems as though the students are definitely interested in science and this interest increases with experience. There has been a definite shift in the students' interest in politics to an interest in scientific discoveries from that of ten years ago. Present students also feel that they are more aware of various facets of science than the students did in the past. This does not, however, reflect in the amount of general science knowledge that the students have. It thus seems that although there is a professed keen interest in science related topics, students tend to focus on their area of study only and do not have a broad scientific view.

MRC scientists and the media - Attitudes to and experiences of reporting their findings to the public: Leverne Gething, Medical Research Council, South Africa

Attitudes of South African scientists to the media and their experiences of reporting findings to the public and media have not been documented. The South African Medical Research Council (MRC) has an excellent research record - but awareness of the MRC among the South African public is very limited. Promoting scientists' engagement with the public would publicise and increase knowledge of research findings.

A postal survey was carried out among MRC scientists to obtain a 'baseline' indication of attitudes and experiences regarding communication to the public and media. Results would inform development and implementation of strategies to fast-track promotion of science communication. A questionnaire with prompted responses was sent to 253 MRC scientists. One hundred were returned (39.5%), representing an impressive assemblage of research leaders.

Although 48.9% of the scientists had published over 30 articles in peer-reviewed journals, 38.9% had never had these mentioned in the lay media. The vast majority (92.8%) agreed that they had a duty to communicate their research to the public, and 70.8% would like to spend more time on this. When source or subject of a news story, 65.4% had been satisfied with the coverage. Most (86.9%) had never had any training in dealing with the media, but 80.8% were interested in it.

Scientists generally want to communicate and see the potential benefits. Science communication and development of links with community and media should be seen as part and parcel of scientific research, and given due recognition and support.

Leverne Gething is no longer presenting in this session

17:30 - 18:00

Poster presentations in Lecture Theatre 1, 2 and 3

Room: LT 1

Science e-communication - media services, infant health care, e-science mags and more

15. Computer literacy in the world of business: Susanne Taylor and Johan Vorster, Technikon Witwatersrand, South Africa

South Africa's President Thabo Mbeki identified Information and Communication Technology (ICT) as a strategic focus area for the country. And rightly so!

The sad reality is, however, that even highly qualified professors and industry professionals often just manage to use the basics of PC office-type software and email. The inherent power and efficiencies of these technologies are thus not utilised effectively – a tremendous waste!

This paper would deal with issues of the information technology explosion and how staff at companies are barely able to master the very basics of one technology – to 'help themselves' – before the next wave, a newer and more advanced version, is upon them.

Training is a key issue here – but one that is usually sadly neglected. The point is that if even highly qualified, educated people battle to use information technology effectively without some training or hand-holding, how much more difficult is it then not for those that do not read and write with confidence.

Surely they, too, should be 'brought on board', to ride the technology wave. This is not only important for their self-esteem, but also to the benefit of the company and the economy.

Companies clearly have a responsibility towards their employees – both the literate and less literate ones. ICT is becoming pervasive in the global society and computer literacy is fast becoming a life skill. Training costs money, especially science and technology-type training. But, training equates to skills upliftment – and this can (in SA) be funded by reclaiming the Skills Development Levy from the relevant Sector Education and Training Authority (SETA). ICT and people training - the key to bridging the knowledge gap.

16. The INFN's initiatives for the educational field and for the public awareness through multimedia instruments: Paolo Bussei, Roberto Fieschi, Marco Bianucci, Silvia Merlino, INFN- University of Parma, Italy

The Italian National Institute for the Physics of Matter (INFN) is engaged in the pre-university didactic of physics and in the public awareness of scientific culture, also through the development of multimedia products.

INFN has in fact started a route articulated on two fronts:

1. Collaboration with school teachers and with the university, for carrying out innovative school programs and instruments (such as multimedia courses) for science education, with a particular attention to physics and technology.
2. Dissemination of scientific and technological culture, by organising scientific exhibitions, producing internet multimedia resources such as "Archimedes" (which aims to popularise some of the main issues of contemporary science, from astrophysics to neurosciences to Biotechnology) and the "European Science Museum Path Configurator" project.

Edumet II, The Energy and its Transformations, TECHNETH: From Silicon to Microchips, *Archimedes*, are some of the most relevant innovative multimedia INFN products addressed to the teaching and public awareness of science and technology. They will be presented in the poster, together with other similar activities.

17. MicroWorlds - Electronic science magazine: Elizabeth Moxon and Arthur Robinson, Lawrence Berkeley National Laboratory, Berkeley, USA

MicroWorlds is an electronic science magazine on the Web. Written for students in grades 7-12, their teachers, and the general public, it features information about research at the Advanced Light Source, a third-generation synchrotron radiation facility at the Lawrence Berkeley National Laboratory (LBNL) that is used by scientists from academic, industrial, and government laboratories around the United States and, indeed, the world.

MicroWorlds has several unique features that sets it apart from many Web educational projects: it features real science, and the scientists, engineers, and support staff that make outstanding research happen; it connects key science concepts like electromagnetism and light to the way the concepts are used in everyday life, engineering, and science; the material is integrated with hands-on activities that make the student a participant in the learning process; and it is developed by ALS writers in collaboration with teachers and students. Three teaching modules, **Exploring the Material World**, **Kevlar – The Wonder Material**, and **Selenium – A Window on the Wetlands**, guide students on a path of scientific discovery as they unravel clues that lead them on an exploration of the world of materials science.

18. The HSRC's Human Resources Development Data Warehouse project - Disseminating research information for government and for the public domain: Robin Naude, Arjen van Zwieten and Andrew Paterson, Human Sciences Research Council, South Africa

A web-enabled database structure, the "HRD Data Warehouse", is currently under construction by the Human Sciences Research Council in South Africa. The aim of the Data Warehouse is to contribute to an improved information and analysis infrastructure on national HRD concerns. This includes the provision of informed analyses, data and information to stakeholders which include government decision makers, private sector managers, researchers and research agencies, and other interested parties in the public domain.

The data will be searchable, though there will not yet be the opportunity to query it dynamically. Access to the data may include drilling down through tables layered by level of detail, or to a range of data tables. The website will also provide access to supporting documentation, metadata, relevant research documents to assist clients in their own analysis as needed.

The development of the web-enabled "HRD Data Warehouse" will take place in parallel to a physical publication, the "Biennial Directory". This is a new experiment in hybrid, or dual channel – print and digital – dissemination of information.

Challenges include: meeting different data needs of different clients with varying ICT skills and with varying levels of sophistication in understanding how to use data, and designing an online environment which successfully brings social scientific analysis together with data display and access.

19. Traditional and online media - how the Internet has changed the reporting of medical news: Keiko Kandachi, University of Maryland and Newsweek Japan, USA

This thesis attempted to investigate how the Internet had changed the reporting of medical news. Since the late 20th century, there have been growing concerns about emerging global health issues. Consequently, the media have an important role to play to better serve the needs of people seeking medical news and information. My presumption was that the Internet held the key for news organisations to accomplish this task: the population online has been exploding since the mid-1990's. Further, it seemed that the Internet could overcome the limitations of the traditional media because of its virtually unlimited space and interactivity.

To examine this assumption, I supplemented the traditional literature review with interviews with primary reporters, editors, producers, and others involved in both traditional and online journalism. To provide a context for the study, I also examined some of the major online sources of medical information. Finally, to better illustrate how news organisations have made use of the Internet in reporting medical issues, I conducted a case study about mad cow disease. In the case study, I compared how online and traditional versions differed during 2000 in three news organisations: CNN, CBS, and *The New York Times*.

In conclusion, I found that the availability of the Internet did not automatically improve the reporting of medical news. Whether the media are online or offline, it is the people, organisation, and/or social forces, or a combination of these factors, that make the difference, not the technologies *per se*.

20. How to create a web based national media service: Tina Zethraeus, Swedish Research Council, Sweden

Who can comment on the latest developments in the USA-Iraq conflict? Are there ongoing studies on the effect of cuts in the school system? How many University Hospitals in Sweden perform research on stem cells? I need an expert to comment on the ongoing election.

Those are examples of questions from journalists, questions that are easily lost in the complicated organisation of a university or research institution. This presentation is about two practices of science communication and will highlight two successful attempts in Sweden to launch gateways to science for journalists and the general public.

ExpertSvar is a new collaborative media service, a gateway to university expertise, exclusively for journalists. A query service is combined with a scientific archive of press releases and gateways to similar international services.

A new site, <http://www.forskning.se> strives to give the general public information about all ongoing publicly funded research with special emphasis on the schools as an important target group. The website has the ambition of becoming the "one stop shop" for questions concerning basic research in the nation, and it is collaboratively driven by the four largest research-funding authorities: among them the Swedish Research Council.

Room: LT 2
Learning or communication - that is the question!

21. Communication within the health sciences - An integrated approach for students: Bridget Wyrley-Birch, Peninsula Technikon/Groote Schuur Hospital, South Africa

The health sciences traditionally tend to be science content-orientated and the health science student has to process a large quantity of scientific knowledge.

Communication can be seen as a critical transdisciplinary aspect of the health sciences. Communication is integral to the health science student as it is a vital aspect of their intended profession working within the community. Communication is also important to the health science student as a means of ensuring their ultimate academic success. Areas have been identified that need to be addressed to enhance student teaching and learning and to ensure their academic success. These areas include medium of instruction (MOI) proficiency, the need for the integration of subject content and the language used and the improvement of student academic literacy.

Many students studying in the health sciences in South Africa today are using English as their medium of instruction but it is not their mother tongue. Students also come from varied educational and cultural backgrounds. This paper intends to discuss an integrated approach to communication within the health sciences as adopted by radiography educators. This approach has included a metacurricular aspect where thinking skills, social skills, technology usage and study skills have been intertwined within the content subjects. Learning

materials were developed which resulted in a course workbook for first level radiographers that aims to improve MOI proficiency, integrate subject-language content and enhance the academic literacy of the student.

Further integration in the form of interdisciplinary projects where common topics are brought together, is explored.

22. Development of an environmental physics undergraduate major course: Dirk Knoesen, University of the Western Cape, South Africa

As part of a new environmental science degree introduced at UWC, a new course in environmental physics was developed during the last few years. The course is presented at second and third year level, as a second major course presented in the physics department. The curriculum pays particular attention to Southern African circumstances, especially towards energy needs and supply. Since the course is very much geared towards application of physics in this field, the understanding and applying of the physical principles are most important. The course is presented following the conceptual physics model used in one of our first year courses, with participation of students in class discussions, projects and personal presentation, data capturing from internet, etc. Due to the specific location in the Western Cape the students visited several industrial and other sites where these concepts are used in practice. The paper will deal in more detail with the course content and presentation mode, the content selection, as well as the presentation mode and student participation.

23. Mechanical technology for the classroom and for PUSET exhibitions: Jeff Bindon, Natal University, South Africa (display)

The University of Natal has developed a range of low cost desktop mechanical technology kits to address some of the problems of how to introduce this important subject into the classroom.

These tiny machines can be made at a school desk with no electric power and only a few hand tools. In addition, they provide an excellent basis for a unique and dynamic PUSET display which actually works, which are simple enough to communicate basic principles and samples of which can be taken home by the public. The way in which these projects have emerged and the way they work are described.

24. Project Oriented Learning as teaching methodology in the teaching of science and technology: Charlotta Coetzee, Technikon Northern Gauteng, South Africa

The new Education Act stated that outcomes based education (OBE) had to be introduced, not only in schools, but also on tertiary level. Technikon Northern Gauteng embarked on Project Oriented Learning (POL) as a teaching methodology for OBE.

Project Oriented Learning is a teaching methodology where a group of learners, independently, works on a real life problem or question. The problem is analysed, and according to the specifications given in the task or assignment, the group works to an outcome.

POL simultaneously supports important objectives of higher education:

- Acquisition of knowledge, which is retained and usable
- Self-directed learning
- Learning to analyse and solve problems

Working in groups (tutorial groups) occupies a central role in POL. The difference between a tutorial group and a class or lecture is that a tutorial also offers a platform for learners to exchange knowledge and ideas.

To be able to exchange knowledge, communication has to take place within the group. Learners are expected to ask questions, give opinions or explain issues in a group. An important part of acquiring skills and knowledge is the ability to ask questions. A tutorial offers the possibility not only to ask questions, but it also gives the opportunity to learn from questions posed by others. The support offered in a small group makes the tutorial an excellent learning context for the academic development of under-prepared students. Further more the small group context offers a safe environment for practicing language skills, which is a significant benefit for students who are not studying in their first language.

25. Project Oriented Learning in the Faculty of Engineering at TNG - An example: Charlotta Coetzee, Technikon Northern Gauteng, South Africa

Technikon Northern Gauteng implemented Project Oriented Learning (POL) in January 2002. All the first year students in the Faculty of Engineering were introduced to the first project. The aim of the introduction project was more towards the gaining of

skills towards Project Oriented Learning rather than content. The project was:

Can you supply the community with potable water?

Student received a "Project manual" in which the project context was well described. In the manual other essential information such as learning objectives, assessment aspects and assessment methods were described. Other supportive material on project work, the structuring and functioning of tutorial groups was provided. Group members were responsible for different tasks in the group. These tasks, such as being the chairperson, were rotated every week. At the end of the project every group had to present its solution.

All the students were grouped randomly, that means that students from the different engineering disciplines (six disciplines), had to work together in a group. This illustrates that the solving of real life problems is a multi-disciplinary action. To function on a multi-disciplinary way, communication between the different parties is essential. At this stage the assessment of the project work is not very easy and still needs further development.

26. Project Oriented Learning (POL) as a tool for communicating environmental chemistry in the department of chemistry, TNG: Corrie van der Linde and Verena Meyer, Technikon Northern Gauteng, South Africa

The changing needs of students and industry act as stimulants to provide society with competent, self-directed graduates and entrepreneurs that can be successful in a multidisciplinary environment. The Faculty of Engineering at Technikon Northern Gauteng (TNG) responded to this paradigm shift by exploring ways to develop teaching and communicating methods that can meet the challenges of real life situations in environmental chemistry. It was decided to use Project Oriented Learning (POL) as a teaching strategy and have it implemented with the assistance of the Hoogereschool van Utrecht (HvU). One of the main strengths of POL as a learning tool is that students have the opportunity to work on and communicate solutions of real life problems using previously and continuously gained knowledge.

This paper will present the experiences of the Department of Chemistry with regards to using POL as a tool for communicating and teaching environmental chemistry.

27. The joy of learning - Skills vs. challenges: Johan Benade and Mike Colley, The Big Picture, Brent Hutcheson and Philip Haas, Hands on Technologies, South Africa

Technology has emerged as one of the greatest factors affecting change in our lives. A programme has been designed that provides children with the necessary skills to approach our technological society with confidence. The objective is to develop learners who are capable of doing things, not repeating what other generations have done, but learners who are creative, inventive and who discover. The programme involves presenting learners with a need, challenge or problem and supplying them with a variety of materials that they can use, put together or construct something with to solve the problem at hand.

Real research, individual learning styles and true co-operation is encouraged, often using the actual school themes as our vehicle. Learners are presented with a range of experiences and situations that help them to develop their design and technological capabilities. Basic and advanced didactic equipment is used which includes bricks, gears, pulleys, motors, pneumatic pumps and sensors to encourage children to approach problems creatively. These construction materials enable children to model their thoughts in 3D forms. Problems are solved in different ways, thus enabling the learners to develop their thought processes.

As well as encouraging thought processes, interaction with these materials allows many manipulative skills to be developed. Working alongside other children helps to develop social interaction and a child's interpersonal skills. Collaboration between children is encouraged thus helping them to learn how to cooperate together in carrying out different tasks. Working in this way also helps their communication skills and confidence.

The programme is based on the belief that learning should take place through construction rather than instruction, and we are confident that the educational materials used, not only stimulate and encourage the learners, but also greatly accelerate the conceptualisation process.

Room: LT 3

Exploring cultural diversity

28. A comparison of 340 participants' performances on a compact programme of 17 science practical tasks according to their English language proficiency and geographical areas: Aydin Inal, University of Cape Town, South Africa

This paper presents the findings of research conducted using a programme of physical science practical activities. The compact programme consisted of 17 practical activities accompanied with written instructions rather than a paper-and-pencil only type of diagnosis. Examples of these items will also be included in the full conference paper.

The research was conducted with 340 participants in the Western Cape and the results with regard to differences in language and geographical areas where the participants' institutions are located will be presented in this paper.

29. An evaluation of the drawings in a new South African textbook for science and technology: A large scale comparison of the assessment responses of different cultural groups: Keith Jacobs, University of Cape Town

The purposes of this study were: 1. To investigate learners' and teachers' perceptions and evaluations of 40 illustrations in a new South African school textbook for Natural Science and Technology, and 2. To compare assessments of the illustrations made by different groups of users, e.g. by classes in advantaged and disadvantaged schools; learners speaking different home languages; learners of different grade levels; biology teachers compared with biology learners; and so on.

The respondents were asked to use six standard, professionally selected criteria to assess and grade

40 illustrations in the school textbook *New Nations Science Grade 7 (1999)*. The learners used basic criteria provided by expert colleagues in graphic art and design at Groote School Hospital and Michaelis School of Fine Art at the University of Cape Town, but expressed in simple language. The respondents were also required to indicate whether, in their view, certain illustrations were an accurate scientific representation of what the textbook artist claimed they were. Each respondent had his or her own new, free copy of the textbook to evaluate the illustrations, considered ten at a time, rated on a five point scale as either "poor", "fair", "very good" or "excellent" for each of the six criteria. The complete analysis involved the use of both qualitative and quantitative research methods.

The inter-group correlation ratings obtained between the assessments of four pairs of groups (advantaged and disadvantaged learners; high school and primary school teachers) for ten illustrations rated inclusively yielded values between 0.70 and 0.93. These high learner-to-learner and teacher-to-teacher correlations suggested that the rating exercise had been taken seriously and consistently by most, if not all, of the participants. An important finding of the study was that, although there were significant differences in individual preferences and ratings among the groups, the learners were found to be more positive in their ratings, whilst the teachers tended to rate more conservatively than the learners on the whole.

Of the 40 illustrations evaluated, each one assessed according to six separate criteria, only three illustrations, namely the chicken (textbook page 100), days of big rain (textbook page 145) and the hippo (textbook page 157) received mean ratings of less than 2.00 ("fair") on at least one of the six assessment criteria; so these particular illustrations

will be referred back to the artist. The learners expressed problems with the size of 60% of the illustrations; a dissatisfaction with the lack of labels; as well as their interpretation and understanding of certain illustrations such as the perlemoen.

Overall, the sample of disadvantaged learners expressed less satisfaction with quality of the illustrations in the textbook than the other samples of evaluators, and their supplied written reasons have made available useful qualitative feedback to science textbook illustrators.

30. Experiences of widowhood and beliefs about the mourning process of the Batswana people: Minrie Greeff, E Manyedi, MP Koen, Potchefstroom University, South Africa

Objectives

- To explore and describe the Batswana widow's experience of widowhood and the mourning process;
- To explore and describe the Batswana community's beliefs about widowhood and the mourning process;
- To formulate guidelines for psychiatric nurses in order to facilitate the development of support mechanisms through which the community can be mobilized to assist the widow during widowhood and the mourning process.

A qualitative design was followed with the aim of exploring and describing the Batswana widow's experience of widowhood and the mourning process as well as the community's beliefs about widowhood and the mourning process. The study was conducted in the context of the Batswana community in the Mafikeng, Lichtenburg, and Zeerust rural areas of the North West Province of South Africa.

Various main, sub and further categories were found. The conclusion that can be made is that widows seem to blame the community for isolation, discrimination and stigmatisation.

Guidelines were formulated to facilitate psychiatric nurses to facilitate the development of support mechanisms through which the community can be mobilized to assist the widow during widowhood and the mourning process.

31. Infusing science and technology from the ground up - A systematic approach applied in Lesotho: Dennis Phakisi, TechnoLed, Lesotho

Science communication takes root where an effective communication system is strategically defined and functional. Science communication should be built on clear vision and strategy shared by all role-players at different levels. Science communication is pursued with specific purposes, primarily aiming to improve the lives of general public living in diverse geographic and economic settings and secondarily winning support of strategically positioned authorities within their organisations. A zealous champion should marshal effective science communication process that should be in line with the best practices suitable for local and regional needs and conditions.

Science communication should be guided by systematic principles such as Kotter's 8 stages process that entails creating a sense of urgency, establishing guiding coalition, generating short term wins, anchoring new approaches in the culture etc. Science communication should evolve with a

momentum gained in the developmental process. Readiness to accept science communication should be tirelessly diagnosed. Communication system should be subjected to a culture of excellence and continuous improvement techniques such as Plan, Do, Study and Act Cycle.

Lesotho is inhabited by Basotho, Indian-Basotho, Chinese-Basotho, Xhomas-Basotho, Ndebele-Basotho, European-Basotho, and Cosmopolitans, etc. In 1996, Lesotho restarted a wide spread communication of Science and Technology (S&T) that was revitalized and spearheaded by the third generation. S&T and Small, Micro and Medium Enterprises Network coalitions had been formed. Various projects and programmes were undertaken by individuals and organisations (Including the government, media, institutions of higher learning etc) that value a catalytic role played by S&T in developing country such as Lesotho. A rural based and replicated Technology and Business Institution has been pivotal to change the perceptions of decision makers and technology beneficiaries towards S&T.

Appropriate Technology Needs Assessment Study that was commissioned in 2000 revealed the status of institutional perception and understanding on technology as a vehicle for development and tool for competitiveness and public awareness and appreciation on appropriate technology. Science communication undertaken since 1996 has facilitated a change of public attitudes as well as improved situation on the ground. This is evidenced by the results that have been observed. Interventions that can improve the process at all levels of local society and the international community are sought.

32. The patient relationship and therapeutic techniques of the South Sotho traditional healer: Minrie Greeff, E Manyedi, MP Koen, Potchefstroom University, South Africa

Objectives

- To investigate the characteristics of the relationship between the South Sotho traditional healer and his/her patients;
- To explore the therapeutic techniques used in the South Sotho traditional healing process;
- To investigate the views of the South Sotho traditional healer regarding the South Sotho healing process;
- To investigate the views of the patients regarding the South Sotho traditional healing process;
- To formulate guidelines for possible incorporation of the South Sotho traditional healers in the National Health Care Delivery System.

The research design used for this research is a qualitative survey within the context of three rural areas of Maokeng, Ikageng and Sebokeng in South Africa.

Two populations were identified. Population one consisted of South Sotho traditional healers practicing in Moakeng, Ikageng and Sebokeng in South Africa. Population two consisted of patients of each of the mentioned traditional healers, staying in the mentioned areas. A nonprobability purposive voluntary sampling method was used for both populations. The sample size was determined by means of data saturation.

Data collection was achieved by video recording of the South Sotho traditional healers in interaction with

their patients as well as when they use their therapeutic techniques. Semi-structured interviews were also conducted with both the traditional healers and their patients regarding their views on the healing process. A pilot study was conducted to test the applicability of the questions. After the video recordings and the interviews field notes were recorded. The video recordings were translated to English and a checklist set to analyse these recordings. The audiotapes were transcribed verbatim and analysed using content analysis.

From the findings it can be concluded that the process of interaction between the traditional healer and the patient is built on a relationship consisting of various phases and based on mutual respect and understanding of each other's cultural views and beliefs. It is mostly the traditional healer that initiates the greeting. Consultation is always done in a sitting position with the traditional healer facing the patient. During consultation the fees to be paid are negotiated prior to resuming divination. The manner in which both the traditional healer and the patient perceive illness is strongly cultural based. The traditional healer becomes more authoritative while the patient adopts the attitude of following and becoming more submissive.

The process of divination is an important part of the healing process and the traditional healer becomes active, while the patient becomes more passive. Clarification of the problem occurs as part of the divination process whereby the patient has to agree and confirm the findings. Various medicines and techniques are used e.g. oral administration, enemata, steam inhalations, steam baths and bathing. Home protection occurs by means of spraying as well as burning of incense. Other techniques include eye, ear and nose installations as well as application of oily medicines to the body. Conclusions regarding the views of the traditional healers included definite role expectations about self. He also sees himself as able to heal people by giving medicines suitable for their illnesses. The patient perceives traditional healing on the same principles upon which the traditional healer basis his views.

Guidelines were formulated for the possible incorporation of traditional healers in the Health Care Delivery System by focusing on facilitating changes in the perceptions and attitudes of both the traditional healers and the biomedical personnel, developing a more committed relationship between the healers and the biomedical personnel and to establish negotiations between these parties. Guidelines for facilitating a comprehensive community based health care delivery service were also formulated.

18:00 - 18:30

Refreshments and poster viewing in foyer

20:00



Conference dinner at Marco's African Place and SA Science Lens Awards

7 December 2002, Saturday

Plenary Session 3 Theme: Different cultures and new challenges

Room: LT 1

Chair: Anastassios Pouris, Foundation for Education, Science and Technology, South Africa

09:00 - 09:30

Science communication perspectives from the African-Caribbean Network: Elizabeth Rasekoala, African-Caribbean Network for Science & Technology, UK

In the post-Cold War Era, the challenge facing the world's nations is that of sustainable economic growth and enhancing social inclusion. Recent events around the globe have highlighted the certainty, that in order for nation states to build and sustain stable, peaceful and harmonious societies and citizens, they must address the fundamental imperatives of social inclusion, in its various dimensions: race, gender, ethnicity, social class, religion and people with disabilities.

The potential contribution of science and technology to addressing these issues, and thus enhancing the quality of life of the world's citizens, is immense. However, the scientific enterprise and its promotion (public communication of science), has increasingly become dominated by a narrow, overwhelmingly 'euro-centric' focus, disempowering and excluding the majority of the world's populace from its benefits, discourse and agenda. For too many of the world's poor, people of colour and women, the scientific enterprise seems to be contextualised in a realm that they do not recognise in their daily lives, and the public communication of science, a cynical ploy.

The challenge for the scientific enterprise and those engaged in its communication is that of achieving as its core agenda the generation and sustainability of social inclusion, through the equitable distribution of its economic and social benefits to all the world's disadvantaged inhabitants, and not just a token elite.

On the journey towards the construction of this sustainable model of public communication of science with social inclusion, there are key aspects that need to form part of the building blocks of this process:

1. Dynamic and empowering partnerships at local, national and international levels, to fully engage the perspectives and agenda of those currently underserved by the scientific enterprise, and its communication.
2. Global contextualised approaches to enhance the value-addedness of public communication of science initiatives.
3. Developing an ethos and conducive environment for social inclusion in the public communication of science, at local, national and international levels.
4. Enhancing the role and capacities of the world's poor, people of colour and women, so that they can be fully engaged in the scientific enterprise and its communication.

09:30 - 10:00

Science communication to rural communities - An experience from Uganda: Alex Tindimubona, Network of Ugandan Researchers and Research Users, Uganda

Over 80% of Uganda's population is rural. The population lives mainly in scattered villages and homesteads. The main livelihood is subsistence agriculture, an ancient mode of production. Over 50% of that population is illiterate, and 40% are below the poverty line of less than a dollar a day. The isolation and illiteracy pose a special challenge to the communication of science to these communities.

This paper will report on research in communication of science and technology to a remote rural community in the fragile mountain ecosystem of South West Uganda, bordering Rwanda and the Democratic Republic of Congo. Using participatory methodologies coupled with researchers' technical assessments, the research found that modern science can indeed be communicated rather well to the community by interested and committed communicators.

The best strategy was found to be to focus on the major problems that the people face in their daily living, and to communicate science through the understanding and solution of those problems. In the case of the specific community under study, the key perceived problem is poverty. The key solutions lie in the introduction of sustainable agriculture, environment and natural resource management. Communication of science that focuses on these issues therefore generated much interest and uptake among the community.

The paper will share experiences, techniques and lessons learned.

10:00 - 10:30

Rethinking the role of the information officer in S&T communication: Rick Borchelt, Whitehead Institute, MIT, USA

Both managers and public information officers (PIOs) at research institutions and research-funding agencies uniformly suffer from poor understanding of the role that communications play in mediating the organisation's interests with broader public audiences. Often, PIOs are viewed within their organisations as in-house journalists, more concerned about adhering to journalistic values and media ethics than they are about preserving the scientific credibility of their researcher colleagues. Conversely, PIOs are mostly likely to be perceived by the public (and by the public's proxy, reporters) as uncritical spokespersons for the institution, keeping to the company line and insulating decision-makers from public scrutiny.

Based on a multi-year study of "best practices" in science communication by a blue-ribbon panel of

practitioners and theorists, I propose a new way of conceptualising the role of the PIO as "manager of the trust portfolio". In a society in which public trust of scientists and scientific institutions appears to be a more consistent indicator of public support for S&T than does scientific literacy, the robustness of the trust portfolio managed by PIOs, including public understanding, science and social credibility, and public participation in scientific decision making, is critical to the scientific endeavor.

10:30 - 11:00



Coffee, tea & refreshments

**Parallel Sessions 37- 42
are run concurrently**

Parallel Session 37

Theme: Indigenous science communication

11:00 - 13:00

Room: LT 1

Paper presentation

Chairs: Peter Thomsen and Michael Duffy, Cooperative Research Centre for Aboriginal and Tropical Health, Australia

**Sharing indigenous knowledge at Questacon:
Neil Hermes, Questacon, Australia**

Questacon is Australia's largest Science and Technology Centre and is taking a leading role in developing cross cultural communication processes in science communication.

In this presentation Mr Neil Hermes will talk about Questacon's aims to facilitate a two-way sharing between Indigenous and non-Indigenous Australians focussing on science and technology.

Questacon's Indigenous Outreach Programs aim to overcome the cultural and geographical challenges that arise when sharing information across cultures. In Australia these challenges include:

- Language barriers: A large proportion of Indigenous people living in remote areas have English as a second or third language.
- Distance: Some communities in Australia are thousands of kilometres from major population centres. At present our Outreach Programs are aimed at rural and remote areas.
- Cultural diversity: Today there are hundreds of groups of Indigenous people living in Australia, each with its own distinct knowledge and stories.

Questacon recognizes that many Indigenous Australians still hold their traditional understandings of the world. In the past, education institutions have attempted to replace these understandings with "correct, modern" knowledge causing confusion, uncertainty and some resentment. The cultural identity of the young Indigenous students was also threatened. Questacon acknowledges the socially important Indigenous ways of "knowing" whilst offering alternative explanations for phenomena.

Questacon's *Burarra Gathering: Sharing Indigenous Knowledge* exhibition presents contemporary and traditional knowledge and technology of the Burarra people. *Burarra Gathering* contributes to visitors'

formal and informal learning of Indigenous knowledge. The exhibition was developed through close consultation with the Burarra people and presents a means for their community to preserve their knowledge and culture. This year a purpose-built online exhibition of Burarra Gathering will be added to Questacon's website. Both the Outreach and Exhibition programs are based on a sound understanding of the importance of appropriate cross cultural means of communication.

Planting the seeds of science and technology within a Maori community: Mark Laws, Auckland University of Technology, New Zealand

The New Zealand Science and Technology Promotion Fund supports creative and innovative activities that help promote positive attitudes towards science and technology. It has a particular emphasis on communities that have low levels of awareness. Funding comes from the New Zealand Government, through the Ministry of Research, Science and Technology, and the fund is administered by the Royal Society of New Zealand.

The "E ruia mai project" hosted two science and technology awareness camps (called wananga). These wananga were specifically for Maori who are the indigenous peoples of New Zealand, with an emphasis placed on cultural-based principles associated with Maori language, customary practices and traditional values.

The wananga were held at a Maori educational facility. This was pivotal to its success because Maori felt comfortable being in their own culturally safe environment. There was also an acceptance by Maori, knowing that the organisers were senior Maori post-graduate science students from the University of Otago. The students also presented their own research, and talked about study, awards, research and support networks within the wider scientific communities.

The participants were involved in small research projects all based around issues that affect Maori, such as language and cultural conservation. These projects were also designed to highlight the benefits of scientific research and knowledge, using technological tools and methodologies.

This paper presents the processes involved in developing the project, it overviews the highlights, outcomes and issues then looks at future directions that similar type projects can follow.

The Ashkui Project - Using cultural landscapes to link Labrador Innu knowledge and western science: Geoff Howell, David Wilson, Environment Canada and Jack Selma, Innu Nation, Canada

Over centuries of close connection with the landscape, the Innu people of Labrador, Canada have gained a special knowledge of the ecosystem upon which their livelihood and culture depends. A cultural landscape concept has been developed which starts with Innu terminology and knowledge of an element on the landscape which has value and meaning for them and then builds an enhanced knowledge base from a number of different perspectives. The underlying premise is that Innu and western knowledge both provide valuable insights into the Labrador ecosystem, but we need to develop new approaches to record, understand and transmit this knowledge between scientists and the Innu.

Innu Elders identified the "ashkui" which are areas of early or permanently open water as an especially important resource to the Innu in the spring. They view these sites as their "pharmacies and supermarkets" and their entire spring experience on the land is centered around these areas. Co-researchers from the Innu Nation are helping natural and social scientists investigate these sites and translate project findings to members of the Innu community. A focus on special people, special places and the development of innovative products has fostered the development of a shared investment by both the Innu people and the western science community. By working from Innu defined landscape units, local knowledge becomes a basic step towards an overall understanding of the environment. This allows for determinations of environmental change to be made more sensibly and equitably in the local context.

PCST and Local Wisdom (LW) - Could ICT bridge PCST and LW for the knowledge-based society? Yuwanuch Tinnaluck, NSTDA, Thailand

The challenge Thailand faces on the path to economic recovery is to strive for being a knowledge-based society on its own momentum. For almost five years after an economic crisis with limited resources and economic constraints, the country has to be increasingly strategic and selective in terms of development. And it is undeniable that science and technology are driving forces for development. However, for centuries, Local Wisdom (LW) practices played a major role in Thai society for creation, enrichment and dissemination of knowledge. Later, modern S&T from the West replaced and depreciated the traditional concepts and practices of LW. There has never been a more appropriate time than this period of economic recovery for LW to regain its prominent role.

The National Science and Technology Development Agency (NSTDA) recognizes the country's need to harness modern S&T in combination with the revival of LW. In an effort to do so, it has found four problems within LW reality.

1. Codification Problem: Most LW knowledge is passed down from generation to generation by way of telling orally rather than systematically recorded or written.
2. Verification Problem: It is not always reliable that certain LW practices would produce the same results in the next use. It needs scientific evidences and processes to be able to benefit from more reliable future use.
3. Diffusion Problem: the two above problems and other factors and conditions may contribute to the limited use of LW within limited geographical area.
4. Upgrading Problem: Some LW practices may yield low effectiveness and low reliability due to a lack of, or low use of S&T knowledge and process.

Consequently, NSTDA has initiated a research project: "Study for Guidelines for S&T Application to upgrade LW". This study focuses on LW in medicine, food and handicrafts through case studies of selected villages in four main regions of Thailand. Finally, it will offer guidelines for the application of S&T to rectify each problematic process, especially the last one.

In the academic year 2002, the Project of Investigation will be based on the study mentioned above with specific aims.

Objectives

1. To gain understanding of the process of knowledge creation from the merging of LW and modern S&T knowledge.
2. To develop and to produce understanding of the way networking is functioning within Thai LW practices in order to identify possible connection and needs for enrichment coming from PCST activities.
3. To identify the growing role and model of ICT that can open a wide range of possibilities in order to diffuse knowledge created, develop PCST, access to S&T information and LW best practices and results.

Case studies of selected villages in Thailand on LW (medicine, food and handicrafts) with focus on the issue of PCST within ICT, and knowledge management.

Science public - Spreading the case of Elhuyar: Leire Canico Orueta, Elhuyar, Spain

Elhuyar is an organisation that started in 1972 with the objective of public communication of science and technology among the Basque community. Basque Country is a small country between France and Spain where three different languages live together: Basque, Spanish and French. In terms of population, we are around 2 million people in the Basque Autonomy and the percentage of Basque-speakers there is around the 20%.

Since its inception, Elhuyar has been trying to join these two main goals: science and Basque language. We thought that Basque language could be a suitable tool to develop any topic in its way to its normalisation. We still believe, even more than before, that knowledge of science and technology is

extremely important in order to live in a world where innovation and research form the base of our way of living. And for that reason, we try to educate the community about science that will influence the needs and interests of different audiences.

In this environment, and according to the development of new ways of communication and resources, we currently work in many different fields:

- *Elhuyar* monthly magazine;
- Radio programmes;
- Press collaborations in local newspapers;
- *Teknopolis*: a television programme about research and innovation in Basque;
- Television in Spanish and Basque;
- www.zientzia.net (a general website with information about current events, dossiers, multimedia resources, etc.), directed to youth and adults interested in science;
- www.zernola.net (science site directed to youth between 8 and 14 years); and
- www.basqueresearch.com (a web site based on research and development news directed to professionals and journalists)

It could be interesting to explain integral science communication offered to a small community.

Parallel Session 38 Theme: Communicating science through theatre & dance

11:00 - 13:00

Room: LT 3

Ideas sharing session

Chair: Chris Krishna-Pillay, CSIRO, Australia

Human cloning - A soap opera as a science communication tool: Luisa Massarani, Museum of Life, and Ideu de Castro Moreira, Federal University of Rio de Janeiro, Brazil

Our objective in this work is to analyse the advantages, limitations, and challenges of a TV soap opera as a tool for communicating issues related to human cloning. Our object of study is *O clone* (The clone), broadcast by TV Globo, the main channel in Brazil, reaching an audience of approximately 85 million people per day. The methodology we used in our study was an 'exhaustive qualitative methodology': we recorded every chapter in videotape and identified every part related to science and scientists. Then, we undertook an analysis of the recorded material aiming to answer the following questions: What and how are scientific issues and genetic techniques presented? What image of scientists is being transmitted? How are ethical and risk aspects being considered in *O clone*? To what extent is it possible to put in debate, in an appropriate way, such a controversial subject, involving so many different aspects, using a fanciful soap opera to discuss the topic? Finally, we aim to propose the following question: Is it possible that a soap opera like *O Clone* can be used as a significant science popularization tool?

Using drama to communicate science: Gillian Pearson and Bridget Holligan, The Oxford Trust, UK

This paper discusses the effectiveness of using drama as a medium for communicating science. It details the development of an innovative formula that has proved very successful in bringing together scientists, drama teachers, science teachers and

school students who then work together to produce dramatic performance pieces that address a wide range of scientific issues.

A key feature of the initiative is the training/motivating workshop at the start of the project in which a variety of strategies are employed to address the very different needs and expectations of the participants. A game-show format is used as an icebreaker to encourage scientists, teachers and drama professionals to share knowledge and to explore ways in which they might work together.

Drama teachers and students are given an insight into the research process and how they might use physical theatre to illustrate scientific principles. Science teachers are introduced to the use of specific dramatic techniques such as Boal's Theatre of the Oppressed to address moral and ethical implications of science. School students are given the opportunity to devise and perform short pieces.

The paper presents an evaluation of the initiative, drawing on experiences from scientists, teachers and students who have participated in workshops and performances.

Communicating ideas of science through the language of Classical Indian Dance: Tonie Stolberg, University of Birmingham, UK

Indian dance is a personal and highly expressive means of communication. The southern Indian art form of Bharatanatyam with its strong and firm foundations in the Hindu tradition is ideal for expressing human relationships with Nature. Effective scientific literacy requires individuals to be

able to appreciate how science and technology impacts on their everyday lives.

The difficulty with traditional means of science communication is its apparent lack of relevance to our every day experiences with nature. This paper documents an ongoing discourse between a group of science educators and a professional dance company, in developing a new language for communicating science: its potential and its limitations. This was achieved by an analysis of the process undergone in creating a dance drama production for a general audience.

The production, *'the story of C'* shows how people as part of nature interconnect and form part of a greater cycle of change and transformation. In creating a story showing the intimate interdependence of the animate and inanimate, issues are explored that go to the heart of the very existence of living things and the interrelation between the Earth and the body. What we have found exciting is the way that the vocabulary of Bharatanatyam can be extended to incorporate modern ideas and concepts coming from contemporary science, but that the process necessitates the breakdown of epistemic practices to allow the accommodation of perspectives normally precluded from traditional Western science teaching, resulting in a more empathetic and intimate approach.

Parallel Session 39 Theme: Evaluating science communication programmes

11:00 - 13:00

Room: 2A

Panel discussion

Chair: Suzanne de Cheveigne, CNRS, France

Inside the big black box - Evaluating the impact of the public visits programs in five major research laboratories in Europe: Paola Catapano, CERN, Switzerland and Giuseppe Pellegrini, Italy

Evaluating the impact of the public visits programs in five major research laboratories in Europe: first results

IN3B is a research project funded by the European Commission that started in January 2002 with the aim to analyse the impact of the public visits programs in five major particle physics research centres from the north to the south of Europe. The results of the research will be used to produce guidelines with a view to improving the communication efficiency of such centres. First results at the end of the first year of research are presented here.

The IN3B network is made up of seven partner institutions from Germany, Switzerland, Italy and Greece. It entails the participation of five European laboratories that organise on a regular basis a programme of public visits. CERN, the European Laboratory for particle physics across the border between France and Switzerland, has had a public visits programme since the early '60s, which today attracts some 30,000 visitors per year from a variety of countries. DESY, the German Electron Synchrotron in Hamburg, Germany, and the INFN Gran Sasso Laboratory in Italy are ideal comparative case studies to CERN, as they both conduct research activities in fundamental physics and do have a very

similar public visits programme, although on a smaller national scale.

The variety of scientific research activities carried out by the Juelich Research Centre in Germany and of the Demokritos National Centre for Scientific Research in Greece complete this truly European network. In addition to the subjects directly involved in the planning and implementation of communication activities at the laboratories, the project includes sociologists, psychologists and anthropologists from the Poster Institute in Italy and the University of Patras.

The analysis entails the sampling of 900 visitors from the five laboratories before the visit begins, immediately after the visit and three months after its conclusion by means of computer assisted telephone interviews. In depth interviews are also conducted on a smaller number of visitors after the visit. Finally, sessions of ethnographic on-site observation are conducted during the visit. The total duration of the project is 24 months and its overall cost approx. 240.00 euro. Final results will be presented during a seminar to be organised at CERN in December 2003.

The challenges of evaluating public understanding of science events in South Africa - Paving the way for ensuring meaningful evaluations: Colleen Hughes, Foundation for Education, Science and Technology, South Africa

Evaluating public understanding of science events is an ongoing yet challenging undertaking in South

Africa. The Science and Society Directorate of the Department of Arts, Culture, Science and Technology (DACST) in South Africa is responsible for initiating and facilitating programmes and projects that promote the public understanding of science and technology.

Since 1998 the Science and Society Directorate has enlisted independent evaluators to evaluate a large proportion of the projects that have been undertaken. It is true to say that all of these evaluations have focussed largely on project success and public and stakeholder opinion of the event / activity, with little emphasis on the level of public understanding of science as a result of the science event, and the effect of individual projects on public perceptions.

This paper interrogates international approaches to evaluating science events as a backdrop to presenting the South African scenario. In the United Kingdom a framework of classifying evaluations into those for assessing the public's knowledge, interest and attitudes towards science, assessing the public's experiences at science events or initiatives, assessing organisers' perspectives of public understanding of science, engineering and technology (PUSET) activities, and assessing the effectiveness of initiatives and events in achieving their stated objectives. What exactly should the purpose of science event evaluations be and are there best practice approaches or frameworks that could be adopted to improve evaluations in this country, are key questions addressed by the paper for the South African context.

In the light of the above, the paper examines the purposes, rigour and outcomes of PUSET activity evaluations in South Africa. As a way forward it highlights new paths that may enhance science event evaluations, as well as evaluator capability in conducting meaningful evaluations that will result in improved implementation practices in this country.

Evaluating European public awareness of science initiatives - A review of the literature: Chris Edwards, The Open University, UK

There are many public awareness of science initiatives (PASIs) and they are diverse, taking many forms from countrywide science weeks to small meetings focused on a single issue, or perhaps a dramatised event. These represent a major investment of resources – individuals and organisations give their time, their expertise or may give material or financial support — and this resource intensiveness often extends to the members of the public involved. This paper will consider the extent to which these initiatives have succeeded. Feedback of this kind is invaluable for all those involved (or interested in involvement) in such enterprises, whether with a one-off activity or a long-term programme. So how much evaluation is taking place, and what patterns does it reveal of the success of these initiatives? Work with the European Network of Science Communication Teachers (ENSCOT) has enabled a review of published items and the evidence collected to help paint this picture for European Union countries. From initial findings it appears that many PASIs are not formally written up and still fewer are evaluated against their aims. The evidence also suggests differences between countries. This paper considers how evaluation could be used by all stakeholders to improve future initiatives in Europe and potentially further afield.

Parallel Session 40

Workshop

11:00 - 13:00

Room: 2B

Workshop

Chairs: Toss Gascoigne, FASTS, Australia and Jenni Metcalfe, Econnect Communication, Australia

Training scientists to use the media effectively: Jenni Metcalfe, Econnect Communication, Australia and Toss Gascoigne, Federation of Australian Scientific and Technological Societies (FASTS), Australia

This practical workshop will engage participants in hands-on exercises designed to enhance their skills in training and interacting with scientists where the objective is effective media performance. The workshop will:

- (a) describe a successful model for training scientists in media skills (as used in Australia), and compare this with other models used in other countries
- (b) demonstrate practical exercises for improving scientists' skills in using the media including message design, media release writing, media events and media interviews.
- (c) look at evaluation techniques for assessing the success of training exercises

(d) discuss the need for on-going media skills training of scientists, including techniques for teaching issues management in advanced media skills courses.

Participants in the workshop will have a chance to play the role of a 'scientist' and participate in practical and hands-on exercises, including:

- being interviewed for television and radio (complete with video and audio recording)
- participating in a 'mock' press conference
- engaging with an 'anti-science' protagonist in a two person radio debate.

Parallel Session 41

Workshop

11:00 - 13:00

Room: 4A

Workshop

Chair: Will Rifkin, University of New South Wales, Australia

25 ways to spot an expert - How people decide who is worth listening to: Will Rifkin, University of New South Wales, Australia

Why do some people get accepted as experts more readily than others?! Those who are successful push our deeply-embedded, cultural hot buttons to earn 'expert status'. The 'negotiation of expert status' is introduced in this highly participatory workshop with the help of participants' experiences and clips from popular films.

Two decades of research are translated into terms and strategies that one can begin to employ immediately. Participants will be exposed to insights that have been found useful and confronting by professional communicators, managers, teachers, lecturers, top executives, and radio and television audiences in Australia, Europe, and the US. This material has proven to be a favourite of professional women.

Participants will learn how to recognise and apply:

- The informational and relational parts of communication
- The notion of a provisional, negotiated status
- 'Implicature', a process that confounds attempts at unambiguous communication
- Intrinsic and extrinsic expert status.

Expert status represents the measure of authority that we give to someone who appears to us to know specialised information or skills that can help us, to

someone who seems to be knowledgeable, credible, and relevant. Expert status is a provisional, "negotiated" status, a status that for the moment resides in the eye of the beholder.

11:00 - 13:00

Room: LT 2

Facilitated discussion

Chair: Michael Kahn, University of Cape Town, South Africa

BMW Centres for Excellence in Mathematics, Science and Technology: Esther Langa, BMW, South Africa and Sadha Moodley, Boston University, USA

This project involves the deployment of interventions in schools that have been identified in the Gauteng province as being exemplary in terms of management and staff. These schools have been transformed into BMW Centres for Excellence in Mathematics Science and Technology. These centres will also serve as professional development resources for the in-service teacher training needs of surrounding schools.

This intervention was initiated by a generous grant from the Government of Japan and is a highly researched intervention that involved researchers from Columbia University in New York as well as educators and education officials in South Africa. It was precipitated by a study conducted in South Africa through the Global Foundation for Research and Scholarship.

Assessment, monitoring and evaluation will be done through Boston University, USA. The project aims to provide much needed science, mathematics and technology resources to high schools (grades 8-12) as well as the following:

1. Apparatus which has been especially designed to serve learners who are being instructed in a language that is different from their mother tongues.
2. Special corresponding hands-on activities to allow learners to engage and participate in the scientific process through investigation, data collection, analysis and conclusions.
3. It is also designed to encourage parents and communities to take ownership of children's education by visible demonstrations of the value of education and science education in particular, in a manner that is relevant to their lives.
4. The centres serve as professional development centres to other schools in the area/region.

The intervention fosters the idea of both horizontal and vertical empowerment.

School innovation in science - The development, education and public communication of science in Victorian schools: Jane Harvey, Department of Education and Training (Victoria), Australia

Schools can be powerful vehicles for raising the awareness and understanding of science not just in their students, but also in their wider communities. This awareness raising is critical in gaining parental and community support for a school's activities, particularly in rural and isolated settings.

For the past three years, the 'Science in Schools Research Project' (SiSRP) has operated across Victoria, Australia in 224 primary and secondary schools with 98 000 students and over 2000 teachers. From this research, conducted by a consortium from Deakin University on behalf of the

Department of Education and Training, has come the 'School Innovation in Science' (SIS) programme, which focuses on improving teaching and learning in science classrooms. In 2003, 'School Innovation in Science' will be available to another 100 schools statewide.

In many cases, the schools' involvement in the project has acted as a catalyst, providing ways to raise awareness of the importance of science, technology and innovation in industry and the community.

This discussion paper outlines the context in which 'School Innovation in Science' operates. Three case studies provide information about the activities of schools located in the Goulburn North-Eastern Region of the Department of Education and Training. These examples highlight the important role schools play in communicating science to the broader community within the Victorian Education System.

How the Japanese science curriculum impacted on the public knowledge of science and technology: An empirical analysis of a recent survey: Kinya Shimizu, Hiroshima University, Japan

The purpose of this study is to present some results of an analysis of the most recent Japanese survey on the public understanding of science and technology (PUST). It focuses on the effect of formal education in the scientific knowledge of Japanese public. Then, as a major source of PUST, the study investigates Japanese science curriculum and identifies in what grade the public learned specific scientific concepts. Thirdly, it examined the effect of curriculum revision. The study compares the level of PUST between two generations: general science generation and science electives generation.

The results indicate three points. Firstly, in Japan, there are a group of scientific concepts which most public within any demographic status (city size, gender, education level, and age) understand. Secondly, the key to the formation of the "general knowledge" in PUST is the success in the education in lower secondary level, from 7th to 9th grade. Thirdly, in spite of the public debate on the lack of PUST of Japanese younger generation, the science elective generation have better understanding of science and technology.

In conclusion, the study suggests the importance of the hidden curriculum in the society as well as the overt school science curriculum.

Innovations in Australian science education: Paula Taylor, Department of Education and Training (Victoria), Australia

Australia is a culturally diverse nation with a desire to build a strong knowledge and innovation based economy. Effective science education programs are a vital key to making this a reality. The Science in Schools (SiS) Strategy is the Victorian Government's

response to this challenge. Initiated in 1998, the SiS strategy has changed the face of science education in Victorian schools.

The innovative programs that this strategy has developed initiate and develop relationships between a wide range of groups including students, teachers, parents, scientists, engineers, tertiary institutions and industry. As well as changing the way that science is delivered in schools, these programs also need to be inclusive of, and responsive to, the diverse cultural needs of the Australian community.

On TRAC in science education: Wayne Duff-Riddell, Stellenbosch University, South Africa

TRAC is a national programme, the objective of which is to encourage and enable school leavers to enter careers in science, engineering, and technology. This is achieved via several parallel mechanisms, all aimed at making specialised science laboratory equipment, syllabus relevant content, and vocational guidance material available to schools. Funding is provided by industrial partners, particularly the South African National Roads Agency Limited (SANRAL) and the National Department of Transport whose primary objective is enhancing the opportunities of learners from previously disadvantaged communities.

The equipment and content focus on the physical science component of the school syllabus, but the TRAC Programme extends more broadly, seeking to demonstrate the linkages between the different study areas of physical science, biology, geography, and technology, and for that matter, everyday life. Within this framework, the programme provides a mechanism for giving learners access to and contact with modern technology as part of the standard school syllabus, rather than in addition to it. This results in learners developing a degree of computer literacy and familiarity with modern technology whilst studying and experiencing the fundamentals of physical science as set out in the South African School syllabus. Because the TRAC PAC, the central element of the TRAC Programme is relatively portable, no special laboratory facilities are required. Any school with access to a computer, or to one of the regional TRAC Labs, can implement the TRAC Programme, enabling learners to participate in the prescribed laboratory work. With the sponsored equipment and a computer in hand, most of the experiments can be conducted with the most basic of equipment, such as a beach ball, a piece of old guttering, a piece of plastic pipe etc. Detailed TRAC worksheets guide both the learners and the educators through the syllabus, enabling the teacher to assess the learners using OBE guidelines.

This paper provides a brief overview of the TRAC Programme and shares some of its successes and failures in communicating science and technology to developing communities, its involvement in providing some formal content in science centres and some initiatives to expand the programme's ability to communicate science and technology to a broader community.

SA learners learn basic hands-on electronics as facilitated by an IT learning environment: Miranda Myburgh, Stellenbosch University, South Africa


SUNSTEP has been very successful the past five years in teaching 77028 learners in six provinces to understand basic hands-on electronics. SUNSTEP made an investigation to determine the extent to which basic electronics can be taught to learners as facilitated by the multimedia computer program, VirtualBookTM. The learners were able to assemble an electronic alarm kit, by first mastering the basic electronics theory and then soldering the correct components onto the printed circuit board until the buzzers beeped and the LEDs flashed, indicating successful completion. It has been proven that the learners are able to independently assemble an electronic kit with the computer program as teaching aid.

What are the key elements for ensuring an effective materials awareness programme? Jane Pritchard and Caroline Baillie, UK Centre for Materials Education, Liverpool, UK

There are a number of science, engineering and technology schemes promoting all aspects of science, engineering and technology SET currently available in the UK focusing on school age audiences. What are the key factors that determine the effectiveness of these initiatives and can we identify a general set of good practice guidelines for current/future scheme organisers? Some programmes aim to raise the general awareness of SET to their audience whilst others are trying to attract students onto science and engineering degree courses (and careers). What forms of evaluation and feedback exist for the schemes currently in operation, in other words how is the success of a scheme determined? These are the questions that we (the UK Centre for Materials Education) asked a number of current scheme practitioners and deliverers at both the national and local level.

Through interviews with scheme organisers and a content analysis of their literature and evaluation and feedback data categories of goals and categories of success that ensure an effective programme have been revealed. The end result will be a resource available to everyone interested in SET initiatives. It will allow them to identify the key elements that can help to ensure that current/new schemes are effective in meeting their aims and if the type of evidence collected to determine that if indeed the aims have been met.

13:00 – 13:30

 Lunch and networking

Plenary

Looking towards the future of PCST

13:30 - 14:00

Room: LT 1

Chair: Marina Joubert, Foundation for Education, Science and Technology, South Africa

Preview of PCST-8 in Barcelona, Spain in 2004: Vladimir de Semir, Universitat Pompeu Fabra, Spain

Announcement of host country for PCST-9 in 2006

**Parallel Sessions 43 - 47
are run concurrently**

Parallel Session 43

Discussion session

14:00 - 15:30

Room: LT 1

Facilitated discussion

Chair: Bruce Lewenstein, Cornell University, USA

Discussion session on public understanding of science and research in the developing world context led by Bruce Lewenstein, Cornell University, USA

For the last 50 years, research and practice in the developed world has led to much better understanding of public communication of science and technology. But models from the developed world may not be relevant to the needs of the developing world. This panel will explore how some of the issues arising from the developed world apply in the developing world.

A key issue is that many science outreach activities are motivated by an equation of "understanding" with "appreciation" -- greater public understanding means greater public appreciation of the benefits that science can provide to society. This approach often assumes that the public has a deficit of scientific knowledge, which must be filled by more and better scientific information. But much recent research has questioned the "deficit model." New models of public understanding of science and research look at ways of integrating public participation into various levels of scientific debate, including providing "a place at the table" for relevant advocacy groups in the direction of particular areas of research (the "lay expertise model"), as has happened in breast cancer and AIDS research, or as sometimes happens with science shops; and creating new forums for public engagement in policy issues (the "participation model"), such as public consensus conferences and citizen juries.

But these models were developed in countries and regions with few of the challenges facing the developing world. For much of the world, "public understanding of science" is about producing and

protecting clean water for drinking and cooking, access to pharmaceutical treatments for infections, malaria, or tuberculosis, creating infrastructure for public health systems to nurture pregnant women and then their newborn children. Public understanding of science in the developing world is about learning the essential link between sexual intercourse and HIV infection, or between boiling and filtering water and avoiding cholera or other widespread diseases. In the developing world context, it is not clear that consensus conferences about genetically-modified foods, or museum exhibits about electrical phenomena, or magazine articles about in-vitro fertilization can address the needs of most members of the population.

The presenters in this panel will explore these issues with cases or ideas from particular national contexts. Ideas from the discussions will be fed into a 2-day workshop funded by the U.S. National Science Foundation on "public understanding of research in developing countries" that will be held immediately following the PCST7 meeting.

Parallel Session 44 Workshop

14:00 - 15:30

Room: LT 3

Workshop

Chair: Chris Krishna-Pillay, CSIRO Education, Australia

Theatre in science communication: Chris Krishna-Pillay, CSIRO Education, Australia

The strength of theatre in science communication is that theatre can be used to explore just about anything. There are science performances covering every area of science from dinosaur ecology and the measurement of latitude to genetics, sex and wastewater management.

Theatre is a particularly potent communication tool because it can easily consider social and political influences as well as purely scientific ones, and can meet the aims of any communication activity. If one's aim is to inspire, one might consider the story of a real person – perhaps a scientist. One could also present a piece exploring hypothetical examples, considering what life might be like with or without a particular scientific development. This also helps the audience understand why scientific research is important to them. For media events theatre can be used very successfully, as it provides information and entertainment for those attending and good visual content for the media. As an educational tool, theatre is becoming more and more popular among science educators, not only in the form of presentations to students, but also as presentations by students.

Chris Krishna-Pillay is currently manager of CSIRO Education in Victoria, Australia. He will draw on more than 10 years experience to explore theatre and theatrical techniques as they have been used recently in science communication and science education. Specific examples will be featured including adult educational cabaret, shows examining the history of science and school's science performances.

Parallel Session 45 Workshop

14:00 - 15:30

Room: LT 2

Workshop

Chair: Rick Borchelt, Whitehead Institute, Massachusetts Institute of Technology, USA, and a representative from the University of Cape Town, South Africa

Developing a science and technology communication strategy for higher education institutions

In addition to assisting in the development (and implementation) of science and technology communication strategies, the workshop will focus on communicating research in the field of science and technology at the Technikon. Idea sharing and basic communication methods will initiate the development of science and technology communication activities.

Workshop outline

14:00 - 14:30: *The public communication of science, technology and research a higher education*

institution - where do I start? Guidelines and advice on best practice: An international perspective by Rick Borchelt, Director: Communications and Public Affairs, Whitehead Institute for Biomedical Research, Boston, USA

14:30 - 15:00: *A local success story: Strategies employed in the public communication of research at the University of Cape Town* (Marketing an institution through communicating science and technology): Skye Grove, Marketing and Communication, University of Cape Town

15:00 - 15:30: *Questions and discussion - where do we go from here, how to turn plans into action!*

Parallel Session 46 Workshop

14:00 - 15:30

Room: 2B

Workshop

Chair: Lily Whiteman, Consultant, USA

Signs of intelligible life in the scientific community - the sciences begin to embrace plain language: Lily Whiteman, USA (hands-on workshop and tips on communicating science in plain language)

Einstein said: "Most of the fundamental ideas of science are essentially simple, and may, as a rule, be expressed in a language comprehensible to everyone." Nevertheless, the kind of comprehensible language advocated by Einstein has traditionally been in short supply within the scientific literature. But now, a fledgling plain language movement is gaining momentum within the sciences. This lively, entertaining workshop will explain how and why it is doing so. This workshop will also provide:

- Information about new programs that train students and working scientists to communicate their research in plain language.
- Practical, time-tested tips for expanding the audience of any scientific communication without diluting substance.
- Side-by-side comparisons of plain language makeovers of scientific communications.
- Recommendations for books, articles and videos on communicating science in plain language.
- Hands-on exercises for communicating science in plain language.

Lily Whiteman has presented workshops on communicating science in plain language to many organisations including the American Association for the Advancement of Science (AAAS), the Council of Science Editors and Vice President Al Gore's National Partnership for Reinventing Government.

Parallel Session 47 Theme: Communicating science in the savannas

14:00 - 15:30

Room: 2A

Panel discussion

Chair: Jenni Metcalfe, Econnect Communication, Australia

Each of the three panel speakers will give a different perspective on the effective communication of science in the savannas in a five minute overview that will explore both practical and theoretical considerations to the issue. The panel will then be asked key questions such as:

- What are the challenges or barriers to effectively communicating science in the savanna regions?
- Who are the multiple players interested in sustainable use of savannas, and what are their cultural perspectives?
- What should science communication aim to achieve?
- What lessons can be learnt from past experiences?
- Is there a model for effective science communication to diverse cultural interests who

want to use the natural resources of a region in different ways?

- Should science communication be wearing and "advocate" or "information/knowledge transfer" role?

Presenters

- The use of weather stations in science communication in the US savannas: Terry Hutter, Exploration Place, USA
- Matching western science with indigenous knowledge systems: Caroline Selepe, Technikon Northern Gauteng, South Africa
- Communicating science to diverse audiences in Australia's northern savannas - with examples of effective communication tools: Kate O'Donnell, CRC for Tropical Savanna Management, Australia

15:30 - 15:45

 Coffee & tea

16:00



Penguins tour to Boulders Beach, Simon's Town. Buses leave from the Kramer Building, UCT at 16:00 (must book!)

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