ICWES15

AUSTRALIA 2011

ADELAIDE 19-22 JULY

Leadership, Innovation, Sustainability

The 15th International Conference of
Women Engineers and Scientists

Adelaide Convention Centre

Adelaide, South Australia

Final Program and Abstract Book

www.icwes15.org

Conference hosts:

ENGINEERS AUSTRALIA
Women in Engineering

INWES

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G'DAY & WELCOME

On behalf of the National Committee for Women in Engineering, Engineers Australia and the International Network for Women Engineers and Scientists (INWES), it gives us great pleasure to welcome delegates from around the world and Australia to the 15th International Conference for Women Engineers and Scientists in Adelaide.

This is the first time such an international conference for women engineers and scientists is being held in Australia and indeed the Southern Hemisphere. Set in the beautiful city of Adelaide, this conference is an opportunity to discuss innovations in technology in the 21st century across the engineering, science and technological professions and network with colleagues in business, academia and government.

The theme of the Conference is Leadership, Innovation and Sustainability. Over the next three days, the Conference will explore outstanding practices and initiatives to attract, develop and retain women to science and engineering; initiatives to encourage women into leadership; achievements and innovations in all fields of science, engineering and technology; the challenges of climate change, water management and renewable energy. The Conference will showcase the achievements of women in these fields and lead the way towards a sustainable future.

We hope you will be inspired by the speakers at the conference, enjoy hearing their stories and learn from their experiences. We also hope you will enjoy the best that Australia and Adelaide has on offer.

Our sincere thanks to all our sponsors and supporting organisations for having contributed generously to ensuring this conference is a great success.

We wish all delegates a wonderful and memorable experience.

Marlene Kanga FIEAust CPEng
Co-Chair ICWES15
Organising Committee

Ha Do MIEAust
Co-Chair ICWES15
Organising Committee

COMMITTEES

ICWES15 Organising Committee

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The Association of Korean Woman Scientists and Engineers (KWSE)

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The ICWES15 Organising Committee gratefully acknowledges the support of the following Conference Partners:

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KEYNOTE SPEAKERS

The Hon Kate Ellis MP

Minister for Employment Participation and Child Care
Minister for the Status of Women

Minister Kate Ellis is the youngest woman ever elected to the Australian House of Representatives. She was first elected in 2004 to become the Member for Adelaide. In 2007, Kate Ellis was appointed Minister for Youth and Sport. In June 2008 Kate was given extra ministerial responsibilities, becoming Minister for Early Childhood Education, Childcare and Youth; and Minister for Sport. In 2010 she became the Minister for Employment Participation and Child Care and the Minister for the Status of Women. Minister Ellis is active in the community and hosts regular meetings and community events to ensure that she keeps in close contact and takes up the issues of the residents she represents.

Dame Professor Jocelyn Bell Burnell, DBE, FRS, FRSE

Oxford University, UK

Dame Professor Jocelyn Bell Burnell is a distinguished astrophysicist, based in the UK. As a postgraduate student, she worked on the discovery of the first radio pulsars, but missed out on the Nobel Prize for Physics which was awarded to her supervisor. She is the current President of the Institute of Physics, UK, the first woman in this role.

Professor Burnell's considerable contributions to the field of astrophysics have resulted in a large number of awards and significant recognition. She was made a Commander of the British Empire (CBE) in 1999 and that year also won the Edinburgh Medal for services to science and society. She became a Fellow of the Royal Society (FRS) in 2003, and Fellow of the Royal Society Edinburgh (FRSE) in 2004 and was elected a Foreign Associate of the US National Academy of Sciences in 2005.
In 2007 she was made a Dame Commander of the British Empire (DBE).

Professor Burnell is currently Visiting Professor of Astrophysics at the University of Oxford and a Professorial Fellow at Mansfield College, Oxford.

Janet Holmes à Court, AC

John Holland Group, Australia

Janet Holmes à Court, AC has been the Chair of the John Holland Group since 1991. She is also Chair of one of Australia's largest private companies, Heytesbury Pty Ltd and its controlled entities which include Heytesbury Beef, Heytesbury Thoroughbreds, The Holmes à Court Collection and Vasse Felix.

Mrs Holmes à Court was made an Officer in the Order of Australia (AO), in 1995 and promoted to a Companion of the Order (AC) on Australia Day 2007. The National Trust of Australia has included her on its list of 100 Australian Living Treasures.

KEYNOTE SPEAKERS

Dr. María Jesús Prieto-Laffargue

World Federation of Engineering Organisations, Spain

Dr. María Jesús Prieto-Laffargue, a telecommunications engineer, is the first woman to be President of the World Federation of Engineering Organisations. She is a prominent figure in the international arena of communications technology and international business. Dr. Laffargue has served on several boards advising national and international companies and organizations in telecommunications, energy, aerospace and transportation.

She has also collaborated with the Universities of Madrid, Barcelona and Navarra. She was Professor of Chamber of Commerce and Industry and author of numerous articles and is currently a member of the Spanish chapter of the prestigious Club of Rome think tank.

Dr. Laffargue has been a delegate of the Spanish government to several European and world organizations. She has served and is currently active in a group of select experts preparing for the United Nations work on the Summit on Sustainable Development. She has been a member of the Council of World Meteorology Organization, the Executive Council of European Meteorology Satellite Organization (EUMESAT) and the Council of Union International Telecomm (ITU).

Emeritus Professor Elizabeth Taylor, AO

Board of Professional Engineers Queensland, Australia

Emeritus Professor Elizabeth Taylor, AO, is a leading academic and was Pro Vice-Chancellor and Executive Dean of the Faculty of Sciences, Engineering & Health at Central Queensland University until 2009. She has degrees in engineering and law and in 2004 was awarded the Order of Australia "for service to engineering education through the design and implementation of innovative academic programs, to professional associations and to enhancing the status of women in the profession and promoting it as a career option".

Professor Taylor is Chair of the Board of Engineers Media, Chair of RedR (Registered Engineers for Disaster Relief) and Chair of the Board of Professional Engineers of Queensland. She was President of the Australian Council of Engineering Deans.

INVITED SPEAKERS

Kathryn Fagg
Linfox Logistics, Australia

Kathryn Fagg is President, Fast Moving Consumer Goods (FMCG) for Linfox Logistics. She started with Linfox in early 2009, and has responsibility for meeting the logistics needs of customers across Asia Pacific in the FMCG Group.

Prior to joining Linfox, Kathryn was with BlueScope Steel. Her last role was President, BlueScope Steel Asia, based in Singapore where she had responsibility for all manufacturing and marketing operations in Thailand, Indonesia, Vietnam, Malaysia and a JV in India with Tata Steel.

Prior to moving to Singapore, Kathryn had responsibility for Australian Building and Logistics Solutions for BlueScope Steel.

Kathryn originally studied Chemical Engineering at the University of Queensland and has a Masters Degree in Organisation Behaviour from the University of New South Wales.

Dr Cathy Foley
CSIRO Materials Science and Engineering, Australia

Dr. Cathy Foley is a Chief Research Scientist with CSIRO Materials Science and Engineering. She is the Research Program Leader for Devices Systems and Engineering and a project leader of a Superconducting Devices and Applications Project which is developing superconducting systems for mineral exploration, detection of metal for quality assurance in manufacturing, electrode-less heart monitors and remote detection of contraband at airports, terahertz imaging, submarine and UXO detection and quantum computing. This multiple million-dollar project assisted with the discovery and delineation of the BHP Cannington Silver mine.

Dr Foley has a world-class reputation in her field. She is a Fellow of the Institute of Physics in the UK, Immediate past President of the Australian Institute of Physics, Fellow of the Academy of Technological Sciences and Engineering (ASTE) and the President of Federation of Australian Science and Technology Societies where she represents 60,000 Australian scientists and technologists.

Helen Gluer, MBA, BCom, CPA, FAICD
Stanwell Corporation, Australia

Helen is the Chief Executive Officer of Queensland's largest generator, the new Stanwell Corporation which was created on 1 July 2011 as a result of a merger of two previous Queensland generating companies. Prior to this appointment Helen had been the Chief Executive Officer of Tarong Energy (one of the predecessor organisations) since January 2007 and before this, she was the Chief Financial Officer of the Brisbane City Council.

With a diverse career, Helen has 28 years experience in banking, finance and infrastructure. Helen is currently a Council Member for the Queensland University of Technology, is a Trustee of the Lord Mayor's Community Disaster Relief Appeal Fund and has directorships with the Queensland Resources Council, National Generators Forum and TransLink Transit Authority. Helen was previously the Chair of the Central Queensland Ports Authority. Her other previous directorships have included City Super Pty Ltd, the South East Queensland Water Board and Brisbane Airport Corporation.

INVITED SPEAKERS - CONTINUED

Kathy Hirschfeld
Snowy Hydro Limited, Australia

Kathy Hirschfeld is a non-executive director, after almost 20 years in leadership and executive roles with BP. Until 2010 she was the Managing Director of BP's Bulwer Island Oil Refinery and a Director of New Zealand Refining Company. Kathy's career with BP started at Perth's Kwinana Refinery in 1990 and positions included Control Systems Engineer, I&E Maintenance Manager, Laboratory Manager, and Operations Superintendent. In 2002/3 she held Commercial Manager roles in BP Exploration in the UK. Kathy was appointed Refinery Manager at BP's joint venture refinery in Mersin, Turkey in 2004, and was responsible for closure of the refinery and conversion to a Marketing terminal.

In 2007 Kathy was recognised by Engineers Australia as one of 25 of Australia's most influential female engineers.

Lorie Jones
Sinclair Knight Merz, Australia

Lorie Jones is Past President of Engineers Australia (WA Division), an active member of the Division Committee, and represents WA on National Congress. She is a Principal Environmental Engineer in the Perth office of Sinclair Knight Merz (SKM) and has performed a number of senior consulting roles including Relationship Client Manager, Project Director and WA Region Sustainability Facilitator.

Gretchen Kalonji
UNESCO

Professor Gretchen Kalonji is the UNESCO Assistant Director-General for Natural Sciences and is the first woman to hold this position in UNESCO.

Ms Kalonji began her academic career at the Massachusetts Institute of Technology (MIT), where she served as Assistant and Associate Professor in the Department of Materials Science and Engineering, from 1982 to 1990. In 1990, Ms Kalonji joined the University of Washington in Seattle as the Kyocera Professor of Materials Science. Since 2005, Ms Kalonji has been working within the University of California system, serving as Director of International Strategy Development for the 10-campus system from 2005 to 2009, and as Director of System-wide Research Development from 2009 to 2010. Since 2006, she has been serving as Professor in the Department of Electrical Engineering at the University of California Santa Cruz.

In addition Ms Kalonji has held or continues to hold appointments as visiting professor or scientist at numerous institutions around the world, including at the Max Planck Institute (Germany), the University of Paris XI Orsay (France) and Tohoku (Japan), as well as at Sichuan, Tsinghua and Peking Universities (China).

Ms Kalonji has served on multiple national and international advisory boards. She currently chairs the US National Science Foundation's Advisory Committee on International Science and Engineering. She has authored many papers in peer-review journals and conference proceedings and has given numerous lectures around the world.

Dr Di McCarthy, BA, BSc, MSc (Hons), PhD, ONZM
Chief Executive of The Royal Society of New Zealand

Dr Di McCarthy is Chief Executive of the Royal Society of New Zealand, a national academy promoting, investing in and celebrating excellence in the sciences and the humanities with head office in Wellington. She has held the position since May 2007.

INVITED SPEAKERS - CONTINUED

Melissa Mellen
Murray F Young & Associates, Australia

Melissa Mellen is the National winner of the 2010 Commonwealth Bank Business Owner award for the Telstra Business Women's Awards, and the 2010 Telstra South Australian Business Woman of the Year. Melissa Mellen purchased Murray F. Young & Associates (MFY) after 10 years working in the business. MFY is a consulting traffic engineering firm providing professional traffic, transport and parking advice to private and government clients.

Professor Tanya Monro
The University of Adelaide, Australia

Professor Tanya Monro is one of Australia's leading physicists and is the 2011 South Australia Australian of the Year. Her work in the field of photonics - the science and technology that allows the generation and control of light using glass optical fibres - enables the creation of new tools for scientific research, and solutions for problems in areas as diverse as information processing, surgery, health monitoring, military technology, agriculture and environmental monitoring.

Karen Moses
Origin Energy Ltd., Australia

Karen Moses is currently responsible for the finance, tax and accounting functions, interactions with capital markets and IT. In addition to corporate strategy and transactional activity, she has an oversight of overall Origin risk including operational HSE, commodity risk, compliance and insurance. Karen oversees the APLNG Project from an Origin perspective.

Prior to joining Origin in 1994, Karen held development and trading roles in the Exxon Group (1983-94). Karen was appointed to the Origin Board in March 2009. She is a Director of the Energy and Water Ombudsman (Victoria) Limited, Australian Energy Market Operator Limited, Australia Pacific LNG Pty Limited and Group companies, Contact Energy Limited in New Zealand and chairs their HSE Committee.

Professor Karen Reynolds
Flinders University, Australia

Professor Karen Reynolds is professor of Biomedical Engineering at Flinders University and the leader of Flinders Medical Devices & Technologies. Karen was recently awarded the title of Professional Engineer of the Year in the 2010 Engineers Australia Engineering Excellence Awards.

Sylvia Tulloch
Dyesol, Australia

Sylvia Tulloch was the founding Managing Director of Dyesol, responsible for the business strategy and plan. Dyesol Limited is listed on the Australian Stock Exchange and is a global leader in Dye Cell Solar Technology.

CONFERENCE FACILITATOR

Bernie Hobbs

Bernie Hobbs is a popular judge on ABC TV's The New Inventors, and a firm favourite with audiences for her weekly science spots on ABC radio around the country.

Bernie has a first class honours degree in biochemistry and microbiology. She has a background in medical research, environmental writing and science teaching, Bernie can tackle tough or technical subjects and bring the driest topics alive for lay or expert audiences.

Bernie has been MC at many important forums and events including the Prime Minister's Prizes for Science, the Association of Consulting Engineers Australia, events for Co-operative Research Centres, the Queensland Government, The Queensland Resources Council, CSIRO, The Australian Society of Medical Research, Brisbane Ideas Festival, The World Congress of Science Journalists and Questacon.

She's worked with kids, animals and rocket scientists, and shared the stage with prime ministers and rock stars. She happily takes the hot seat at triple j when Dr Karl can't, and loves nothing more than working with a live audience.

Bernie has won awards for the kids tv show the experiMENTALS, and for her infamous greenhouse website Planet Slayer - where you find out what age you should have died at so you don't use more than your share of the planet.

PRE- CONFERENCE PROGRAM

Monday, 18 July 2011

10:00-11:00	**Site Tour 1** **Bio Innovation SA - BioSA Incubator**	**Site Tour 4** **Australian Rail Track Corporation** **Control Room at Mile End**	**Site Tour 3** **From Soil to Skin** **Claret Ash Farm**
11:30-12:00			
14:00-16:00	**Site Tour 2 - SA Water Desalination**		

Tuesday, 19 July 2011

08:30-17:00	**Workshop 1** **Leadership Skills for Professional Women**	**Workshop 2** **Fear Free Presentations**				
10:00			**Site Tour 1** **Bio Innovation SA - BioSA Incubator**	**Site Tour 4** **Australian Rail Track Corporation** **Control Room at Mile End**	**Site Tour 3** **From Soil to Skin - Claret Ash Farm**	
10:30						**Site Tour 5** **IPAS Optical Fibre Research Facility**
11:00						**Site Tour 5** **IPAS Optical Fibre Research Facility**
11:30						
12:00						
14:00			**Site Tour 2** **SA Water Desalination**			
16:00						
17:30-19:00	**Welcome Reception**					*Art Gallery of SA*

CONFERENCE PROGRAM

Wednesday, 20 July 2011

09:00-09:45	**Opening Ceremony and Welcome to Country** Facilitator: Ms Bernie Hobbs **Opening Address** - *The Hon Kate Ellis, MP* **Diamond Sponsor Presentation** - *Karen Wood, BHP Billiton*				*Hall C*
09:45-10:30	**Plenary** Facilitator: Ms Bernie Hobbs **Keynote Address: Reflections of a Female Astronomer** *Dame Prof Jocelyn Bell Burnell, Oxford University, President, Society of Physics, United Kingdom*				*Hall C*
10:30-11:00	**Morning Tea & Posters** - within the exhibition				*Hall K*
11:00-11:45	**Plenary** Facilitator: Ms Bernie Hobbs **Keynote Address: Women Leadership in Engineering and Technology** *Dr Maria Jesús Prieto-Laffargue, President, World Federation of Engineering Organisations, Spain*				*Hall C*
11:45-12:30	*Hall C*	*Hall D*	*Meeting Rooms 1 & 2*	*Meeting Room 10*	*Meeting Room 11*
	Leadership Facilitator: Ms Bernie Hobbs	**Gender Equity / Workforce Issues** Chair: Prof Kong Joo Lee President Elect, INWES, Association of Korean Women Scientists and Engineers, Republic of Korea	**Higher Education** Chair: Ms Monique Moutaud INWES Board member, France, Vice President Conferences	**Telecommunications / Electrical Engineering** Chair: Hon Trish White Former Member for Taylor, South Australia, Executive Member, Worley Parsons, Board Member, Australia Post	**Scholarship Winners** Chair: Ms Sue Bird President INWES, UK
11:45	Invited Speaker Presentation *Ms Gretchen Kalonji, UNESCO, France*	Perception of Barriers to Career Progression by Women Engineers and Engineering Students: 306 *Dr Achela K Fernando, Unitec Institute of Technology, New Zealand*	Today's Relevance of Feminist Theory and Gender Inclusive Engineering Curricula to Help Students Overcome Thresholds in Engineering Education: 309 *Sally A Male, The University of Western Australia, Australia*	Green Path Connection in Multi-Layer Transport Network: 312 *Eunyoung Cho, ETRI (Electronics and Telecommunications Research Institute), Korea*	Assessing the Agricultural Faculty Publication Productivity from Gender Perspective: A Case Study: 315 *Dr Suriya M Mayandi Thevar, Annamalai U niversity, India*
12:00		Painting the Picture - An Update on Women in Engineering Statistics in Australia: 307 *Melissa Marinelli, Curtin University, Australia*	Why do Girls Choose Engineering? A Comparison of three Engineering Disciplines: 310 *Dr Rebecca J Gravina, RMIT University, Australia*	Statistical Analysis of Some Accuracy Defining Parameters of Location Based Services offered in South Africa: 314 *Folasade M Dahunsi, University of Witwatersrand, Johannesburg, South Africa, South Africa*	Scientometric Analysis of Publications on Women in Computing: With Special Reference to 'Gender & ICT' Conference Proceedings: 316 *Dr Suriya M Mayandi Thevar, Annamalai University, India*
12:15	Facilitated Discussion	Providing a Gender Balanced Workplace - It's Not Just a Numbers Game: 308 *Ms Nicky E Smith, Opus International Consultants, New Zealand*	A Holistic Review of Gender Differences in Engineering Admissions and Early Retention: 311 *Dr P K Imbrie, Purdue University, United States Dr Teri Reed-Rhoads, Purdue University, United States*		Senior Women Faculty in the Indian Institutes of Technology: 317 *Dr Asha Gopinathan, GenSci-e-Tech, Trivandrum, Kerala, India*
12:30-13:30	**Lunch & Posters** - within the exhibition				*Hall K*

Wednesday, 20 July 2011

13:30-15:00	*Hall C*	*Hall D*	*Meeting Rooms 1&2*	*Meeting Room 10*	*Meeting Room 11*
	Gender Equity / Diversity Facilitator: Ms Bernie Hobbs	**Mentoring / Networks** Chair: Dr. Cheryl Leggon Society of Women Engineers, USA	**Higher Education** Chair: Prof. Nadia Ghazalli INWES Board member Canada Industrial Alliance Chair for the Advancement of Women in Science and Engineering, Quebec, Canada	**Technical: Water** Chair: Dt. Myung Hee Jung Association of Korean Women Scientists and Engineers, Republic of Korea	**Workshop: Moving Towards a Future with Appropriate Technology:** 341 *Presenter: Jackie M Carpenter, SWESE (Trelay), United Kingdom*
13:30	100 Years Later: Has Anything Changed for Women in Science *Dr Cathy Foley, CSIRO Materials Science and Engineering, Australia*	Mentoring of Senior Women Engineers - Experiences and Lessons Learnt: 323 *Louise H Round, Aurecon, New Zealand*	Undergraduate Research Initiative at a Community College: 329 *Margaret E McCarthy, Springfield Technical Community College, United States*	Reducing Corrosion in WWT Inlet Tanks by Returning Mixed Liqour: 335 *Anna B Mollergren, Hunter Water Australia, Australia*	
13:45		Lessons Learned from the First Years of a Mentoring Scheme for Women in Science, Engineering and Technology in the UK: 324 *Ms Pamela R Wain, International Network of Women Engineers and Scientists, United Kingdom*	A Spatially Gender-Disaggregated Database for Bursary Allocation to Attract Women Pursuing Science, Engineering and Technology (SET) in Kenya: 330 *Dr Faith Njoki Karanja, The University of Nairobi, Kenya*	Reclamation of oilfield produced water using hydrophilic pervaporative membranes: 336 *May N Sule, Imperial College London, United Kingdom*	
14:00	A Review of the UNESCO Report: "Engineering: Issues, Challenges and Opportunities for Development": 319 *Dr Tony Marjoram, UNESCO*	Career Support in Science and Knowlege Management - Mentoring at non-University Research Organizations in Germany: 325 *Katharina Sauter, Fraunhofer-Gesellschaft, Germany* *Dr Birgit Gaiser, Helmholtz-Gemeinschaft, Germany* *Anke Hübenthal, Max-Planck-Gesellschaft, Germany*	Combating Global Warming and its Effects on Sustainable Agriculture: Climate Change - Responsive Agriculture Education Approach: 331 *Dr Uduakobong Aniebiat Okon, APAGESTE - UNIUYO., Nigeria*	Bringing Systematic Innovation into Project Delivery - The Perspective of a Wastewater Network Project Office: 337 *Ms Sarah Sinclair, Sinclair Knight Merz, New Zealand*	
14:15	For Female Engineers: How to Improve your Career Prospects in Male-Dominated Organisations: 320 *Dr Mark C Toner, Toner & Associates, Australia* *Ms Gunilla E Burrowes, University of Newcastle, Australia*	Curtiss-Wright Engineering Cadettes: 21st Century Questions and Issues: 326 *Ms Anne M Perusek, Society of Women Engineers, United States* *Ms Tanya Zanish-Belcher, Iowa State University, United States*	The MetaKettle Project: A Journey to the Heart of Higher Education: 332 *Dr Cecilia Moloney, Memorial University of Newfoundland, Canada*	Hungry for Power - Challenges for the Municipal Wastewater Treatment Industry: 339 *Ms Amanda Lake, Jacobs Engineering, United Kingdom*	
14:30	A Case Study on the Engineering Profession-Diversifying to Success!: 321 *Ms Kartikee Verma, Kellogg Brown & Root Pty Ltd, Australia*	The Boundaries of Women's Rights: Activism and Aspirations in the Society of Women Engineers, 1946-1980: 327 *Ms Lauren A Kata, United States*	Life after a Bachelors Degree in the Sciences: Responses of Female University Students in the Southeastern Region of Korea: 333 *Prof Jung Sun Kim, BIS-WIST and Dongseo University, Busan, Korea, Korea*	Learning from Mistakes: 340 *Kelly A Stokes, Townsville Water, Townsville City Council, Australia*	
14:45	Facilitated Discussion	Why Women and Men Join the Society of Women Engineers: 328 *Dr Jane Z Daniels, Henry Luce Foundation, United States*	Challenges Facing Female Engineering Students in Africa - Our Experience: 334 *Miss Nana Yaa D Oti-Boateng, Kwame Nkrumah University of Science and Technology, Ghana*		
15:00-15:30	**Afternoon Tea & Posters** - within the exhibition				*Hall K*

Wednesday, 20 July 2011

15:30-17:00	*Hall C*	*Hall D*	*Meeting Rooms 1&2*	*Meeting Room 10*	*Meeting Room 11*
	Sustainability Facilitator: Ms Bernie Hobbs	**Women in Academia: ADVANCE** Chair: Ms Gunilla E Burrowes, University of Newcastle, Australia	**Industry Best Practice** Chair: Prof Jung Sun Kim, BIS-WIST and Dongseo University, Korea	**Workshop: Training Material for WiE Attraction, Retention and Higher Management Development:** 359 *Presenters: Marie Helene Therre, Chair, WFEO, WiE Standing Committee, France and Dr Suzelle Barrington, McGill University/Universite Europeenne de Bretagne, Canada*	**Workshop: INWES Projects - Achievements and Plans:** 360 *Presenter: Ms Pamela R Wain, International Network of Women Engineers and Scientists, United Kingdom*
15:30	Sustainable Solutions: 342 *Ms Sylvia Tulloch, Dyesol, Australia*	ADVANCE: Recruitment and Retention of Women in STEM - Accomplishments of The University of Illinois at Chicago's (UIC) Women in Science and Engineering System Transformation (WISEST): 347 *Dr Manorama M Khare, University of Illinois at Chicago, United States*	Family-friendly Policies and Women Engineers Career: 353 *Kim Ball, Griffith University, Australia*		
15:45		ADVANCE: Elder Care Impact on Higher Education: 348 *Dr Gretalyn M Leibnitz, Washington State Universtiy, United States*	Women Leading Diversity at SKM: 354 *Ms Alison McKechnie, Sinclair Knight Merz, Australia* *Ms Rowenna M Walker, Sinclair Knight Merz, Australia*		
16:00	Sustainable Building Design: Challenge and Opportunity: 343 *Kate E Dougherty, SKM, Australia*	ADVANCE: The Outcomes of 19 Institutional Transformation Efforts to ADVANCE Gender Equity: 349 *Diana Bilimoria, Case Western Reserve University, United States*	How to Get the Best for Less - Engineering your Recruitment: 355 *Allyson M (Woodford) Black, Production Superintendent Lytton Refinery, Caltex Australia, Australia*		
16:15	Connecting the Dots: The Value of Systems Thinking in Sustainable Outcomes: 344 *Ms Susanne Cooper, Sinclair Knight Merz, Australia*	ADVANCE: Retaining and Advancing Women Faculty: 350 *Dr Canan Bilen-Green, North Dakota State University, United States*	Finding, Recruiting, and Retaining Women Engineers for National Security R&D Positions: 356 *Ms Janet L Williams, Sandia National Laboratories, United States* *Michael Kline, United States*		
16:30	Capacity Building in Science Technology and Innovation (STI) Policy for Sustainable Development in West Africa - The Role of Women Engineers and Scientists: 345 *Dr Peggy E Oti-Boateng, Technology Consultancy Centre, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana*	ADVANCE: Building a Diverse STEM Faculty: 351 *Prof Mary Ellen Bock, Purdue University, United States*	Are We There Yet? How Wollongong City Council is Progressing Towards Being an Employee of Choice: 357 *Rosemary Crowhurst, Wollongong City Council, Australia* *Lisa-Marie Walsh, Wollongong City Council, Australia*		
16:45	Facilitated Discussion	Women Engineering Deans in the United States: A New Model for Academic Leadership: 352 *Ms Peggy Layne, Virginia Tech, United States*			
17:00-18:00	**Poster Session**				*Hall K*

Thursday, 21 July 2011

8:45 - 9:45	**Plenary** *Hall C* Facilitator: Ms Bernie Hobbs **Gold Sponsor Presentation: Ms Bashayer Al-Awwad, Chair, Kuwait Women Engineers** **Keynote Address: John Holland and Women in Construction: A Case Study** *Janet Holmes à Court, Chair, John Holland Group, Australia*				
09:45-10:30	*Hall C*	*Hall D*	*Meeting Rooms 1&2*	*Meeting Room 10*	*Meeting Room 11*
	Innovation Facilitator: Ms Bernie Hobbs	**Leadership** Chair: Ms. Gail Mattson INWES Board member USA, Past Presidents Society of Women Engineers USA	**Materials Science / CFD** Chair: Elizabeth J Smith, The University of South Australia, Australia	**Community Involvement** Chair: Ms Michelle Shi-Verdaasdonk	**Technical: Water** Chair: Prof Martin Lambert School of Civil, Environmental & Mining Engineering University of Adelaide
9:45	Innovation in Photonics & Reflections on the Engagement of Women in STEM Careers *Prof Tanya Monro*	Establishing a Broader Commercial Vision: 406 *Ms Carla Cher, Watermark Intellectual Asset Management, Australia*	The Study of two Phase Flow Wall Erosion using a Generalized Computational Fluid Dynamics Prediction Model: 409 *Ms Dorina Ionescu, University of Johannesburg, South Africa*	Various techniques for the preparation of metal nano particles and their performance in catalysis: 647 *Heeyeon Kim, Korea Institute of Energy Research, Korea*	Preparation of Mesoporous Titania Photocatalyst for Water Treatment Application: 414 *Dr Xingdong Wang, CSIRO, Australia*
10.00	Medical Devices – Partnering for Success *Prof Karen Reynolds, Flinders University, Australia*	Reflections on a Year of Engineering Leadership: 407 *Doug Hargreaves, Engineers Australia, Australia*	Quad-tree Grid Generation using the Concept of Linked Lists: 410 *Ms Ansook Sul, Korea Anvanced Institute of Science and Technology, Korea*	Responding to Climate Change: Use of Public Participation GIS to Understand Preferences of Adelaide Park Visitors: 412 *Dr Delene L Weber, University of South Australia, Australia*	Comparative Adsorption of Copper from Synthetic and Real Wastewater by Un-calcined Sodium Exchanged and Acid Modified Montmorillonite: 415 *Dr Christianah Olakitan Ijagbemi, Mechanical Engineering Department, Federal University of Technology, Akure, Nigeria, Nigeria*
10.15	Facilitated Discussion			Join the Queue: The Difficulty of Engaging Rural Communities in Park Based Volunteerism: 413 *Dr Barbara Koth, University of South Australia, Australia*	Effective Planning and Management of Water Resources through Borehole Profiling: 416 *Dr Faith Njoki Karanja, The University of Nairobi, Kenya*
10:30-11:00	**Morning Tea & Posters** - within the exhibition *Hall K*				
11:00-12:30	**CEO Circle** *Hall C* Chair: Kathryn Fagg, President FCMG, Linfox Logistics, Australia				
11:00	**Leaders Create the Future: 417** *Ms Kathy Hirschfeld, Board member, Snowy Hydro Limited, Australia*				
11:30	**Leadership with a Focus on Queensland's Unfolding Resource Industries** *Ms Helen Gluer, CEO Stanwell Corporation, Australia*				
12:00	**Leadership Presentation** *Ms Karen Moses, COO Origin Energy Limited*				
12:30-13:30	**Lunch & Posters** - within the exhibition *Hall K*				

Thursday, 21 July 2011

13:30-15:00	*Hall C*	*Hall D*	*Meeting Rooms 1&2*	*Meeting Room 10*	*Meeting Room 11*
	Workforce Challenges and Leadership Facilitator: Ms Bernie Hobbs	**Women in Academia** Chair: Dr Sally A Male, The University of Western Australia, Australia	**Mechanical Engineering / Systems Engineering** Chair: Prof David Hood, National Deputy President, Engineers Australia	**Technical: Structural and Geotechnical Engineering** Chair: Dr Rebecca J Gravina, RMIT University, Australia	**Workshop: Successful Leadership Journeys - Women Engineers from Kuwait** *Presenter: Bashayer Ibrahim Al-Awwad, Kuwait Society of Engineers - Women In Engineering committee chair, Kuwait*
13:30	Navigating the Labyrinth of Leadership - A Personal Account: 420 *Ms Kathy Hirschfeld, Snowy Hydro Limited*	Part-time Academia: Work-family Balance Utopia or Female Ghetto?: 425 *Dr Kate O'Brien, University of Queensland, Australia* *A/Prof Karen Hapgood, Monash University, Australia*	Emerging Technologies: Will the Chevy Volt Succeed or Fail?: 431 *Suzanna Cottrell Olsen, Arizona State University, United States*	Kingsgrove to Revesby Rail Quadruplication - Innovations in Design and Construction of the Overbridges: 437 *Dr Gillian Sisk, Sinclair Knight Merz, Sydney, Australia* *Ms Sally Cox, Leighton Contractors, Sydney, Australia* *Ms Naomi Stone, Leighton Contractors, Sydney, Australia*	
13:45		Baseline Study on the Status of Women in Engineering and Technology at Tertiary Institutions in Kenya: 426 *Siphila W Mumenya, University of Nairobi, Kenya*	Current Trends in the Application of Atmospheric Plasma for the Improvement of Wind Turbine Efficiency through Separation Control: 432 *Ms Amelia Greig, University of Adelaide, Australia*	Towards a More Sustainable, Resilient Infrastructure System: Regional Risk Assessment of Coastal Bridges during Hurricane Events: 438 *Candase D Arnold, Rice University, United States*	
14:00	Making the Move or Keeping the Connection? Engineering Women as Manager and Leaders - An Australian Study: 421 *Melissa J Marinelli, Curtin University, Australia*	Athena SWAN Charter for Women in Science, Engineering and Technology: 427 *Miss Sarah Hawkes, Equality Challenge Unit, United Kingdom*	Effect of Sawdust Addition on the Thermo-Physical Properties of Some South-Western Nigerian Clay Blends: 433 *Dr Christianah Olakitan Ijagbemi, Mechanical Engineering Department, Federal University of Technology, Akure, Nigeria, Nigeria*	Improving the Thermal Performance of Framed Window Systems: 439 *Miss Lizette JC McNeill, Institute of Engineers Australia, Australia*	
14:15	'I Like the Challenge': A Study of Women Engineers Who Have Stayed in the Profession: 422 *Ms Mary E Ayre, University of South Australia, United Kingdom* *Professor Julie E Mills, University of South Australia, Australia*	Projection on the Future Ratio of Women Scientists at Japanese Universities: 428 *Ms Asuka Hoshikoshi, National Institute of Science and Technology Policy, Japan* *Dr Maki Kato, National Institute of Science and Technology Policy, Japan*	Optimising Hydropower Generation through Fluid Dynamics Research: 434 *Dr Jessica M Andrewartha, University of Tasmania, Australia*	Challenging Design: Foundations for Tall Buildings: 440 *Ms Frances Badelow, Coffey Geotechnics, Australia* *Ms Helen Chow, Coffey Geotechnics, Australia*	
14:30	Facilitated Discussion	Innovative Practices to Retain Women Scientists & Engineers in Academia: 429 *Ms Priti N Mody-Pan, University of Washington, United States* *Dr Suzanne G Brainard, University of Washington, United States*	Transformation Planning for Integrating Unmanned Aircraft into National Airspace: 435 *Kristina L Richardson, Department of Systems Engineering - The United States Military Academy (West Point, NY), United States*	Accelerated Drainage in Sand Piles by Convoluted Perforated Pipe: 441 *Eliza Hashemi, RMIT University, Australia*	
14:45		Gender Differences in Publication Output: Towards an Unbiased Metric of Research Performance: 430 *Dr Suriya M Mayandi Thevar, Annamalai University, India*	Comparison of Solar Sorption Cooling Systems Using Trnsys Software: 436 *Ms Rebecca Selwyn, University of Bristol, United Kingdom*	Rules for the Provision of Earthquake Resistance in Small Buildings in Ghana: 442 *Carlien D Bou-Chedid, Ghana Institution of Engineers, Ghana*	
15:00-15:30	**Afternoon Tea & Posters** - within the exhibition				*Hall K*

Thursday, 21 July 2011

15:30 - 17:00	*Hall C*	*Hall D*	*Meeting Rooms 1&2*	*Meeting Room 10*	*Meeting Room 11*
	Gender Equity / Diversity Facilitator: Ms Bernie Hobbs	**Agricultural Science** Co-Chair: Dr Sally Plush, Australia Dr Tara Pukala, Australia	**AGM**	**Workshop: Women in Local Government. Local Government Session** *Presenters: Jillian Kilby, Engineers Australia, Australia* *Gabrielle Cusack, Regional Development Australia - Orana NSW, Australia*	**Workshop: Making Change Stick! - Systems for Sustaining Change:** 524 *Presenter: Ms Alexandra L Meldrum, UNSW - AGSM., Australia*
15:30	Improving Gender Equity and Diversity in the Science Profession: A New Zealand Perspective: 444 *Dr Di McCarthy, The Royal Society of New Zealand, New Zealand*	Effectivity of Entomopathogenic Fungus Beauveria Bassiana to Control White Grub Lepidiota SP: 449 *Dr R.R Rukmowati Brotodjojo, Dept. of Agrotechnology Universitas Pembangunan Nasional "Veteran" Yogyakarta, Indonesia*	INWES Annual General Meeting		
15:45		Study of Integrated Pest Management (IPM) Application to Increase Yield, Quality and Income of the Cocoa Farmers in Kulon Progo, Yogyakarta, Indonesia: 450 *Ms Dwi A Puspitaningrum, Dept. of Agribusiness Universitas Pembangunan Nasional "Veteran" Yogyakarta, Indonesia*			
16:00	Perceptions and Experiences of the Workplace among Canadian Computer Science and Engineering Students - A Gender Analysis: 445 *Valerie J Davidson, University of Guelph, Canada*	Production of Biogas from Cowdung and Food Waste by Countinous Feed Process: 451 *Olayinka A Abdul, Lagos State Development and Property Corporation, Nigeria*			
16:15	Can Labour Saving Technologies Help Rural Women in Uganda? The Case of the Manual Forage Chopper for Smallholder Dairy Farmers: 446 *Florence B Lubwama Kiyimba, National Agricultural Research Organization, Uganda*	The Production of Biodiesel from Oils and Fats: 452 *Ji-Yeon Park, Korea Institute of Energy Research, Korea*			
16:30	Women Engineering Career: The Case of Nigeria: 447 *Dr Christianah Olakitan Ijagbemi, Mechanical Engineering Department, Federal University of Technology, Akure, Nigeria, Nigeria*	Structure, Hydrogeology, and the Geothermal System of Mount Ungaran Area, Central Java, Indonesia: 531 *Prof Dr Sari B Kusumayudha, University of Pembangunan Nasional (UPN), Indonesia*			
16:45	Facilitated Discussion				
19:00-23:00	**Gala Dinner**				*Hall F*

Friday, 22 July 2011

08:45-09:45	**Plenary** *Hall C* Facilitator: Ms Bernie Hobbs **Gold Sponsor Presentation: Elizabeth Bryan, Caltex, Australia** **Keynote Address: The Allure of Conformity** *Emeritus Prof Elizabeth Taylor, Chair Board of Registration for Professional Engineers, Queensland (RPEQ), Australia*			
9:45 - 10:30	*Hall C*	*Meeting Rooms 1 & 2*	*Meeting Room 10*	*Meeting Room 11*
	Leadership Facilitator: Ms Bernie Hobbs	**Gender Equity / Workforce Issues** Chair: Miss Rosaline Ganendra, Minconsult Sdn Bhd, Malaysia	**K-12 & Higher Education** Chair: Ms Mary E Ayre, University of South Australia, United Kingdom	**Sustainability** Chair: Prof Doug Hargreaves, Engineers Australia, Australia
9:45	A Story About Dragons: 502 *Ms Melissa Mellen, MFY, Australia*	The Promotion of Women Engineers in Management Positions, Problems and Solutions: 504 *Ms Dorina Ionescu, University of Johannesburg, South Africa*	Science Made Simple - Support for Elementary School Science Teachers: 507 *Valerie J Davidson, University of Guelph, Canada*	An Agent of Change? Reflections and Insights on Implementing a Sustainability Change Program: 511 *Ms Susanne Cooper, Sinclair Knight Merz, Australia*
10.00		Attracting and Retaining Women in Science and Engineering: 505 *Sangeeta Wij, Prime SD Engg. Consultants Ltd., India*	Women in Engineering: Are we re-inventing the Wheel?: 508 *A/Prof Sujeeva Setunge, RMIT University, Australia*	A Digital Future and Resource Depletion: 512 *Jackie M Carpenter, SWESE (Trelay), United Kingdom*
10.15	Facilitated Discussion	The Retention and Renewal of Women in Engineering in New Zealand: 506 *Ms Tracey Ayre, IPENZ, New Zealand*	System Fix: Transforming Education and Recruitment of Engineers by the Experience of WiE Advocacy and Experiment: 509 *Ms Bronwyn Holland, The University of Technology, Sydney, Australia*	
10:30-11:00	**Morning Tea & Posters** - within the exhibition *Hall K*			
11:00 - 12:30	*Hall C*	*Meeting Rooms 1 & 2*	*Meeting Room 10*	*Meeting Room 11*
	Innovation and Sustainability Facilitator: Ms Bernie Hobbs	**Gender Equity / Workforce Issues** Chair: Dr Tony Marjoram, UNESCO	**Publication Workshop** Co-Chair: Professor Julie E Mills, University of South Australia, Australia Dr Rebecca J Gravina, RMIT University, Australia A workshop presented by senior academics on successfully publishing your research	**Workshop: Women Professional Engineers at Work**: 532 *Presenters: Ms Alison McKechnie, Global SKM Consulting, presenting on diversity practices at SKM* *Dr Ikuko Imoto, NPO The Geoecological Conservation Network, Japan* *Ms Yukiko Tanaka, I.N.O. Consulting Service Co., Japan* *Ms Keiko Yamamoto, Japan International Cooperation Agency, Japan* *Ms Aguri Nakano, Employment and Human Resources Development Organization of Japan, Okinawa Polytechnic College, Japan*
11:00	Engineering Sustainability - A Systems Approach: 513 *Ms Lorie Jones, Sinclair Knight Merz, Australia*	Steps to Attract and Retain more Female Engineers: 518 *Bethany G Indrawan, Hatch Associates, Australia*		
11:15		An Opportunity for Change: 519 *Angela E Hili, SMEC Australia, Australia*		
11:30	Sustainability in the Built Environment - Common Excuses and Solutions: 514 *Jillian M Hardie, Arup, Australia* *Moira Sammut, Arup, Australia*	Secrets of Successful Women: 520 *Miss Rosaline Ganendra, Minconsult Sdn Bhd, Malaysia*		
11:45	Trelay - A Sustainable Cohousing Community in England: 515 *Jackie M Carpenter, SWESE (Trelay), United Kingdom*	Barely Surviving or Trailblazing? Professional Life of Women Engineers in Shipbuilding, Mechanical and Construction Industries in Taiwan: 521 *Dr Wen-Ling Hong, National Kaohsiung Marine University, Taiwan*		
12.00	Demonstrating Carbon Dioxide Capture through Pilot Plant Operation: 516 *Dr Clare J Anderson, Cooperative Research Centre for Greenhouse Gas Technologies, The University of Melbourne, Australia*	Good Practices to Promote Women in Science and Engineering: The Indian Context: 522 *Ms Prerna Sohal, M/S Tandon Consultants Pvt. Ltd, New Delhi, India, India* *Ms Nilanjana Rao, DLF Universal Ltd., New Delhi, India, India*		
12.15	Facilitated Discussion	Women in Engineering: The Illusion of Inclusion: 523 *Dr Cheryl B Leggon, Georgia Institute of Technology, United States*		

Friday, 22 July 2011				
12:30-13:30	**Lunch & Posters** - within the exhibition			*Hall K*
13:30-15:00	*Hall C*	*Meeting Rooms 1 & 2*	*Meeting Room 10*	
	Future Minds High School Expo Facilitator: Ms Bernie Hobbs	**Gender Equity / Workforce Issues** Chair: Ms Gaye Francis	**Technical** Chair: A/Prof Margaret Jollands, RMIT University, Australia	
13:30		50/50 or 80/20: A New Way of Thinking About Gender Diversity: 525 *Ms Joanne M Conradi, Parsons Brinckerhoff, Australia* PB's Women's Network *David Cruickshanks-Boyd, Parsons Brinckerhoff, Australia*	From Inception to Delivery: How Effective Use of Innovative Geospatial Technology adds Real Value throughout a Projects Lifecycle: 529 *Ms Rachael Potts, Parsons Brinckerhoff, Australia* *Ms Guifen Lin, Parsons Brinckerhoff, Australia*	
13:45			Drinking Water Source Protection Planning in Remote Indigenous Communities: 530 *Natalie Fries, Parsons Brinckerhoff, Australia* *Jamie Burgess, Parsons Brinckerhoff, Australia*	
14:00		Engineering Career for Women: An Examination of Orissan Women's Less Access to and Retention in Engineering Careers: 526 *Dillip Pattanaik, IRMA-India, India*	Provision of Sustainable Road Transport Infrastructures - Urban Corridor in Delhi: 641 *Ms kamini Gupta, Central Road Research Institute, New delhi, India, India*	
14:15		The Formation of Women in Engineering: Townsville: 527 *Kelly A Stokes, Townsville City Council, Australia*	Sustainable Water, Sanitation and Hygiene (WASH) in Developing Countries: Learning from WaterAid's Approach: 338 *May N Sule, Imperial College London, United Kingdom*	
14:30		Being a Female Engineer and Role Model - A Personal Perspective: 528 *Ms Shya Jackson, Parsons Brinckerhoff, Australia*	Community Service Learning Using the Pedal Prix Challenge: 754 *Ms Michelle Bailey, The University of South Australia, Australia*	
14:45		Strategies to Attract, Develop and Retain Women: 677 *Lesley Adams, Woodside Energy Ltd, Australia*		
15:00-15:30	**Conference Close**			*Hall C*

Wednesday, 20 July 2011

17:00-18:00	**Poster Session** Opening by: Ms Gay Thompson, Member for Reynell, attending on behalf of the Hon Gail Gago, Minister for the Status of Women, South Australia	*Hall K*

Canadian Survey of Working Conditions for Engineers: 602
Valerie J Davidson, University of Guelph, Canada

Proximate Composition of two Paleamonid Prawns from Ovia River, Edo State, Nigeria: 603
Ms Flora Ehigiator, University of Benin, Nigeria

Recent Trends in Rates of Student Enrolment in Cell and Molecular Biology Subjects in Relation to Gender Policy: 605
Jedida A Kongoro, Kenyatta University, Kenya

Bioremediation of soil polluted with engine oil using mycelia and spent substrate of Pleurotus ostreatus: 606
Dr Lauretta Nwanneka Ofodile, Yaba College of Technology, Nigeria

Tharwa Bridge: 607
Macia Prelog, Aurecon, Australia

Growth Analysis of Smartphone Market: 608
Saira Zahid, University of Dundee, United Kingdom

Power: An Attribute of Software?: 609
Dr Veronica VN Akwukwuma, Universityof Benin, Benin City, Edo State, Nigeria., Nigeria

Installation of Biogas Plants for the Mitigation of Global Warming in Uganda: 610
Ms Wilbrod Birabwa, Solar promotion, Uganda

Attracting, Developing and Retaining Women Engineers and Scientists: 611
Rufina Dabo, Ministry in charge of education, Senegal

Architecture as a Profession for Women in India: 612
Ms Monicca Jaain, Intercontinental Consultants and Technocrats Pvt. Ltd, India

Chemical Information Service through Information Technology (IT): 613
Dr Myung Hee Jung, Research and Policy Center for Chemical Technology, Korea Research Institute of Chemical Technology, Korea

Art and Science of Anatomy: Hemi-section of the Head and Neck: 614
Alexandra Koba, San Francisco State University College of Sciences and Engineering, United States

Novel Lattice-Reduction-Aided Receiver for Multiple-Input Multiple-Output Satellite Communication Systems: 615
Dong-Young Kwon, Korea Aerospace Research Institute, Korea

University-centered Policy for Female Entrepreneurs in Taiwan: 616
Ms Tien-Chi Lin, National Cheng-Chi university, STPI/NARL, Taiwan

Woman Entrepreneurship to get Bioproducts - The case of Bacillus Thuringiensis Biopesticide: 617
Dr Iracema Oliveira Moraes, PROBIOM TECHNOLOGY, Brazil

Biotechnology for Economic Empowerment of Farmers: 618
Mary N Mwangi, Biochemistry and Biotechnology Department, Kenyatta University, Kenya, Kenya

New Method of Thermoluminescent Dosimetry of Complex Radiation at High Energy Accelerators and Thermonuclear Fusion Facilities: 619
Dr Barbara Obryk, Institute of Nuclear Physics (IFJ) Polish Academy of Sciences, Krakow, Poland

Expression of HCV Core Antigen (121aa, 174aa) Fused to HBs-Ag Gene in Transgenic Potato Plant: 620
Dr Hamideh Ofoghi, Biotechnology Dept. IAT, IROST. Tehran, Iran, Iran

Attracting Girls to Physics, Developing and Retraining Them: 621
Professor Francisca N Okeke, University of Nigeria, Nsukka, Nigeria, Nigeria

Problems in Urban Infrastructure Development in India and Innovative Engineering Solutions: 622
Ms Prerna Sohal, M/S Tandon Consultants Pvt. Ltd, New Delhi, India, India

Construction of Sheds as a Good Practice of Adaptation to Climate Change: 624
Griselle F Vega, Sustainable Human Development Institute, Peru

Characterisation of Salmonella Isolated from Nile Tilapia (Oreochromis Niloticus) Along Lake Victoria Beaches in Western Kenya: 625
Sarah Awuor Wandili, Kenya

Solid Acids: Phosphate - and Titanium Phosphate - Functionalized MCM-41: 626
Dr Galina M Zaitseva, Kiev's National Medical University, Ukraine

Studies on the Effect of Nigerian-like Diet on Cadmium-induced Infertility in Male Rats: 628
Martina A Adaikpoh, UNIVERSITY OF BENIN, BENIN CITY, NIGERIA, WEST AFRICA, Nigeria

Perchlorate Biodegradation using Solubilized Waste Sludge: 629
Prof Yeonghee Ahn, Dept. of Environ. Eng., Dong-A Univ., Busan 604-714, Korea, Korea

River Water Flow Modeling Under Climate Change in Kura-Araks Basin: 630
Dr Nelli A Ajabyan, The Center for Ecological-Noosphere Studies, the National Academy of Sciences, Armenia

Regional Assessment and Management of Water Resources in the Prydniprov'e in a Changing Climate: 631
Dr Larysa B Anisimova, Institute for Nature Management Problems and Ecology of the National Academy of Sciences of Ukraine, Ukraine
Iryna I Romanenko, Institute for Nature Management Problems and Ecology of the National Academy of Sciences of Ukraine, Ukraine

Generalization of Data on Dielectric Permeability of Liquid and Steam Phases of Water for the Purpose of Definition Water Coolant Void Fraction: 633
Dr Volga V Beliayeva, Joint Inst. for Power & Nuclear Research "SOSNY", National Academy of Sciences of Belarus, Belarus

Development of Smart Metering Control Protocol: 635
Inji Choi, KEPCO, Korea

Overview of Applications of the Ellipsometry Technique in Modern Science and Technologies: 636
Dr Agnieszka Chrzanowska, Institute of Physics Cracow University of Technology, Poland

Geomorphology Analysis to Unravel the Volcanic Evolution of Mount Bromo Complex, East Java, Indonesia: 637
Ayu N Ciptahening, University of Pembangunan Nasional (UPN) "Veteran" Yogyakarta, Indonesia

Sustainable Cities: A Total Carbon Modelling Approach: 638
Ms Samantha J Coras, AECOM - Buildings Applied Research & Sustainability, Australia

Woody Vegetation Assessment of Opada Forest Reserve as a Tool for Sustainable Biodiversity Management: 639
Stella Osarenakhue Ebiloma, Kogi State University, Anyigba, Kogi State, Nigeria

A Model for Enhancing Development and Retention of Women in Science and Engineering Profession: 640
Oyefunmke A Famose, Federal University of Technology, Nigeria

Relationship Between ENSO and Northward Propagating ISO over East Asia and its Interdecadal Change: 642
Kyung-Ja Ha, Pusan National University, Korea

Performance Analysis of Linear Profiles: 644
Seyedeh Zahra Hosseinifard, Australia

Effect of Different Irrigation Application Levels and Potassium Doses on Tomatoes Grown Under Greenhouse in South East Brazil: 646
Jokastah Wanzuu Kalungu, South Eastern University College - University of Nairobi, Kenya

Wednesday, 20 July 2011

17:00-18:00	**Poster Session**	*Hall K*

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Dr Hyong-Ha Kim, Korea Research Institute of Standards and Science, Korea

Development of Soybean Reference Materials for GM Analysis: 649
Dr Hyong-Ha Kim, Korea Research Institute of Standards and Science (KRISS), Korea

A Study of the Electromagnetic Pulse System: 650
Ms Taeyoun Kim, Korea Aerospace Research Institute, Korea

Scramjet Engine Research of Korea Aerospace Research Institute: 653
Ms Yang Ji Lee, Korea Aerospace Research Institute, Korea

Parametric Model of Human Skull: 654
Yan Li, Massey University, New Zealand

COMS LRIT/HRIT Dissemination Service Qualification During IOT Period: 655
Hyun-Su Lim, Korea Aerospace Research Institute, Korea

Performance of Diversified Legume Based Cropping Systems under Smallholder Farms in Northern Malawi: 657
Dr Wezi G Mhango, Bunda College of Agriculture, University of Malawi, Malawi

Effects of Antioxidant and Proliferation of Osteoblasts with Rice Bran: 658
Jungsun Moon, College of Pharmacy, Sahmyook University, Seoul 139-742, Korea, Korea
Sookyeon Lee, College of Pharmacy, Sahmyook University, Seoul 139-742, Korea, Korea

In Vitro Mutation Induction for the Improvement of Mycosphaerella Fijiensis Resistance in two Musa Cultivars Grown in Kenya: 659
Mary N Mwangi, 1Kenyatta University, Department of Biochemistry and Biotechnology, Kenya

Optimization of Laser Parameters for Bulge Reduction in PMMA: 660
Ms Rehema Ndeda, Jomo Kenyatta University of Agriculture and Technology, Kenya

Identification and Preference of Fruits and Vegetables by Pupils of the Kwame Nkrumah University Primary School, Kumasi- Ghana: 661
Professor Ibok Oduro, K wame Nkrumah University of Science and Technology, Ghana
Dr Patricia K Brown, K wame Nkrumah University of Science and Technology, Ghana
Miss Wilhelmina k Laryea, K wame Nkrumah University of Science and Technology, Ghana
Miss L Asumeng, K wame Nkrumah University of Science and Technology, Ghana

Study on Interface Characteristic of SiOC Film to Improve the Mobility: 662
Dr Teresa Oh, cheongju university, Korea

Interfacial Properties of SiOC/Al Thin Film for Silicon Solar Cell: 663
Dr Teresa Oh, cheongju university, Korea

Effect of Aqueous Extract of Cyphostemma Glaucophilla on Lipid Profile and Serum Electrolytes: 664
Eleojo Ojogbane, Kogi State University,Anyigba, Kogi State, Nigeria, Nigeria

Mechanical Disruption of Candida Cells Using Three Methods: 665
Dr Francisca I Okungbowa, University of Benin, Nigeria

Spatial Modelling of Groundwater Conditions in Nairobi City using Geographic Information System: 666
Ms Caroline K Onyancha, MASINDE MULIRO UNIVERSITY, Kenya

Open Rrelationships in the Castles of Clay: High Diversity and Low Host Specificity of Termitomyces Fungi Associated with Fungus-Growing Termites in Africa: 667
Dr Zipporah B Osiemo, Kenya

The Effects of MgCl2 Concentrations in the Aqueous Phase of Water/Brij 30/n-Decane and n-Dodecane Nano-emulsion Systems Produced by PIT Method: 668
Firoozeh Pourjavaheri-Jad, RMIT University, Australia

Serological Study of Newcastle Disease (ND) in Japanese Quails fed with Varying Protein Levels: 669
Mary E Sanda, Kogi State University, Anyigba, Kogi State, Nigeria

Production of Monoclonal Antibody to Tescalcin (TESC) and Development of Fluorescent Microsphere Immunoassay for TESC: 671
Dr Eun Young Song, KRIBB, Korea

Construction of Algae Development Plants in Marine Areas Around Thermal Power Stations: 672
Dr Chika Suzuki, Kochi University (Japan)/INWES JAPAN/Women Professional Engineers Society of Japan, Japan

The Relativity between Various Regulation and Red Tide Index: 673
Dr Chika Suzuki, Kochi University(Specially Appointed Assistant Professor), Japan

The Electrochemical Oxidation of Phenol and Chlorophenol with Ti/Pt and BDD Electrodes: 674
Dr Mi-Sook Won, Korea Basic Science Institute, Korea
Shelf Life Predicting Model for Edible Coated Minimally Processed Mango: 675
Dr Sri Wuryani, Dept. of Agrotechnology, Universitas Pembangunan Nasional "Veteran" Yogyakarta, Indonesia

Attracting Developing and Retaining Women Engineers and Scientists in Africa: 676
Ms Aude Abena, AFISC (Cameroon Women engineers and scientists Association), Cameroon

Effective Strategies for Recruiting and Retaining Women Engineers and Scientists in the Profession: 678
Ms Margaret Ajibode, Women Engineering Society

Water Use and Availability among Rural Women in South Western Nigeria: 679
Oluwaseun A Alade, The Polytechnic Ibadan, Saki Campus,Oyo State,Nigeria, Nigeria

Women Engineers and Scientists and Gender Policy in Armenia: 680
Svetlana Aslanyan, Institute of Linguistics of the National Academy of Sciences of Armenia, Armenia

Gender Based Digital Divide in Engineering Education in India: 681
Krishnendu Banerjee, India

Gender Issues and the Challenges of Attracting and Retaining Women Engineers and Scientists - Bangladesh Perspective: 682
Dr Zakia Begum, University of Information Technology and Sciences (UITS), Bangladesh

Girls into Sciences: Contextualizing School Science for Enhanced Performance: 683
Prof Stella Y Erinosho, Olabisi Onabanjo University, Nigeria

The Construction and Management of Gender Issues within Engineers Without Borders Australia: 684
Ms Naomi Francis, BMT WBM, Australia

Promoting Gender Equality in Engineering Education and Careers: 686
Durdana Habib, National University of Computer & Emerging Sciences, Pakistan

Wings - Women in Great Sciences: 687
Edith C Hammer, Lund University, Sweden
Alice Nicolle, Sweden

The Role of Site Audits in Providing Flexible Working Environments for Women: 688
Ms Xanthe K Holford, Coffey Environments Pty Ltd, Australia

Wednesday, 20 July 2011

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The Link between Climate Variability, Gender and Household Food Security: Lessons from Malawi: 689
Ms Tasokwa VM Kakota, Bunda College of Agriculture, University of Malawi, Malawi

Recent Trend of Japanese Female Professional Engineers: 690
Ms Ryo Kimura, The Woman Professional Engineers Society of Japan, Japan

JWSE: Division of Women Engineers Support, the Japan Society for Science Policy and Research Management: 691
Mizue Y Kissho, Toho University, Japan

Engineering a Career in the 21st Century: 692
Miss Miranda J Lamont, Opus International Consultants, New Zealand

Developing African Women Scientists and Engineers in the 21st Century: 693
Prof Caroline C Lang'at Thoruwa, African Women in Science and Engineering, Kenya

Centre for Empowering Women and Girl-children for Careers, Business and Health: 695
Ms Jenniffer K Mabuka, Department of Global Health, University of Washington, Seattle, USA., Kenya

Equal Opportunities: 696
Miss Yogita Maini, Halcrow Group Limited, United Kingdom

A Bibiliometric Study of the Publication Activities of Women Scientists With Special Reference to ICWES Conference Proceedings: 697
Dr Suriya M Mayandi Thevar, Annamalai University, India

Towards the Design of Gender Social Programmes in Science, Engineering and Technology in Sub-Saharan Africa: A Study of the Women in Engineering and the Built Environment Programme at the University of Johannesburg: 698
Ms Hannelie Nel, University of Johannesburg, South Africa

Poland IEEE Women in Engineering Affinity Group: 699
Dr Barbara Obryk, Institute of Nuclear Physics (IFJ) Polish Academy of Sciences, Krakow, Poland

Supporting Women Scientists and Engineers in the Southeastern Region of Korea: 700
Ms Hye Young Park, BIS-WIST, Korea

Women of Color in SWE: An Historical Perspective: 702
Dr Bevlee A Watford, Virginia Tech, United States

Gender Mainstreaming Science Policies in Taiwan: 703
Professor/Chair Chia-Li Wu, Tamkang University, Taiwan

ADVANCE: Advancing Women Faculty at North Dakota State University: 704
Dr Canan Bilen-Green, North Dakota State University, United States

ADVANCE: Institutions Developing Excellence in Academic Leadership: 705
Diana Bilimoria, Case Western Reserve University, United States

ADVANCE: Purdue University Center for Faculty Success: 706
Prof Mary Ellen Bock, Purdue University, United States

Career Formation and Career Development of Female Students in Engineering Courses: 708
PEJp Maki Iwakuma, Women Professional Engineers Task Force, project team of IPEJ., Japan

ADVANCE: The UIC WISEST Post Doctoral Research Associates Program - An Innovative Pilot Initiative for Underrepresented Minority STEM Women: 709
Dr Manorama M Khare, University of Illinois at Chicago, United States

Women in Engineering in India: 711
Nabanita Mukherjee, India

Unconcious Resistance to Change: 712
Ms Kate OReilly, Optimiss Consulting, Australia

Constructing Diversity: 713
Dr Jan Peters, Katalytik, United Kingdom

Where did they all go? Career Crossroads for Female Engineers: 714
Melanie J Pollock, GM Holden, Australia

Women Engineers: Looking around Looking Forward: 718
Ms Mai Yeung, AECOM Australia Pty Ltd, Australia

Livelihood Interventions in North East India: 719
Dr Ajanta K Bezbaruah, Handique Girls' College., India

Australias First Sustainable Precinct: 720
Ms Karen M Billington, Northrop Consulting Engineers, Australia

Leadership in Engineering Education from K12 to University: Key to Improving Diversity in the Engineering Profession: 721
Steven C Goh, University of Southern Queensland / Engineers Australia Queensland, Australia

Engineering Professional Performance to meet Community Expectations: 723
Ms Alexandra L Meldrum, AGSM - Australian Graduate School of Management, Australia

Leaders of Tomorrow: 725
Dr Jan Peters, Katalytik, United Kingdom

Tactics to Become Leaders for Women Scientist and Engineers (II): 726
Naoko Tagashira, Toshiba, Engineer, Japan

How to Improve the Quality of Life of a Company's Low-income Employees through Housing Enhancement: 727
Professor Delma V Almada, Tecnologico de Monterrey, Mexico

Strategic Networking for Women Engineers and Scientists: 728
Dr Carla Boehl, Australia

Conservation of Critical Ecosystems in the High Lands of Burundi: Case of Peat Bogs: 729
Miss Beatrice Cyiza, Burundi Nature Action, Burundi

Mycorrhiza for a Sustainable Phosphorus use: 730
Edith C Hammer, Lund University, Sweden

Review of Effects of Global Warming in Africa's Irrigation Systems: 731
Jokastah Wanzuu Kalungu, South Eastern University College - University of Nairobi, Kenya

It Would Be A Lake if it Could - Changing Water Flows on a Cooper Creek Floodplain: 733
Ms Danuta J Kucharska, University of Melbourne, Australia

Energy Savings Certificates : The French Experience: 734
Séverine Leclercq, Femmes Ingénieurs (French Association of Women in Engineering), France

Reflections by Engineers Australia Legal Counsel: 735
Ms Caroline Marsh, Engineers Australia, Australia

Quality of Groundwater in the Kwahu West District of Ghana: 737
Ms Marian Asantewah Nkansah, Kwame NKrumah University of Science and Technology, Ghana

Climate Change: 739
Professor Francisca N Okeke, University of Nigeria, Nsukka, Nigeria, Nigeria

Modelling of Groundwater Conditions in Nairobi using Geographic Information System: 740
Ms Caroline K Onyancha, Masinde Muliro University of Science and Technology, Kenya

Evaluating Externally Funded Water Projects in Nigeria: 741
Emmanualla C Onyenechere, Nigeria
P A Okereke, Nigeria

Climate Change and Spatial Planning Concerns in Nigeria: Remedial Measures for More Effective Response: 742
Dr Emmanuella C Onyenechere, Evan Enwerem University, Owerri, Imo State, Nigeria, Nigeria

Wednesday, 20 July 2011

17:00-18:00	**Poster Session**	*Hall K*

Environmentally Sustainable Buildings - The Indian Perspective: 743
Ms Nilanjana Rao, DLF Universal Ltd.,, India

Women in Local Government Engineering... A Hands on Approach: 744
Ms Shereny Selim, enior Traffic Engineer at Hurstville City Council, Australia
John Roydhouse, Executive Officer IPWEA NSW, Australia

Sustainable Agricultural Development of Ukraine in Terms of Modern Integration Process: 745
Prof Olena Shubravska, State Organization, Ukraine

Third Party Access to NSW Water Infrastructure: Drivers and Challenges for Private Projects: 746
Ms Kate E Simpson, Veolia Water Australia, Australia

An Assessment of the Role of Networks in Promoting Female Participation in Science and Technology in Nigeria: 747
Prof Kehinde A Taiwo, Dept. of Food Sci. & Tech., Obafemi Awolowo University, Ile-Ife,, Nigeria

The use of Virtual Teams on Major Projects: 748
Louise Wallace, Parsons Brinckerhoff, Australia
Emily Trusler, Parsons Brinckerhoff, Australia

Training of Engineers and the Current Challenges for Southern Universities: 749
Prof Khedidja Allia, USTHB, Algeria

An Assessment of the Design, Instrumentation and Use of Mathematics Labouratory in Secondary School: 750
Lucy Eraikhuemen, University of Benin, Nigeria

The Research of Scheme to Raise Scientific Preference of Korean Primary and Junior High School Students: 753
Prof HyeYoung Kim, Korea National Sport University, Korea
Ms JiHye Kim, Ewha Womans Univ., Korea

Recent developments in the vacuum process measurement techniques for the IT industries: 757
Yong-Hyeon SHIN, Korea Research Institute of Standards and Science, Republic of Korea

The Science and Technology Guidance for Girl Students in Japan: 756
Dr Akiko Tsugawa, Japan
Dr Maki Iwakuma, WPETF,project team of IPEJ., Japan
Dr Sachiko Tanaka, Japan
Dr Ikuko Imoto, NPO The Geoecological Conservation Network, Japan
Ms Ryo Kimura, The Woman Professional Engineers Society of Japan, Japan
Dr Kayoko Sugahara, Japan
Ms Nami Kubo, The Woman Professional Engineers Society of Japan, Japan
Ms Aguri Nakano, Okinawa Polytechnic College, Japan

PRE-CONFERENCE MEETING

INWES Asia and Pacific Nation Network Meeting

Hosted by The Association of Korean Woman Scientists and Engineers.

Date: Tuesday, 19 July 2011
Time: 09:00-16:00
Venue: Engineers Australia SA Division Office
Cost: $50.00

PRE-CONFERENCE WORKSHOPS

Presented by
Engineering Education Australia

EEA Engineering Education Australia

WORKSHOP 1

Leadership Skills for Professional Women

Presenter: Helen Woods, Engineering Education Australia
Date: Tuesday 19 July 2011
Place: Adelaide Convention Centre
Time: 08:30 - 17:00
Price: $660.00 incl. GST - includes lunch, morning & afternoon tea

Overview:

This workshop takes participants through aspects of personal visioning and discovery into their impact as leaders. It offers a unique and energising experience using a variety of tools and processes to challenge current beliefs and focus on reaching personal and professional goals. The main focus is on determining ways of being the best you can be in all aspects of life. The breakthrough experience aims to challenge participants and presents a variety of skills and strategies for developing confidence and leadership qualities that are essential for high performers.

WORKSHOP 2

Fear Free Presentations

Presenter: Barry O'Sullivan, Engineering Education Australia
Date: Tuesday 19 July 2011
Place: Adelaide Convention Centre
Time: 08:30 - 17:00
Price: $660.00 incl. GST includes lunch, morning & afternoon tea

Overview:

As you move up the organisational ladder, the ability to influence effectively, in all forms of presentations, is an essential skill. Few are naturals. This workshop is a highly interactive and practical learning activity (without the dreaded role plays used in many presentation skills courses). The content combines business, coaching and acting elements in a way that even the most introverted personality will enjoy. It is not just about presentation skills but also about how to influence and persuade others in a personable and professional manner.

Please visit **www.icwes15.org** for further information on the Pre-Conference Workshops.

PRE-CONFERENCE SITE TOURS

SITE TOUR 1

Bio Innovation SA – BioSA Incubator

Date: Monday, 18 July 2011 or Tuesday, 19 July 2011
Time: 10:00 – 11:00
Cost: $50.00

Bio Innovation SA (BioSA) is a public corporation established in 2001 to foster the growth of the South Australian bioscience industry.

Since its establishment, BioSA has assisted in doubling the number of biotech companies in South Australia. There are now nearly 100 biotechnology companies in the state, employing more than 1,700 people and generating ~$300 million in annual revenue.

About the BioSA Incubator

Australia's first dedicated bioscience incubator, the BioSA Incubator, was opened for business in June 2008 to fast-track the growth of local companies.

Early stage bioscience companies lease office and laboratory space and have access to business development assistance in this state-of-the-art, purpose-built building.

The tour of the facility will encompass tenant areas, shared services areas and the Conference Centre and Café.

SITE TOUR 2

SA Water Desalination

Date: Monday, 18 July 2011 or Tuesday, 19 July 2011
Time: 14:00 - 16:00
Cost: $50.00

The South Australian Government and SA Water are committed to providing reliable drinking water supplies for the future. As part of South Australia's Water for Good Plan to secure water for the future, the Government is building a seawater desalination plant at Lonsdale, south of Adelaide, to ensure drinking water is available even in times of drought. The total project cost is $1.83 billion and the plant will deliver up to 100 billion litres of water each year (100GL) - about half of Adelaide's annual water supply.

AdelaideAqua – a consortium of four companies with extensive world-wide desalination experience and strong safety and environmental credentials - have been contracted to design, build, operate and maintain the plant for 20 years, and construction is well underway. The project will be commissioned in April 2011 (approximately 15 million litres a day), progressing to 50GL capacity by the end August 2011 and full 100GL capacity by the end of December 2012.

SITE TOUR 3

Claret Ash Farm

Date: Monday, 18 July 2011 or Tuesday, 19 July 2011
Time: 10:00 - 12:00
Cost: $50.00

Janesce founder, Janice Sarre Smith, learnt from an early age how nature provides everything we need to keep healthy. Collecting vegetables from her father's organic garden gave her an understanding that good soil grows strong plants. When Janice decided to create her own skin care range she realised that it was vital to the success of the products that the plants are grown in the right conditions.

To realise her dream she settled on 33 acres of pristine land known as Claret Ash Farm. The site was prefect - situated within a valley and protected by a belt of hills it had excellent soil quality, ample water supply and the complete lack of any chemical pollutants in its use as a dairy farm by the previous owners. Claret Ash Farm uses biodynamic farming methods and is certified organic. It is home to production, manufacturing, research and development activities and gardens continue to produce the 100% organic herbs and flowers used to make the exquisite extracts, essences and mother tinctures.

"From Soil to Skin" as Janice says, every Janesce product is handmade at Claret Ash Farm with love, joy and care. It is a complete process of nurturing soil to nurture skin.

SITE TOUR 4

Australian Rail Track Corporation - Control Room at Mile End

Date: Monday, 18 July 2011 or Tuesday, 19 July 2011
Time: 10:00 – 11:00
Cost: $50.00

Australian Rail Track Corporation (ARTC) currently has responsibility for the management of over 10,000 route kilometres of standard gauge interstate track in South Australia, Victoria, Western Australia, New South Wales and Queensland. ARTC also manages the Hunter Valley Coal Rail Network and other regional rail links in NSW.

In order to control trains throughout the network, ARTC has established 3 Network Control Centres near Adelaide, Newcastle and Junee. The Adelaide centre is termed Network Control Centre West (NCCW) and has been recently upgraded and moved into new premises at Mile End. The new control centre features state of the art computer control of signalling, large display screens and touch screen communications.

The tour will feature an introduction to ARTC, followed by an inspection of the network control centre and the opportunity to speak with some female network controllers about their work.

SITE TOUR 5

IPAS Optical Fibre Research Facility

Date: Tuesday, 19 July 2011
Time: 11:00 - 11:30
Cost: $50.00

IPAS is involved in numerous areas of cutting edge photonics research. Our research spans many areas and ideas all the way from fundamental science to high-end applications, closely tied with industry. We use lasers and optical fibres to develop technologies for applications ranging from defence to environmental monitoring and even chemical sensing and medicine.

Major research strengths include:

- Production facility of novel optical materials
- Fibre lasers
- Fibre sensors
- Nonlinear Fibres and Devices

PROGRAM INFORMATION

Speakers' Preparation Room

The Speakers' Preparation room is located in Meeting Room 3 on the Plaza Level of the Adelaide Convention Centre and will be open during the following hours:

Tuesday 19 July	14:00 – 17:00
Wednesday, 20 July	07:30 – 18:00
Thursday, 21 July	08:00 – 17:00
Friday, 22 July	08:00 – 16:00

Oral Presentations

It is important that all speakers upload their presentation in the Speakers' Preparation Room at least two hours prior to the commencement of their allocated session. Speakers who are presenting at an early morning session should check-in their presentation the day before their presentation. An audio visual technician will be available in the Speakers' Preparation Room to assist with this process.

Poster Presentations

Posters will be displayed from Wednesday, 20 July to Friday, 22 July 2011. Poster presenters must check-in at the Registration Desk for directions to their allocated poster area.

The presenting author must be present at their poster during the allocated poster sessions on Wednesday, 20 July and Friday, 22 July 2011. Posters not collected at the conclusion of the Conference will be discarded.

SOCIAL PROGRAM

Welcome Reception

Date: 19 July 2011
Time: 17:30 - 18:00 Private Viewing of Selected Exhibitions (optional)
18:00 - 19:30 Welcome Reception
Venue: Art Gallery of South Australia

Included for full Registered Delegates *(excludes Students and Day Registrants)*

Additional Guest Tickets: $60.00 per ticket

The Organising Committee extends a warm invitation to all delegates to attend the Welcome Reception at the Gallery of South Australia. This informal function will provide delegates with a taste of some of South Australia's finest food and wine and a unique opportunity to have a private viewing of selected gallery exhibitions prior to the commencement of the Reception.

Opening of Poster Exhibition

Date: 20 July 2011
Time: 17:00 - 18:00 Formal Opening and Reception

Opening by Ms. Gay Thompson, Member for Reynell, South Australia, on behalf of the Hon. Gay Gago, Minister for the Status of Women, South Australia

Venue: Hall K, Adelaide Convention Centre

Included for full Registered Delegates. The Organising Committee invites all delegates to attend the Opening of the Poster Exhibition at the Adelaide Convention Centre. This will be an opportunity to view the research of women engineers and scientists from around the world, as presented in poster format. It will feature fine food and wine in an informal environment.

Conference Dinner

Government of South Australia
SA Water

Date: 21 July 2011
Time: 19:00 – 23:00
Venue: Adelaide Convention Centre

Included for full Registered Delegates *(excludes Students and Day Registrants)*

Additional Guest Tickets: $125.00 per ticket

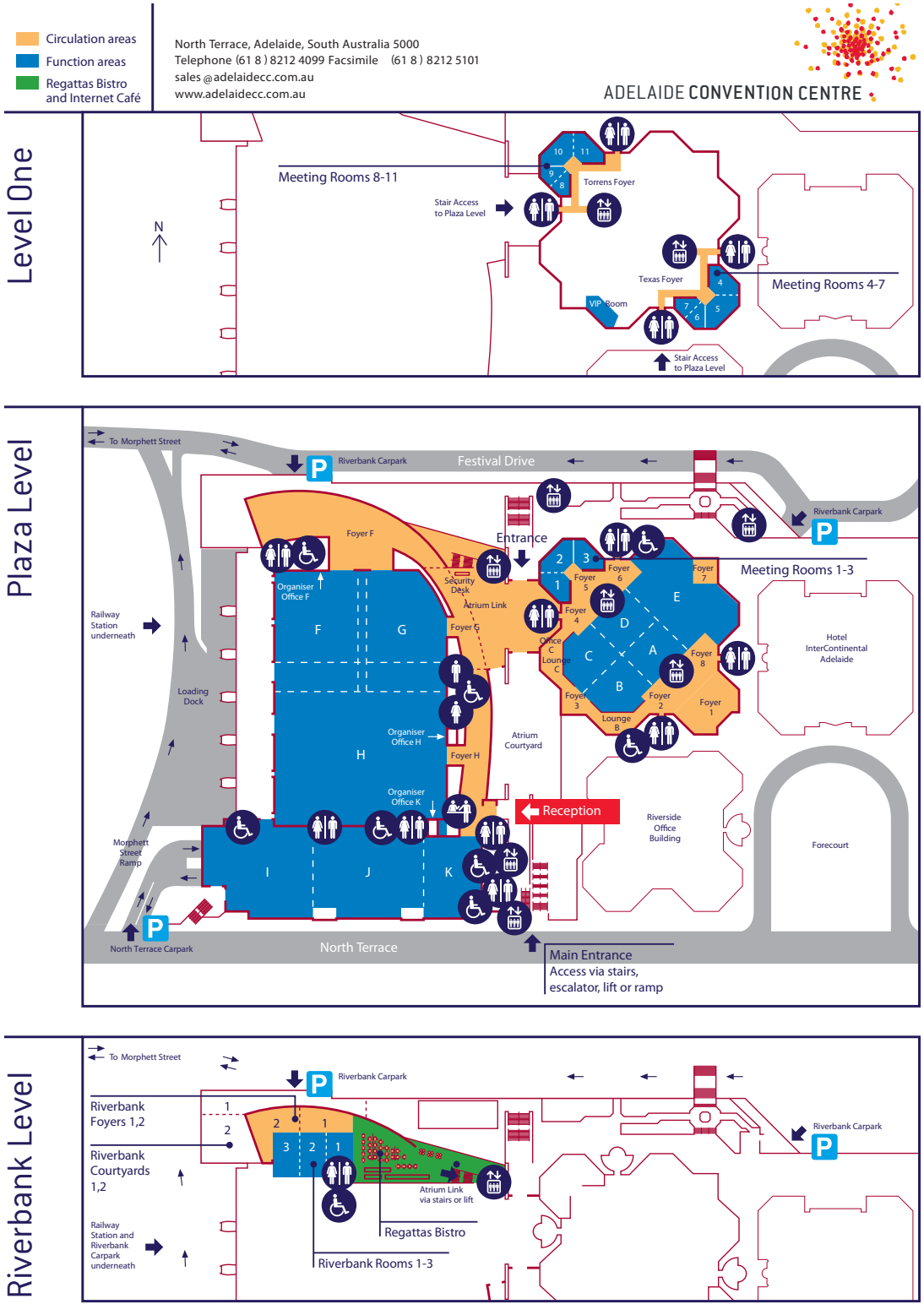
The ICWES15 Conference Dinner is proudly sponsored by SA Water and promises to be the highlight of the social program. The evening will include fine dining, exciting entertainment and an elegant setting in which to relax and enjoy networking with old friends and new.

CONFERENCE VENUE

Adelaide Convention Centre

North Terrace, Adelaide SA 5000

P: +61 8 8212 4099 W: www.adelaidecc.com.au



EXHIBITION INFORMATION

Exhibition Hours

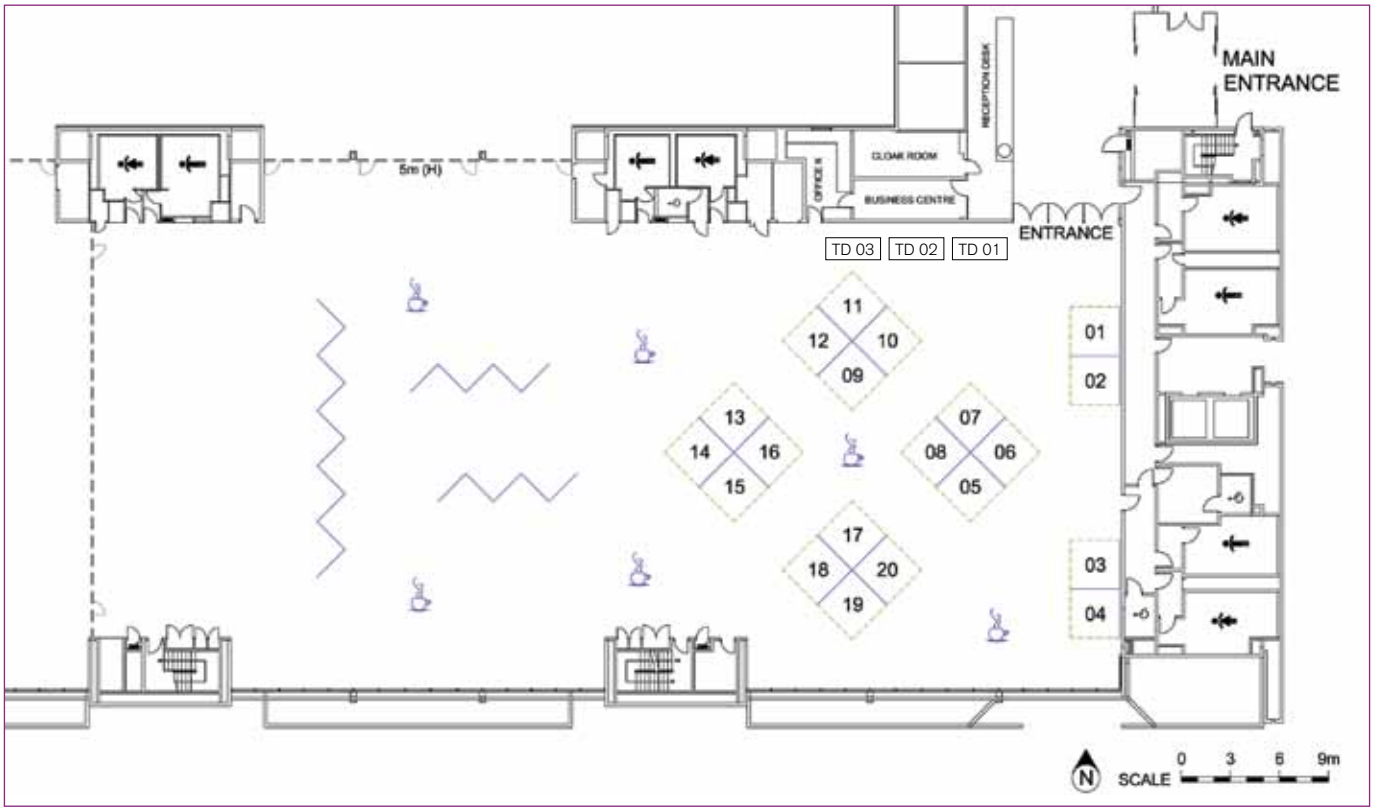
The Exhibition is located in Hall K of the Adelaide Convention Centre and will be open during the following hours:

Wednesday, 20 July 2011 (Including poster session drinks)	08:00 - 18:00
Thursday, 21 July 2011	08:00 - 16:00
Friday, 22 July 2011	08:00 – 15:00

Exhibitors

Company	Booth Number
Australian Institute of Project Management	13
Australian Opal and Diamond Collection	TD 03
BHP Billiton	7 & 8
BMT WBM Pty Ltd	12
Caltex Australia	11
Engineers Australia	4
INWES	TD 01
IPWEA NSW	17
Kuwait Women Engineers	19
Origin Energy Ltd	20
Parsons Brinckerhoff	1 & 2
PepsiCo	15
RailCorp	3
SA Water Corporation	9
Sinclair Knight Merz	16
The University of Adelaide	5 & 6
University of South Australia	10
Women in Science Enquiry Network	TD 02
Worley Parsons	14

Exhibition Floor Plan



SPONSOR AND EXHIBITOR PROFILES

Australian Institute of Project Management
Booth: 13

Website: www.aipm.com.au

Australian Institute of Project Management (AIPM) is the member organisation for project management in Australia and has been instrumental in progressing the profession of project management in Australia over the past 30 years.

BHP Billiton **Booth: 7 & 8**

Website: www.bhpbilliton.com

BHP Billiton is the world's leading diversified resources company with 41,000 employees working in over 100 operations in 25 countries. It is the largest company listed on the Australian Stock Exchange.

BMT WBM Pty Ltd **Booth:12**

Website: http://www.wbmpl.com.au/

BWT WBM are Engineering and Environmental Consultants with a proven record in addressing today's engineering and environmental issues. The company is a specialist consultancy focusing on the application of leading edge technology in the fields of engineering and environment.

Caltex Australia Limited **Booth:11**

Website: www.caltex.com.au

Caltex Australia is a leading transport fuel supplier and convenience retailer in Australia and the only integrated oil refining and marketing company listed on the Australian Securities Exchange.

Engineers Australia **Booth: 4**

Website: www.engineersaustralia.com.au

Engineers Australia is a professional member association with more than 95,000 members. It provides continuing professional development, technical information, networking opportunities and advocacy for the engineering profession.

Engineers Media

Website: www.engineersmedia.com.au

Engineers Media is the publishing company of Engineers Australia. It publishes Engineers Australia magazine and other publications and provides a range of services for the engineering profession.

International Network for Women Engineers and Scientists (INWES) **Booth: TD 01**

Website: www.inwes.org

INWES is a global network of organizations of women in Science, Technology, Engineering and Mathematics (STEM), reaching over 250 000 members from 60 countries worldwide. INWES provides a significant voice, for women around the world on issues such as the environment, sustainable development, gender equity, and many other critical issues.

IPWEA NSW **Booth: 17**

Website: www.ipwea.org.au

The Institute of Public Works Engineering Australia (IPWEA) is a professional organisation providing member services and advocacy for those involved in and delivering public works and engineering services to the community.

Kuwait Women Engineers **Booth: 19**

Website: www.kse.org.kw

Kuwait Women Engineers is part of the Kuwait Society Engineers, the professional organisation for engineers in the State of Kuwait.

Leighton Holdings Limited

Website: www.leighton.com.au

Leighton Holdings Limited is listed on the Australian Stock Exchange and is one of the world's major project development and contracting organisations as well as the world's largest contract miner. Leighton Holdings owns a large number of companies including Thiess, Leighton Contractors and John Holland and operates in more than 20 countries.

Origin Energy Limited **Booth: 20**

Website: www.originenergy.com.au

Origin Energy Limited is listed on the Australian Stock Exchange and is involved in gas and oil exploration and production, power generation and energy retailing. Origin Energy currently has its major production interests in the Cooper Basin, which has been the principal supplier of natural gas to New South Wales, South Australia and Queensland. Origin Energy is also Australia's largest producer of coal seam gas (CSG).

Parsons Brinckerhoff **Booth: 1 & 2**

Website: www.pbworld.com

Parsons Brinkerhoff, an international engineering company. Since its inception over 120 years ago PB has worked on some of the world's most significant infrastructure projects. PB employs approximately 14,000 people worldwide and 2,500 in Australia.

Pepsico Australia

Website: www.smiths.com.au

Pepsico Australia is a major snack food manufacture in Australia. It owns the Smith's Snackfood Company which manufactures snack foods from potatoes, corn and wheat flour.

RailCorp NSW **Booth: 3**

Website: www.railcorp.info

RailCorp NSW is the provider of CityRail passenger services cover the greater Sydney region and CountryLink country and long distance passenger services within NSW.

SA Water Corporation **Booth: 9**

Website: www.sawater.com.au

SA Water is a water utility which is wholly owned by the Government of South Australia. It delivers water and wastewater services to almost 1.5 million people across the State of South Australia. With assets of more than $9 billion and more than 1500 staff, SA Water is a very significant organisation in South Australia.

Sinclair Knight Merz **Booth: 16**

Website: www.skmconsulting.com

SKM is a leading projects firm, with global capability in strategic consulting, design and delivery. It operates in three regions: Asia Pacific, the Americas and EMEA (Europe, Middle East & Africa), deploying some 6,500 people from more than 40 offices while serving the Buildings and Infrastructure, Mining and Metals, Power and Energy and Water and Environment sectors.

The University of Adelaide **Booth: 5 & 6**

Website: www.adelaide.edu.au

The University of Adelaide was established in 1874 and is one of Australia's leading universities. The University has a rich tradition of excellence in education and research with world-class academic staff and a vibrant student life.

University of South Australia **Booth: 10**

Website: www.unisa.edy.au

The University of South Australia is the largest university in South Australia, with five campuses. The University is committed to educating professionals, creating and applying knowledge, engaging communities, maintaining cultural diversity among its staff and students, and providing equitable access to education.

Women in Science Enquiry Network Booth: **TD 02**

Website: www.wisenet-australia.org

WISENET was established to increase women's participation in the sciences and to link people in different branches of science and those working towards a more participatory and socially useful science. Membership is open to men and women who are interested in the sciences.

Worley Parsons Limited **Booth:14**

Website: www.worleyparsons.com

Worley Parsons is a leading engineering company which is listed on the Australian Stock Exchange. It delivers engineering, procurement and construction management services and other project solutions to global resource projects. The company is a leading provider of professional services to the energy, resource and complex process industries in Australia and New Zealand.

REGISTRATION INFORMATION

Registration Desk Hours

Tuesday 19 July	08:00 – 17:00
Wednesday, 20 July	07:30 – 18:00
Thursday, 21 July	08:00 – 17:00
Friday, 22 July	08:00 – 16:00

Full Registration Entitlements

- Entry to all Conference Sessions
- Lunch, morning and afternoon tea daily
- 1 ticket to the Welcome Reception
- 1 ticket to the Conference Dinner
- Delegate Satchel
- USB of Conference Proceedings
- Final Program
- Access to the Exhibition

Student/Concession Entitlements

- Entry to all Conference Sessions
- Lunch, morning and afternoon tea daily
- Delegate Satchel
- USB of Conference Proceedings
- Final Program
- Access to the Exhibition

Day Registration Entitlements

- Entry to all Conference Sessions on your day of registration
- Lunch, morning and afternoon tea on your day of registration
- Delegate Satchel
- USB of Conference Proceedings
- Final Program
- Access to the Exhibition on your day of registration

Workshop Entitlements

- Entry to Workshop
- Lunch
- Morning & Afternoon Tea

Accompanying Partner Entitlements

- Ticket to the Welcome Reception
- Ticket to the Conference Dinner
- Delegate Satchel
- Final Program

Pre - Conference Site Tour Entitlements

- Entry to Site Tour facility
- Tea/Coffee break at Site Tour facility
- Return coach transfers from Adelaide Convention Centre

ACCOMMODATION INFORMATION

Hotels

InterContinental Adelaide
North Terrace
Adelaide SA 5000
P: + 61 8 8238 2400

Mercure Grosvenor Hotel Adelaide

125 North Terrace
Adelaide SA 5000
P: + 61 8 8407 8888

Miller Apartments

16 Hindley Street
Adelaide SA 5000
P: + 61 8 8410 1888

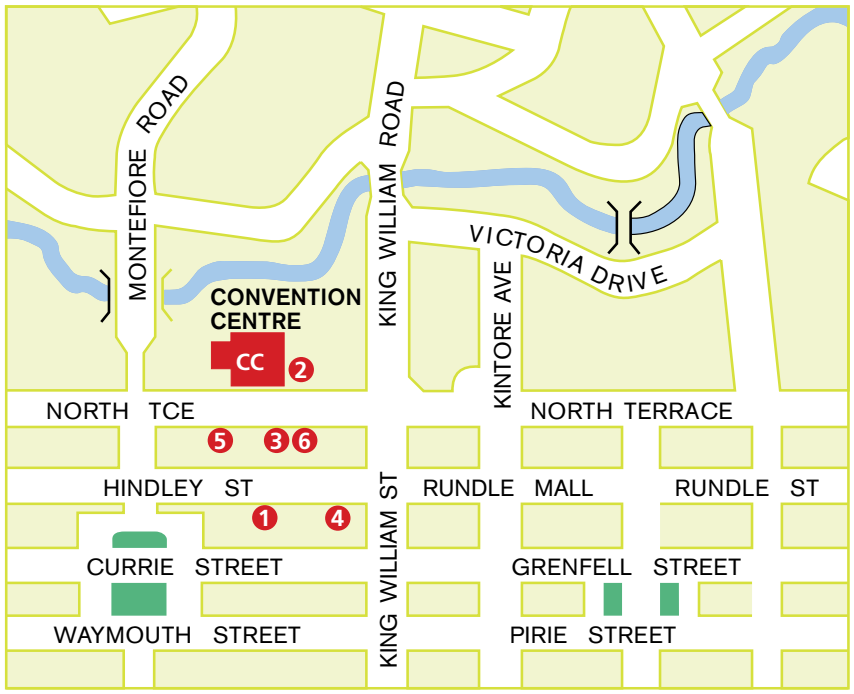
Oaks Horizons Adelaide

104 North Terrace
Adelaide SA 5000
P: + 61 8 8210 8000

Stamford Plaza Adelaide Hotel

150 North Terrace
Adelaide, SA 5000
P: + 61 8 8461 1111

HOTELS - LOCATION GUIDE



1. Hotel Grand Chancellor On Hindley
2. Intercontinental Adelaide
3. Mercure Grosvenor Hotel Adelaide
4. Miller Apartments Adelaide
5. Oaks Horizons Adelaide
6. Stamford Plaza Adelaide

GENERAL INFORMATION

Attendance Certificate

A certificate of attendance is included in your name badge.

Car Parking

The Adelaide Convention Centre operates both the Riverbank and North Terrace car parks, which are open 24 hours/day, 7 days a week. The car parks are situated under the Convention Centre (Riverbank) and beneath the Exhibition Hall. In total, 1250 spaces are available and provide easy access to the Adelaide Convention Centre, Exhibition Hall and Adelaide Plaza.

Both car parks are fitted with video surveillance camera systems and security patrol these areas every afternoon and night weekdays and 24 hours on weekends and Public Holidays.

Catering

All morning teas, lunches and afternoon teas during the conference are included in your registration fee and will be served in the Exhibition.

A separate buffet will be setup in the Exhibition to cater for delegates who require a special dietary meal.

Child Care Service

City West Childcare Centre is a joint venture between the Department of Further

Education, Science and Technology and the University of South Australia and provides a high quality child care service for children from 0-school age.

For further information about this facility and to book their service, please visit **www.citywestchildcare.com.au**

Conference Office

ICMS Pty Ltd
84 Queensbridge Street
Southbank, VIC 3006
AUSTRALIA

Phone: +61 3 9682 0244
Fax: +61 3 9682 0288
Email: icwes15@icms.com.au
Website: www.icwes15.org

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In the event of industrial disruption or other unforeseen circumstances, the Conference Office, the Organising Committee and the Host Organisations accept no responsibility for loss of monies incurred by participants and /or accompanying persons. The Conference Office, the Conference Committee and the Host Organisations accept no liability for injuries/losses of whatever nature incurred by participants and/or accompanying person, nor for loss or damage to their luggage and/or personal belongings. Participants and or/accompanying persons should make their own arrangements with respect to personal insurance.

Mobile Phones and Pagers

As a courtesy to speakers and other delegates, we request that all mobile phones and pagers are in silent mode or switched off before entering sessions.

Messages

The Conference registration desk staff will take messages for delegates during the Conference. Messages will be posted on the message board, located next to the registration desk. Delegates are requested to check the message board during breaks.

Name Badges

Your name badge is your entrance ticket to all conference sessions and the Exhibition. Please wear your name badge at all times. Your tickets for the pre conference workshops, site tours, welcome reception and conference dinner are also included in your name badge holder.

No Smoking Policy

Delegates should be aware that smoking is banned in public buildings and hotels and restaurants throughout South Australia, including the Conference venue.

Tickets

Delegates will receive all pre-booked tickets at registration. Tickets are required for the pre conference workshops, site tours, welcome reception and conference dinner. If you have misplaced your tickets or have not received tickets for functions you wish to attend, please see the staff at the Registration Desk.

KEYNOTE SPEAKERS – SUMMARIES OF PRESENTATIONS

Dame Professor Jocelyn Bell Burnell, DBE, FRS, FRSE, President of the Institute of Physics, UK

Reflections of a Female Astronomer

Dame Burnell will speak about her amazing career as an astrophysicist, her research work and her leadership in the physical sciences.

Dr. María Jesús Prieto-Laffargue, President of the World Federation of Engineering Organisations.

Women Leadership in Engineering and Technology

In an effort to better understand and participate in this age of change, the speaker will undertake the subject of WOMEN LEADERSHIP in Engineering and Technology Business as the central ingredient to tackle some of the challenges that the Society, at length, faces today. In many Countries (as UNESCO reminds us) women have unrecognised and invaluable management knowledge which is urgent to make visible in a complex World plenty of science and technology but lacking diversity and integration. As we have entered in a time of great awakening and lightning-fast learning the power of some women in the professional classes is reconfiguring in newly effective ways and we can see how it is possible to make the assertion that women already have the power to bring about the conditions that can begin to secure Leadership equality. However, the binomial Gender-Engineering and technology has still tremendous imbalance. The World has still huge shortage of Women in Engineering and Technology and it does the Technology Business and Corporations. Based on her own experience the speaker, mother of four children engineer, first woman President of the World Federation of Engineering Organisation and ex CEO of technology intensive Business will share her experiences and encourage women to imagine and fulfil their dreams whatever they could be.

Prof Elizabeth Taylor AO, Chairperson of the Board of Professional Engineers of Queensland.

The Allure of Conformity

Professor Taylor will speak on "The allure of conformity". The next challenge for women is to decide whether our entry into professional leadership does lead change. Even as leaders, challenges continue – struggling with the allure of conformity, having the courage to ask difficult questions, continuing to ask why (and why not) and how our leadership makes the world a better place for all. Our leadership could extend beyond our undoubted technical competence. It would be a loss to the world if we could find no way to use the experience we have gained in our own struggles for equality to build a platform for the next iteration towards the elusive rights of all.

Mrs Janet Holmes à Court AC, Chair of the John Holland Group

John Holland and Women in Construction: A Case Study

Mrs Holmes à Court will provide a perspective on her career and her leadership journey to become Chair of a major company as well as her leadership and support for the arts.

INVITED SPEAKER SUMMARIES

Dr Cathy Foley, Chief Research Scientist with CSIRO Materials Science and Engineering, President FASTS.

100 Years Later: Has Anything Changed for Women in Science?

Dr Foley will speak about her research on superconducting devices as well as her work to support and retain women in science and technology as President of FASTS.

Ms Kathy Hirschfeld, Director, Snowy Hydro Limited

Navigating the Labyrinth of Leadership - A Personal Account

Ms. Hirschfeld will speak on "Navigating the Labyrinth of Leadership" and present a personal account of her leadership journey as a chemical engineer over 30 years which resonates with the idea of a labyrinth. Kathy has met with many of the obstacles women encounter such as discrimination, differing leadership styles and unconscious prejudice. She will talk about what has worked for her in facing the challenges in her progress to become Managing Director of a $5 billion turnover company and now a professional non-executive director. The presentation will focus on 3 key ideas - choice, possibility and coaching – and how she used these to build her career. Choice embodies the idea that either leaders create the future or the circumstances certainly will - we can choose our attitude & our actions in the face of circumstances that appear limiting. One of the most powerful ways to choose to create the future is to stand for a Possibility such as John F. Kennedy did when he declared we would send a man to the moon. The third idea of Coaching is about finding the right support to enable you to achieve your possibilities.

Ms Lorie Jones, Principal with Sinclair Knight Merz

Engineering Sustainability – A Systems Approach

Over the last fifty years, engineers have made important contributions to improved environmental outcomes, through design and implementation of containment and control measures which comply with community expectations and government regulations. In the past, engineers have operated under an assumption that there is no real limit on resources – our mandate has been narrowly focussed on providing the best solution for our clients over the short term at least cost. However, in more recent times we have come to understand that we live in a global community whose finite resources are not sufficient to give everyone in the world the standard of living that they aspire to, under current technology. A paradigm shift in thinking is required, and engineers are rising to the challenge of leading the community through to the new paradigm. Moving forward, engineers should demonstrate leadership in environmental management beyond compliance – not just implementing 'end of pipe' solutions to achieve environmental standards but seeking to design or implement new processes or technologies which avoid waste generation in the first instance; reuse/recycle wastes to achieve higher value products, and reduce consumption of water, energy and materials. As engineers, we have a responsibility to challenge 'business as usual'. Moreover, the community's expectation has increased beyond local environmental management towards more sustainable outcomes over the long term which includes social and economic considerations on a global as well as local scale. This paper discusses a systems approach to engineering more sustainable solutions.

Ms Gretchen Kalonji, Assistant Director-General for the Natural Sciences, UNESCO

Ms. Kalonji will speak of her leadership experiences as the first woman to the an Assist Director General at UNESCO, her innovations in science and engineering education, her efforts to promote equity and access for women and underrepresented minorities and her novel approaches to the internationalization of research and education.

Dr Di McCarthy, Chief Executive Officer of the Royal Society of New Zealand

Improving Gender Equity Australia and Diversity in the Science Profession: A New Zealand Perspective

Dr McCarthy will provide a New Zealand perspective on improving gender equity and diversity in the science profession. There is increasing global evidence that women and diversity in workplace teams and on company boards improve profitability and performance. Yet, women remain under-represented and under-utilised in the sciences both at governance and at senior management levels, and the largest proportion of those leaving the sciences as a profession are women. This paper explores gender issues evident in the New Zealand science sector, in particular, and looks at initiatives already in place and requiring implementation to improve gender equity and diversity in the science and innovation profession both nationally and internationally.

Ms Melissa Mellen, Director of Murray F. Young & Associates (MFY)

A Story About Dragons

This presentation tells the story of an entrepreneur named Poppy. It is a story about the growth of her business, the success of a young business owner … a woman … a leader in her field … how the creativity and innovation of an individual lead to the expansion of her business, employment opportunities, increased clientele … it is a story about dragons. We will explore this case study of the development of Poppy's business. What lessons as professionals and business owners can she teach us? What were the outcomes of her approach to developing her business and what techniques did she use? We will highlight the additional benefits that were experienced by Poppy as a result of her business success … not only in her profession but in her life generally. The definition of innovation is "the introduction of new things or methods". As engineers and scientists, we are known for our technical expertise. The challenge is to apply innovation to complement our profession, to expand our expertise and to grow ourselves. Being a business leader requires much more than a qualification. It is not only about "good business sense". Poppy shows us how we can foster these hidden skills that we had forgotten (perhaps without knowing it) and develop new skills that the stereotype says we find challenging (can an engineer really be creative?). And we will answer the question, why was Poppy successful? Was it her expertise? Was it her training? Was it her innovative and creative approach … or was it much, much more than that?

Prof Tanya Monro, University of Adelaide

Innovation in Photonics & Reflections on the Engagement of Women in STEM Careers

Professor Monro will present an overview on some of the innovative solutions to challenges in health, defence and the environment that are currently under development at the Institute for Photonics & Advanced Sensing (IPAS) at The University of Adelaide. Many of these opportunities are being addressed by harnessing a transdisciplinary approach, building diverse teams, and focussing on creating knowledge and technologies at the boundaries the traditional disciplines. In addition, I will provide some reflections on the current challenges and opportunities for women in STEM careers, including a perspective from the Australian Academy of Technological Sciences and Engineering (ATSE), which has been pursuing a strongly proactive agenda to increase the engagement of women in the academy.

Prof Karen Reynolds, Flinders University

Medical Devices – Partnering for Success

Professor Reynolds will speak about her research and innovations in the field of medical devices & technologies.

Ms Sylvia Tulloch, Director of Dyesol Limited

Sustainable Solutions

Scientists and engineers are challenged to use our skills to ensure our projects meet the needs of the present without compromising the ability of future generations to meet their own needs. This involves the three aspects of sustainable development: economic development, social development, and environmental protection. Ms. Tulloch will discuss case studies in the renewable energy sector, where technological projects are founded in sustainability concepts.

PRESENTATION SUMMARIES – CEO CIRCLE

Ms Kathryn Fagg, President, Fast Moving Consumer Goods, Linfox Logistics, Melbourne.

CEO Circle

Ms Fagg will speak about her leadership perspectives in her role at Linfox and also at BlueScope Steel Asia, where she had oversight of operations in a number of countries in Asia.

Ms Karen Moses, Chief Operating Officer, Origin Energy, Melbourne.

Ms Moses will provide leadership perspectives in her role at Origin Energy especially as the company undertakes large resources projects such as the APLNG Project in Queensland.

Ms Helen Gluer, Chief Executive Officer of Stanwell Corporation Queensland.

Leadership with a Focus on Queensland's Unfolding Resource Industries

Ms. Gluer will speak on "Leadership with a focus on Queensland's Unfolding Resource Industries". She will provide a perspective on the journey and the lessons learned to the top of a major power generator, Stanwell Corporation and the leadership qualities she considers to be most important.

Ms Kathy Hirschfeld, Director, Snow Hydro Limited

Leaders Create the Future

Leaders create the future – they make the unpredictable happen by seeing possibility and then inspiring others to make it happen. They bring out the best in people and help them achieve potential they don't even know they have, both as individuals and as teams. Leaders have to be bold, but humble – a difficult combination! Women leaders have to be prepared for a career that doesn't follow a linear path and organisations need to recognise that most women cannot follow the same career track as their male colleagues. We need to find ways to enable women to take breaks for family and to continue to reach their potential.

APNN MEETING PRESENTATION SUMMARIES

Asia Pacific Nation Network Meeting, Adelaide, Australia, 19th July 2011

New Zealand Situation for Women Engineers

Ms Tracey Ayre, *Policy Advisor, Project Manager, Women in Engineering, Engineers New Zealand, IPENZ.*

The involvement of women in engineering in New Zealand drops dramatically along the career pipeline. Encouragingly, 21 per cent of all professional engineering graduates are female. Less encouraging is that only six per cent of Chartered Professional Engineers and only two per cent of Fellows are female. In March 2011, the Institution of Professional Engineers New Zealand launched an extensive programme to address the low representation of women in the engineering profession. This programme has been developed to enable the profession realise the opportunities the increased involvement of women in the profession presents.

Status of Pakistani Women in Engineering and Strategies for Improvement

Ms. Durdana Habib, *National University of Computer & Emerging Sciences, Islamabad Pakistan, INWES Board member*

Throughout the world women are underrepresented in Engineering Institutes and consequently the engineering workforce in technical careers. The situation is no different in Pakistan. Although the women dwelling in urban areas of the country get a better educational exposure compared to their rural counterparts and many of them pursue professional degrees from the country as well as from abroad; the ratio of women opting engineering as careers is showing steady but slow progress. The social and traditional reasons why women opt or are made to opt out of technical fields need to be addressed and steps to be taken by institutes and government to encourage gender equity will be described.

Women Engineers in Australia

Dr. Marlene Kanga, *National Councillor Engineers Australia, Past Chair National Committee for Women in Engineering (2008-2009)*

Approximately 17 percent of engineering students in Australia are women. However less than 10 percent in the engineering workforce are women, indicating the significant loss to the engineering profession as women progress through their careers. This paper will describe some of the issues fro women engineers including working and pay conditions, workplace practices and culture and policies to support women with families. It will also describe some of the initiatives of Engineers Australia and the National Committee for Women in Engineering to attract, retain, support and celebrate the achievements of women in the engineering profession.

Korean policies for promoting women in science and technology and their outcome

Kong-Ju-Bock Lee, Department of Physics, Ewha Womans University , Republic of Korea

The world's lowest birthrate and the fast shift towards an 'aging society' has been big issues in Korea. The most important factor in economic growth of Korea was human resources in last decades even though the main players in economy were men. The issues of low birthrate and aging society urged the Korean government to draw attention to women resources and resulted in legislation of an Act on Fostering and Supporting Women Scientists and Technicians in 2002. In this presentation SWOT analysis for women in science and technology based on statistical figures and social characteristics, key policies to overcome the weakness and threats, outcome of each policy, and recommendation for effectiveness will be introduced.

Engineering Issues and Networking in the Asia-Pacific Region

Dr. Tony Marjoram, *Former Programme Specialist, Division of Basic and Engineering Sciences, UNESCO.*

Engineering is a central part of the knowledge system and is of vital importance in supporting and promoting social and economic development and addressing the Millennium Development Goals – which include the promotion of gender equality and the empowerment of women. The participation of women in engineering, and broader gender issues relating to engineering, are of increasing importance in the context of equity, access and contribution to development. Partnerships and networking are of vital importance in addressing these issues and are the focus of this presentation, with particular reference to the Asia-Pacific region.

The Association of Korean Woman Scientists and Engineers

Dr. Byung Joo Min, *President of the Association of Korean Woman Scientists and Engineers, Special Committee Member of Korea Atomic Energy Research Institute,* and
Dr. Hyong-Ha Kim, *General Executive of the Association of Korean Woman Scientists and Engineers, Principal Research Scientist of Korea Research Institute of Standards and Science, Republic of Korea.*

The Association of Korean Woman Scientists and Engineers was established in 1993 as one of the first associations for women scientists and engineers in Korea. It currently has more than 1200 members working in various fields of science and engineering of which 68% are Ph.D.s. KWSE aims to contribute to enhance the technical capacity as well as to improve the status of women scientists and engineers in industry, academia, and research institutes. In this presentation, current activities and on-going projects including international and domestic networking of women scientists and engineers, as well as achievements and future plans of KWSE will be introduced.

The Current Activities and Cahllenges of Vietnamese Women Engineers and Scientists

Phuong-Tung Nguyen, *Institute of Applied Materials Science, 1 Mac Dinh Chi, Dist. 1, Hochiminh City, Vietnam*

Women account for 51% of labor force in Vietnam and 27.3 % of deputies the National Assembly of Vietnam, the highest organ of state power. Vietnamese women are among the most politically active in the world as raked by the United Nations. Vietnam's rate of female university graduates is 36.24%, 33.95% and 25.96% for Masters and PhD, respectively. It can be said that intellectual women are an elite division of their gender, and there are many official guidelines and policies to encourage women participation in science and technology. However, these women still have to face "double challenge" only because of their gender

The talk will discuss the challenges the women engineers-scientists are facing with and propose a solution.

Japanese policies for formation of a gender-equal society and annual activities of INWES-Japan

Aguri NAKANO, *INWES-Japan steering committee,* and **Maki IWAKUMA,** *INWES-Japan steering committee, INWES Board member*

To begin with, we express our sincere gratitude to people around the world for the warm messages and support after the unprecedented disaster that hit Japan on the 11th March.

The Third Basic Plan for Gender Equality was published in December 2010. The government has declared to increase the share of women in leadership positions.

However, such leadership positions are occupied by males in many areas. We have been practicing activities to encourage young females to select the fields of science and technology as their career. The paper introduces our activities, e.g., voluntary classes for senior high school students and teachers presenting the various career paths that lead to science and technology fields.

Women Scientists and Engineers in Mongolia before and after Socialism

Ariunbolor Purvee, *Mongolian University of Science and Technology, Ulaanbaatar, Mongolia*

This paper describes the changing role of women scientists and engineers in Mongolia from before the Socialist period in Mongolia to the present. Mongolian women receive more education than Mongolian men, primarily because of the high dropout rate among the latter. This paper will present more detailed information about the numbers and statistical trends of Mongolian women who were trained and employed as scientists and engineers both before and after the Socialist period. Prospects for the future will also be discussed.

Scientometric Mapping of Women's Publication Activities in Engineering and Science in Third World Countries

Dr.M.Suriya Thevar, *Professor of Library and Information Science, Annamalai University, Tamilnadu, India, INWES Board member*

Understanding the gender differences in scientific publication at national and institutional level is an important issue in the sociology of science and also for policy makers and decision makers in higher education and the labour market. The aim of the paper is to explore the gender differences in the publication activity of the male and female scientists in science and engineering in the developing nations. This study seeks to determine whether the scientific productivity of the third world female scholars differs quantitatively from that of male scholars. Based on the findings of this kind of studies, national, local and international policies can be revived to make women as the best contributors to scientific knowledge and scientific workforce.

Women Engineers in Papua New Guinea

Ms. Dorothea Vagalia, *Electrical Engineer Operations, PNG Power Ltd.*

There are less than 200 women engineers in Papua New Guinea. Women engineers face issues relating to attraction and retention, work life balance, progression into management positions and assistance for women engineers who are also mothers. The paper also suggests some recommendations to support women engineers in Papua New Guinea.

Title: Attracting and Retaining Women in Science and Engineering

Ms. Sangeeta Wij, *President WISE India*

Women are underrepresented in science and engineering professions and rarely ever reach the Top Positions. Improving their representation depends on acknowledging and resolving barriers and highlight and award excellence in their performance. The issue of Glass Ceiling becomes more and more serious as the women raise families and their priorities shift away from Career growth and Professional advancement. The Recommended Actions for helping Women through WISE, a Society for Women in Sciences and Engineering in India, will be discussed in detail.

Current Situation of Women Scientists and Engineers in Taiwan

Chia-Li Wu, *Dept of Chemistry, Tamkang University, Tamsui, Taiwan*

A large proportion of women scientists in Taiwan stay in the academics or research institutes. At present, we have very limited statistics on women scientists and engineers engaged in industry. In the present report, statistics for women engineers and scientists will be presented and compared with data from other countries. The paper will report on a preliminary survey of women scientists and engineers from industrial sectors and present gender statistics from National Science Council along with gender policies of NSC practiced in recent years.

The Existence of Women Engineers in Indonesia

Ms. Sri Wuryani, *Lecturer, University of Pembangunan,Yogyakarta, Indonesia*

This paper will describe the situation for women engineers in Indonesia including the proportion studying engineering and in the workforce. It will describe professional associations and other support available for women engineers and the situation regarding working conditions and difference in the incomes of men and women in Indonesia.

ABSTRACTS

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Perception of Barriers to Career Progression by Women Engineers and Engineering Students

Achela K Fernando, Unitec Institute of Technology, New Zealand

Introduction: Although the widely held view of engineering being a field of study best suited for men is changing, there is anecdotal evidence suggesting gender imbalance in engineering industry. Efforts take place throughout New Zealand to encourage participation and career progression of females in engineering (eg. formation and activities of societies such as WIE in NZ Universities, provision of support by professional institutions such as IPENZ/ ICE to provide networking opportunities and celebrate achievements of women engineers). However, it is noticed that female engineers feel the presence of more barriers to them to accomplish in the profession which also seems to discourage prospective students who value a good balance between their role as an engineer and a mother.

Objective: To assess the perception by female engineers and engineering students of these barriers, and how prepared the engineering industries/ educational institutes are to cater for the specific needs of a woman as she progresses through the career balancing the familial responsibilities.

Method: Conduct a surveyed to collect data from female engineers/students through a well-designed questionnaire. The data are analysed and findings summarised.

Results/Conclusions: Based on findings some measures are proposed to encourage female participation and retention in engineering industry. Implementing these suggestions can be invaluable as the loss of trained workforce to engineering industry when a young female engineer chooses family over engineering work - either by changing career path with more flexible working conditions or by stopping work all together - can be equally wasteful to the individual and the industry.

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Painting the Picture - An Update on Women in Engineering Statistics in Australia

Melissa Marinelli, Curtin University, Australia

Martina Calais, Murdoch University, Australia

The paper examines women's participation in engineering education and workforce in Australia. Using data from recent editions of Engineers Australia's The Engineering Profession: A Statistical Overview and drawing heavily on a detailed analysis of 2006 Population Census data, the aim is to show trends in the commencements, enrolments and graduations of female engineering students and to give an overview of the nature of female participation in the engineering workforce.

Key findings include:

- slight increases in female percentage participation in engineering studies from 2001 to 2008, with growth in overseas and postgraduate students;
- the 2006 engineering labour force included 9.7% women, while 10.7% of individuals with engineering qualifications were women;
- unique and significant gender differences in the uptake of full-time and part-time employment exist;
- the gender pay gap is evident, with female engineers in full and part-time positions earning lower average weekly salaries than male engineers;
- a higher percentage of qualified engineering women are not in the labour force, compared to men, with a notable difference in the age groups around 35 years; and
- gender segregation of the engineering labour force by occupation and industry is seen, with a higher proportion of women in clerical / administrative and sales roles and health care & social and accommodation & food sectors.

The work is the foundation for a regular update of gendered statistical data that will establish a detailed picture of engineering women in Australia and will assist with targeted progression of issues.

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Providing a Gender Balanced Workplace - It's Not Just a Numbers Game

Nicky E Smith, Opus International Consultants, New Zealand

All large organisations have policies to provide equal opportunities to women in the workplace, but my aim is to take it one step further and provide a gender balanced workplace.

My vision of a gender balanced workplace has equal (or close to it) numbers of men and women in the workplace. More than that, it is a workplace where all things are gender neutral, or balanced.

This paper will discuss the moves I am taking within Opus International Consultants (an Engineering Consultancy) to provide a gender balanced workplace, and it's not just a numbers game. Providing a gender balanced workplace is covered in two main areas:

1. Improving the ratio of women to men
2. Shifting the work culture

Improving the female to male ratio has two key components:

1. Recruitment - attracting more women into engineering and the organisation; changing the stereotype of the engineer; deliberate targeting to prospective female employees
2. Retention - retaining women in the organisation; providing structured network groups for women; mentoring for young women engineers; providing tailored professional development for women in engineering and leadership.

Shifting the work culture requires women in the workplace to be empowered so they can implement change. It means celebrating the gender differences. Often minimal change to some key practices can effect strong change in the work environment.

This paper details my vision for the future and what I am currently doing to improve the gender balance in my workplace.

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Today's Relevance of Feminist Theory and Gender Inclusive Engineering Curricula to Help Students Overcome Thresholds in Engineering Education

Sally A Male, The University of Western Australia, Australia

Recommendations to improve gender inclusivity of engineering curricula have existed for well over a decade in Australia. Particularly in response to the Johnson review of engineering education (1996), cultures in engineering faculties have improved. This paper asks whether feminist literature in the field of engineering education can contribute to curriculum development in 2011.

The paper has two parts. The first focuses on a small sample of a new curriculum development process at our University. Three thresholds identified by participants in two workshops are selected for discussion.

The theoretical framework for the first part of the paper has been adapted from threshold concept theory. This theory recognises that any discipline has concepts that are transformational for students, critical to student's progress and yet troublesome for many students. The theory can be used to focus students' and teachers' attention on critical concepts in a curriculum.

The second part of the paper presents an alternative, yet complementary perspective from feminist and engineering education literature. This literature has also identified these same threshold areas as troublesome for female students, and furthermore, contributes a possible explanation for and recommendation to address one of the thresholds.

The consistencies support the conclusion that long-standing recommendations for gender inclusive engineering education are likely to help many students, not only women. These examples provide incentive for continued improvement of engineering education programs, as recommended for gender inclusivity, and using approaches that are integrated with feminist theories and experience in the field of gender inclusivity in engineering education.

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Why do Girls Choose Engineering? A Comparison of three Engineering Disciplines

Rebecca J Gravina, RMIT University, Australia

Sabrina Woon, Australia

Margaret Jollands, RMIT University, Australia

A large number of initiatives have been implemented to increase the number of girls starting engineering programs, but while a few have initially increased the numbers, none have delivered lasting results. This indicates there is a poor understanding of what attracts women to engineering. Among engineering disciplines, two consistently attract more girls: chemical and environmental engineering typically has 20 to 40% girls, compared to civil engineering with 5 to 10% girls. Despite this there have been no studies on what influences girls to select their discipline of engineering.

This paper aims to evaluate what influences female students when selecting engineering as a university program and the particular discipline of engineering. Female engineering students from each discipline in the School of Civil Environmental and Chemical Engineering at RMIT University have been interviewed to explore why they chose that particular field of engineering and what influenced them in their choice. The results have been analysed to determine whether the factors are different when they choose different engineering disciplines and the outcomes will be used to develop strategies to encourage female students to choose engineering

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A Holistic Review of Gender Differences in Engineering Admissions and Early Retention

Beth M Holloway, Purdue University, United States

P K Imbrie, Purdue University, United States

Teri Reed-Rhoads, Purdue University, United States

World-wide research continues to seek to identify the reasons for the underrepresentation of women in engineering. This work is primarily focused on two broad areas: pre-college preparation, exposure and experiences (recruiting), and higher education experiences (retention). Many programs and practices have been implemented incorporating the results of these studies.

The university admissions process is also a gateway to engineering, but little has been done to understand if this process is gender biased. A nonparametric statistical analysis of several cohorts of applications and admission results in the College of Engineering at a large U.S. Midwestern University compares the medians of common admissions metrics (e.g. high school grade point averages, class rank, standardized test scores) of men and women. The data indicate that, in practice, admission may be biased against women. In exploring ways to reduce gender bias in the admissions process, a study of academic performance and self-reported affective measures were modeled using retention and graduation as outcomes. Though first year men and women report similar levels of each success measure, the relative importance of each measure in predicting retention was different for men and women.

Because of the data-based nature and the breadth of this work, these results have been used to inform changes in admissions practices on the studied campus. A more gender neutral set of admissions practices is essential for gender parity in engineering, particularly in light of recent research which suggests recruiting women into engineering is a larger issue than retaining women to graduation.

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Green Path Connection in Multi-Layer Transport Network

Eunyoung Cho, ETRI (Electronics and Telecommunications Research Institute), Korea

Sunme Kim, ETRI, Korea

Wonkyung Lee, ETRI, Korea

Hoyoung Song, Electronics and Telecommunications Research Institute, Korea

Jehoon Yoo, ETRI, Korea

Taewhan Yoo, ETRI, Korea

Jonghyun Lee, Korea

Intelligent network management is one of the long term efficient approach for reducing Opex and Capex. Recently, energy efficiency in transport network can be achieved by varied research of automatic path connection management with control plane functions. In packet and optical transport network, maximum resource utilization, path computation,

energy awareness and its reoptimization will be more complicated. In this paper, we investigate management and control plane software components to improve multi-layer network operation such as network planning tool, path computation engine, virtual network topology manager, and embedded OAM&P functions and protocols. Finally, we propose the enhanced path connection control architecture using knowledge-based technique for energy aware network communication.

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Multi-Client, Internet-Based Applications on Low-Power Network Routers

Amal A Fahad, University of Rochester, United States

Kai Shen, University of Rochester, United States

Internet-based applications become widespread nowadays due to several reasons, such as data availability, work offloading from power-hungry devices, and content transformation for special-need devices. These applications usually run in a server/client model where the server side is hosted on dedicated machines and responds to clients' requests. In order to avoid the network-condition effects on applications' performance and guarantee the applications' high performance, the server

side usually runs on multiple machines that consume high power, a few hundred of Watts each. This work contributes to significant energy saving in the Internet-based information technology and consequently improves the sustainability of computing.

In this paper, we propose a new architecture for networked server applications. We argue that the low-power network routers, which consume around 6 watts only and are main components of the network infrastructure, can handle running these applications.

Our results showed that these routers are capable of handling such servers with variant level of performance based on the application required responsiveness, and the computation vs I/O boundedness. Since these low-power platforms come with lower specifications than regular servers, in terms of CPU speed, and memory capacity, the

expected challenge is to provide high-performance services to highly concurrent clients. This paper provides a performance measurement for an I/O-bound application and a CPU-intensive application. Future work will identify the performance bottlenecks of such low-power systems. We also plan to study how a distributed system will help increasing the overall performance.

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Statistical Analysis of Some Accuracy Defining Parameters of Location Based Services offered in South Africa

Folasade M Dahunsi, University of Witwatersrand, Johannesburg, South Africa, South Africa

Barry Dwolatzky, University of Witwatersrand, Johannesburg, South Africa, South Africa

Location Based Service (LBS) enables mobile users to connect to points of interest at a particular geographical location providing real-time and personalized service based on location. These services are location information based on wireless technology and are accessible through mobile stations (mobile phones, Personal Digital Assistants (PDA), etc). This paper presents results from data on LBS collected at sixty (60) location points with nine hundred and thirty eight (938) LBS requests from the only two (2) LBS providers and ,mobile operators in South Africa. We report statistically how some parameters such as; time of the day, environment, geographical location, type of LBS request and mobile operators' network affect the accuracy of network based positioning offered by South African Mobile Operators to LBS registered users in South Africa. Our findings indicated that some parameters such as geographical location and environment of LBS request has a significantly high impact on the accuracy provided by the LBS provider and so is the other parameters. It is therefore important to put into consideration such parameters when providing LBS to users for improved accuracy.

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Assessing the Agricultural Faculty Publication Productivity from Gender Perspective: A Case Study

Suriya M Mayandi Thevar, Annamalai U niversity, India

An overwhelming amount of research has been published about faculty research performance since it is an index of departmental and institutional prestige as well as the individual scientist's reputation, visibility and advancement in the academic reward structures.This study is an attempt to explore gender difference in publication productivity of the agricultural scientists in Annamalai University, a unilateral university in the Southern part of India.

Objective: This study would investigate critical issues such as (i) are there significant gender differences in publishing productivity of agricultural scientists in India? (ii) how are the traditional measures of publication productivity (quantity & quality) influenced by gender? (iii) What explains why a small group of agricultural faculty/scientists are prolific? (iv) Why are so few women among those scientists who are prolific? and (v)what are the implications for practice?

Methods: Publication data of the agricultural scientists will be collected from the university database and the personal data about the scientists will be gathered from a structured questionnaire. The publication activity index (AI) will be used to compute the individual scientist's research productivity (RP) and specialization index (SI) is adopted to measure the departmental/institutional productivity.

Result and Conclusion: The structured questionnaire and the direct interviews among the scientists will help in identifying the causative factors that determine the growth or fall in the productivity pattern of the agricultural scientists in the sample institution. This study will be used as a base for devising gender sensitive policies to promote equity in the publication output of the sample institution.

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Scientometric Analysis of Publications on Women in Computing: With Special Reference to 'Gender & ICT' Conference Proceedings

Suriya M Mayandi Thevar, Annamalai University, India

Objective: The present study is an attempt to map the dynamics of themes that have been represented in the conference proceedings held at Asia, Europe and NorthAmerica on the subject 'gender in ICT'. These thematic maps would find answer to some of the critical and policy oriented questions such as: (i)what is the research status of the

individual countries on the core theme of the discipline 'gender and ICT'; (ii) what are the most focused area of research specialties (themes/issues); (iii) which countries are active in conducting research on this subject and (iv)what is the impact of these research on gender development. Activity Index is adopted to compare the research productivity of the women scientists and engineers of the various regions and to measure their contribution to the different fields of scientific knowledge. Co-word analysis is employed to reveal patterns and trends in the field of gender studies in IT by measuring the association of strengths of terms representative of relevant publications. In order to identify the equity in the distribution of research efforts of the various regions on the subfields of gender & ICT, the Wroclaw's taxanomic model is applied. Hierarchical Clustering Techniques and Salton Index are used to compare the domain where women's contributions are higher or lower.

Result and Conclusion: This study would look into (i)the productivity pattern of women scientists; (ii)authorship pattern of their publications; (iii)effect of women scientists' collaboration on their productivity; (iv)association between levels of authors and co-author's strength; (v)impact of co-author's strength on productivity.

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Struggles of Senior Women Scientists in IITs

Asha Gopinathan, Sree Chitra Thirunal Institute of Medical Sciences and Technology, Tiruvanthapuram, Kerala, India

In 1994 senior women scientists at MIT put a request that a committee be established to look at conditions facing women professors in the school of science at MIT and the low numbers of women in various departments. The amended form of this report came out in 1998. Titled the MIT Report, it concluded that junior women feel supported within their departments and feel that only work-family conflicts were likely to adversely affect their careers. This is in contrast to senior (tenured) women who felt marginalized within their departments and their isolation increased as they made their way up the ladder. This was accompanied by differences in salaries, space, resources, outside offers. The report has made waves in academia in the U.S forcing the establishments of various universities to take a look at their policies regarding women professors. In this paper I propose to look at these issues in depth illustrating it with examples from India. Hiring practices, career pathways, routes to attaining a senior position, struggles by women within academia, relationship between prestige of an institution and women's status will be covered. A questionnaire has been sent to women full professors of IIT Madras. This is followed by personal interviews. Preliminary results indicate bottlenecks at the entry level followed by problems in moving into positions of authority and power.

Key words: senior , women scientists , academia , MIT Report , IIT

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A Review of the UNESCO Report: "Engineering: Issues, Challenges and Opportunities for Development"

Tony Marjoram, UNESCO

Engineering drives innovation, human, social and economic development, and underpins our physical infrastructure, knowledge societies and economies. Major issues and challenges facing the world include the need to address poverty reduction, environmental sustainability and the other Millennium Development Goals (MDGs), climate change mitigation and adaptation, and recovery from the recent financial and economic crisis. Engineering is of vital importance in addressing all these challenges, and this presentation will introduce and discuss the UNESCO Report, "Engineering: Issues, Challenges and Opportunities for Development", the first ever international study on engineering, looking at the role, issues, challenges and opportunities that engineering faces and provides for development.

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For Female Engineers: How to Improve your Career Prospects in Male-Dominated Organisations

Mark C Toner, Toner & Associates, Australia

Gunilla E Burrowes, University of Newcastle, Australia

Women continue to be disadvantaged in male-dominated organisations. Female engineers will invariably work for organisations run by men, and therefore could be disadvantaged in their careers.

This paper presents a new approach for female engineers (and scientists) to enhance their career prospects in such organisations. As a prerequisite, female engineers need to understand a number of relevant issues, e.g. female/male differences in leadership, decision-making, assertiveness and career management.

A key element of this approach is the concept that employees are playing a corporate game whether they realise it or not. It is a game because they are working to rules set by their organisation and from a career point of view there are winners and losers. To call it a game is not to trivialise its importance. Female engineers can enhance their careers by observing the way the game is played, understanding the rules (both written and unwritten) and then deciding if they want to be willing participants.

The new approach described here is for women to develop a number of skills. They first need to observe how the game is played, e.g. who has the power (official and unofficial), what are the relevant relationships, which employees are favourably viewed by management and why. Their next steps include improving their attraction and expert power, further developing their leadership capabilities, challenging any discriminatory practices, understanding the culture and practices of management, raising their profile, developing internal and external networks and planning their careers on 10, 5 and 2 year timeframes.

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A Case Study on the Engineering Profession- Diversifying to Success!

Kartikee Verma, Kellogg Brown & Root Pty Ltd, Australia

Melissa Griffith, Kellogg Brown & Root Pty Ltd, Australia

Statistics continue to show that the engineering profession remains male dominated. Surveys show that women are not staying in the engineering profession or reaching senior positions within engineering organisations proportionate with their overall participation. One quarter of respondents to the Women's survey (Women in the Professions: The State of Play 2009-10, Executive Summary of the APESMA Women in the professions survey report) indicated that they would leave their profession

within five years. The research highlights that engineering organisations have to implement significant workplace cultural change to ensure the retention and promotion of talented women.

The first part of this paper presents a brief overview of the current statistics and research related to female progression and lack of retention within the engineering profession. The second part of this paper discusses how this current research has been used to formulate a diversity strategy for engineering organisation, Kellogg Brown & Root Pty Ltd (KBR).

Using current research, a working group within KBR has developed a diversity strategy. The strategy has been developed with the goal of enabling KBR to become a more inclusive organisation that respects, promotes and fosters each individual's unique background, characteristics and abilities.

This paper will discuss the implementation of the strategy and in particular what appears to be working, the challenges faced in rolling out the plan, and how we might measure success.

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Mentoring of Senior Women Engineers - Experiences and Lessons Learnt

Louise H Round, Aurecon, New Zealand

This paper looks at the success of the women at Aurecon establishing a Women's Initiative in 2008 and in particular a mentoring program. The program has assisted in raising Board awareness of both the issues facing senior female engineers and project managers and the talents that they have.

The Women's Initiative established a Mentoring Working Group and organised for the most senior female engineers and project managers to be mentored by a Board Member for the following 12 months. As this was the first program of its kind, there was initial feedback at the six month mark, with a final evaluation of the program at its completion. This evaluation included feedback on both the mentoring program and the mentors themselves, to assist in the development of the Leadership Team. One of key findings was that with the geographic spread of the mentors and mentees opportunities for face to face meetings were limited and that this made establishing a rapport difficult.

The final feedback in March 2010 was positive with the majority of participants wanting to continue the program. One of the main outcomes for the mentees was the opportunity for time and exposure with a Director. As a result it was agreed that there would be a change of mentor for each mentee to increase the exposure. The author is a civil engineer and mentee in this program.

This successful program has been expanded to all women Executives and a self-paced development program has also been adopted.

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Lessons Learned from the First Years of a Mentoring Scheme for Women in Science, Engineering and Technology in the UK

Pamela R Wain, International Network of Women Engineers and Scientists, United Kingdom

MentorSET is a mentoring scheme for women in science, engineering, technology (SET) in the UK. It is managed by the Women's Engineering Society (WES), a membership organisation. Funding comes almost entirely from the UK's Resource Centre for Women in SET, channeling money from the UK government.

Objectives: This study looks at the development of the scheme, and draws out useful lessons for creators and managers of similar projects.

The scheme received its first funding in 2002, but this was the result of a lengthy process, which the paper will describe. There were few closely comparable schemes to help in the process of writing the guidelines for MentorSET. Some of the details of the project proposal and the subsequent contract had to be modified as things developed.

MentorSET mentoring has developed its own special flavour to meet the particular needs of professional women. There are interesting differences between the needs of the mentees in different disciplines. Adequate funding is always a problem. MentorSET delivers good value for money, but mentoring is expensive. Some of the scheme's administration is done by volunteers, and all the mentors are unpaid.

Evaluating the effectiveness of mentoring schemes is difficult, and different approaches are used.

Results: MentorSET is past the start-up phase and relatively stable, creating about 60 new mentoring pairs a year.

Conclusions: Mentoring is a powerful way to help people, but it is time-consuming to do it well. The effort involved in setting up and managing a scheme is high.

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Career Support in Science and Knowlege Management - Mentoring at non-University Research Organizations in Germany

Katharina Sauter, Fraunhofer-Gesellschaft, Germany

Birgit Gaiser, Helmholtz-Gemeinschaft, Germany

Anke Hübenthal, Max-Planck-Gesellschaft, Germany

Fraunhofer-Gesellschaft, Helmholtz Association and Max Planck Society are Germany's most important non-university research organizations with a staff of about 70.000 persons and a share of female scientific staff between 19 and 26 %. The aim of these organizations is to increase the proportion of women in science and management. An approach of this type has implications both for staff recruitment and as a basis for improving career opportunities for women throughout their term of employment.

Therefore, the three research organizations run several mentoring programs for supporting women's careers. These programs have been designed to be interdisciplinary and have a reach that extends to the whole of Germany and beyond. The mentoring programs encourage networking between individual institutes and considerably strengthen participants' identification with the sponsoring organization.

This win-win situation widens participants' circle of contacts and improves their career opportunities throughout the research organization. Inter-organizational networks are also forming: The three research organizations are already working closely together on the recruitment of mentors. This encourages additional networking between participants right across the scientific community.

The primary goal of the mentoring programs of all three research organizations is to enable women to catch up in the working world. Although the proportion of women in leading positions in science and industry has been slowly rising in recent years, there

is still a need for pro-active measures in order to achieve genuine gender equality. The successful networking between the three research organisations may help to accelerate the dynamic in gender equality.

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Curtiss-Wright Engineering Cadettes: 21st Century Questions and Issues

Anne M Perusek, Society of Women Engineers, United States

Tanya Zanish-Belcher, Iowa State University, United States

Peter Meiksins, Cleveland State University, United States

The Curtiss-Wright Cadettes was a World War II program to recruit women into engineering to fill in for the men drawn into the war effort. 800 women were given accelerated training programs in major American universities and placed in engineering jobs at Curtiss-Wright facilities around the country. This paper examines the experiences of those women, based on documentary evidence and on a number of interviews with women who participated in the program. We explore the question of whether this program represented a breakthrough for women in engineering, demonstrating that women could serve well in that occupation and eventually leading to a growth in the numbers of women aspiring to engineering careers. Although many of the women who were recruited into the Cadettes had earlier technical education, few entered the program expecting to use it as a springboard to a technical career. Most saw it as a chance to contribute to the war effort. When the war ended, the Cadettes were summarily let go by Curtiss-Wright and few seemed to expect anything different. Some pursued professional careers in science and engineering; most returned to traditional roles after their wartime experience in engineering. The Cadettes program reveals the power of traditional gender expectations to limit women's ambitions and the ability of wartime conditions to define opportunities as momentary and exceptional. The emergence of a significant group of organized women actively seeking careers in engineering would have to wait until gender expectations changed and "normal" labor market conditions had been re-established.

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The Boundaries of Women's Rights: Activism and Aspirations in the Society of Women Engineers, 1946-1980

Lauren A Kata, United States

Mainstream feminist organizations were not the only parties responsible for disseminating equal rights ideas into society at large. Professional women engineers in the post-World War II period spoke publicly and frequently on matters of equal rights and equal opportunity as members of the non-profit, educational engineering society-the Society of Women Engineers (SWE). In its first three decades, SWE women drew upon the language, legacy and legal gains credited to the women's movement, while engaging other matters particular to the needs and philosophies of the engineering profession within which it sought to gain legitimacy and credibility. At different times in SWE's history, however, individual ideas and promotion of the feminist cause came into conflict with the aims of a non-profit organization, and members' voices represented opposite ends of the spectrum. In SWE's 60th anniversary year, this paper looks back at its early history, and specifically, the organization's support of and gradual retreat from the Equal Rights Amendment to the U.S. Constitution. SWE's participation in the women's movement became increasingly complicated when the boundaries of the movement expanded to include indictments on technology, making it difficult to rationalize the use of SWE resources toward solidarity with organized feminist protest. Exploring these tensions helps us understand the boundaries of women's rights; how an organization like SWE could be both empowering and limiting; and how imagined possibilities rooted in feminist ideals could be bound by organizational and professional constraints.

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Why Women and Men Join the Society of Women Engineers

Jane Z Daniels, Henry Luce Foundation, United States

Nicole M DiFabio, George Washington University, United States

Sabina Bajrovic, Hunter College, United States

Why do women join the Society of Women Engineers (SWE)? Why do men join SWE? This paper will address these questions of membership throughout SWE's history (1950 to 2010), by membership type (student/professional) and related demographics of SWE membership. Of particular interest to participants in ICWES 15, this paper includes both an historical and current investigation of international members of the organization. Theoretical evidence supports information from the National Archives, to help us understand why women choose to join a "women's" engineering organization rather than, or in addition to, an organization focused on their engineering discipline. Details regarding the historical development of SWE's membership come from SWE's National Archives, where correspondence, founding organizational documents and other materials suggest the reasons that women formed the organization, why men supported the organization before male membership was accepted, and why women and men joined that organization over the last sixty years. Finally, a survey was distributed and the SWE website was studied to determine if the historic reasons women and men joined SWE are consistent with the reasons current members join the organization and remain members.

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Undergraduate Research Initiative at a Community College

Margaret E McCarthy, Springfield Technical Community College, United States

Beth C McGinnis-Cavanaugh, United States

Barbara S Wurtzel, United States

A USA NSF-funded initiative by the Council on Undergraduate Research in partnership with the National Council of Instructional Administrators has charged community colleges to consider instituting a foundation program to introduce students to undergraduate STEM research. A team of four women has begun formalization of this process. They include a reference librarian, a leader in academic professional development, and two professors, civil engineering and physics. Initial focus will be the formation of a faculty cohort, "Research in Community," to promote test-bed implementation and assessment as well as foster faculty buy-in across the campus. This format is modeled on the

existing highly-successful "Teaching in Community," a professional development program dedicated to appreciative faculty inquiry and support and sharing of best practices in teaching as well as support for the formation of learning communities. The program will be coordinated with the College's existing Honors Program, Writing Across the Curriculum, and current independent faculty/student research projects. The major goals of the initiative are to enhance the overall student experience, improve student performance and preparation, support student transfer opportunities, and foster outreach to academic, community, and industry partners. Specifically, the program aims to provide better access for women in STEM and all aspects of the undergraduate experience. This paper will discuss the successes and challenges of initiating the program, preliminary faculty feedback and input, institutional and administrative barriers to successful implementation, and strategies to overcome such barriers.

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A Spatially Gender-Disaggregated Database for Bursary Allocation to Attract Women Pursuing Science, Engineering and Technology (SET) in Kenya

Faith Njoki Karanja, The University of Nairobi, Kenya

Industrialization is largely dependent on human resources having appropriate skills paticularly in Science, Engineering and Technology (SET). In this regard, Kenya adopted a busary reform strategy in 2007 for 19 Technical Training Institutes with guidelines for its administration set where the ratios for beneficiaries are given as, for Poor Household 40%, Orphans 30%, Female 15%, and Special needs 15%. The objective of this study was to develop a Spatially Gender-Disaggegated Database that can be used for mainstreaming bursary allocation specifically for Women pursuing SET Programmes. GIS was used to develop this database which contained the location of Technical Training Institutions and the amount of Busary allocated. To establish compliance with Bursary Administration policy, Kitale Technical Training was selected and data captured on the students by gender, home district and courses (SET, Business and Others). The results obtained revealed a total student population of 406 comprising 270 Males and 136 Females are spatially distributed countrywide. A comparison of the courses taken by gender Male to Female ratios showed that for Science (7:3), Engineering (9:1), Technology (4:5), Business (5:5) and others (3:7). The total enrollment for Women in SET was found to be 50 (12%) which is very low. In addition, the bursary allocated to this particular institution benefited 9% of the total Female population. Using trace analysis it was established that 28 of the 50 Female students came from areas that are economically disadvantaged. Such information is useful in streamlining bursary administration leading to attraction of Women in SET programmes.

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Combating Global Warming and its Effects on Sustainable Agriculture: Climate Change - Responsive Agriculture Education Approach

Uduakobong Aniebiat Okon, APAGESTE - UNIUYO., Nigeria

This paper reports on a survey to propose a more intensive Climate-Change-Responsive Agriculture Education (CCRAE) for Nigerian universities and presents the proposed CCRAE curriculum contents, with a view to make relevant input for combating Global warming (GW) and its effects on sustainable agriculture. This Work is based on the philosophy of building a supper structure on well-built foundation. It is pertinent to equip Agriculturists with the strategies to control and fight GW and its effects on agricultural environments via the educational system. The study was conducted in Akwa Ibom State of Nigeria, employing comparative research design. The population of the study comprised experts in a.) Environmental Studies, b.) Agriculture and c.) Curriculum. A sample size of 150 was drawn using Stratified Random Sampling Technique based on the three research groups. The research instruments employed included Focused Grouped Discussions (FDG) and validated four-point rated. Questionnaire with the> bench mark at 2.00 points. Research questions were answered and hypotheses testes at 95% level of significance. Statistical tools included Descriptive and Analysis of Variance. In the results, there were no significant differences in the mean responses of the research groups on 1) the need to proposed CCRAE and 2) the Selected Curriculum Content proposed for CCRAE. Summaries of the FGD re-affirmed the need for CCRAE curriculum contents. Recommendations were based on the CCRAE curriculum contents to build more solid foundation to wrestle with GW.

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The MetaKettle Project: A Journey to the Heart of Higher Education

Cecilia Moloney, Memorial University of Newfoundland, Canada

Janna Rosales, Memorial University of Newfoundland, Canada

Among the ways that universities can advance the participation of women in science and engineering is by adopting integrative pedagogies which set the technical foundations of educational programs within their wider economic, social, cultural, ethical, and personal contexts. This conclusion undergirds the MetaKettle Project, a practical and innovative follow-up to the recent NSERC/Petro-Canada Chair for Women in Science and Engineering, Atlantic Region (2004-2009). The MetaKettle Project offers a pragmatic response to a rapidly changing world and an integrative perspective on higher education. Not only a hub for curricular development and pedagogical support but also an arena for transformative educational experiences, the MetaKettle Project brews big picture thinking about engineering and science education. This includes critically reflecting on the "what" and "how" of science and engineering, as well as the dynamic "who" and "why" of the person who aspires to be a scientist or engineer. The MetaKettle Project taps into the motivations and values which students bring to their study and work, including an emerging sense of themselves as citizens engaged in understanding and meeting the complex challenges of our times, both locally and globally. When situated within this larger context, our efforts to promote women in science and engineering expand to enabling change at the university, fostering increased engagement by our students and life-long sustainability for our graduates. Doing so requires re-engaging the "heart" of higher education, as well as its mind.

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Life after a Bachelors Degree in the Sciences: Responses of Female University Students in the Southeastern Region of Korea

Jung Sun Kim, BIS-WIST and Dongseo University, Busan, Korea, Korea

Hee Jung Chang, BIS-WIST, Korea

Hye Young Park, BIS-WIST, Korea

The underrepresentation of women in science and engineering still persists despite the increase in educational attainment of women in the southeastern region of Korea. This underrepresentation may be attributed to women's higher rates of attrition from the science "pipeline." BIS-WIST, a regional institute commissioned by the Ministry of Education, Science and Technology (MEST) of the Republic of Korea, asked 400 female junior and seniors majoring in science or engineering in 7 different universities in the southeastern region whether they were satisfied with their current majors and whether they would consider employment irrelevant to their majors. Among the randomly chosen respondents, only 12.8% were unhappy with their majors. Yet, 46.2% said that they would consider a career unrelated to science and/or engineering. Interestingly, about 46% were interested in the fine arts or illustration. However, only 7.9% said that they would be willing to participate in a fine arts education program which does not guarantee job matching afterwards. The career development program to prevent the "pipeline leak" for women in science and engineering in the Busan, Ulsan and Gyeongnam region will be introduced focusing on the science illustrator program.

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Challenges Facing Female Engineering Students in Africa - Our Experience

Nana Yaa D Oti-Boateng, Kwame Nkrumah University of Science and Technology, Ghana

Kokor D Agyente, Kwame Nkrumah University of Science and Technology, Ghana

Engineering and science are the backbone to the industrial development of nations all over the globe. Africa as a developing continent is in dire need of engineers and scientists to support its industrial development. Universities in Africa have steadily increased intakes into these programmes, but the percentage of female engineering students in Ghana is less than 20%. The aim of our study was to ascertain the reasons for the low participation of girls in engineering with the objective to create awareness of the challenges of the female engineering student (FES) and advocate for change. Fifty female engineering students of KNUST, Kumasi were interviewed to list their 3 worst and 3 best experiences and 50 non engineering male and female students on their perception of FES. Results indicated that for the worst experiences, fear of stigmatization was 100%, partial or total exclusion in some class activities 92% and cultural belief and stereotyping was 85%. In the case of best experiences 78% of them indicated being acknowledged for good performance, 74% said family pride, while 65% said some of their best experiences were during industrial attachment. 98% of others students perceive FES as brave and 'boyish' among others. In conclusion, these findings reiterated our fears and threw more light on the reasons why females are not drawn to pursue programmes in engineering. There is the need to break these barriers to attract more girls into engineering in Africa and efforts must be made to make engineering more interesting especially for females.

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Reducing Corrosion in WWT Inlet Tanks by Returning Mixed Liqour

Anna B Mollergren, Hunter Water Australia, Australia

Ken Newton, Hunter Water Australia, Australia

Craig White, Hunter Water Australia, Australia

Darren Bailey, Hunter Water Australia, Australia

Corrosion of concrete and metallic structures occurs in enclosed tanks at the inlets of many WWT plants, which results in substantial construction, maintenance and replacement costs. Many extraction systems are adequate for odour control but do not allow sufficient air changes to protect the inlet structures from hydrogen sulphide (H2S) attack.

Trials were undertaken to examine the impact on H2S liberation by blending mixed liquor (ML) from an activated sludge process with incoming septic sewage. This can promote conversion of dissolved H2S to sulphate as well as other mechanisms of reducing dissolved H2S concentrations in the sewage including turbulence and dilution.

A full-scale trial was conducted at a 10 ML/day WWT plant to determine the effects of combining 3.5 ML/day ML with incoming septic sewage. The gaseous H2S concentrations across three sections of the inlet works were monitored using online H2S gas analysers located under the inlet works covers.

Results indicated that combining mixed liquor with incoming septic sewage resulted in an average H2S gas reduction of >40% in turbulent areas of the inlet works. Although turbulence (promoting liberation of H2S) increased due to the additional flow, the dilution effect helped reduce the H2S concentration measured in all sections of the inlet works.

Further studies are to be undertaken to examine the conversion rate from H2S to sulphate and if higher ML flows will reduce H2S offgassing so that the inlet works can be partly uncovered to prevent corrosion.

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Reclamation of oilfield produced water using hydrophilic pervaporative membranes

May N Sule, Imperial College London, United Kingdom

Michael R Templeton, Imperial College London, United Kingdom

The suitability and application of a novel hydrophilic polymer pervaporation based irrigation technology for energy efficient, cost effective and environmentally friendly treatment and reuse of oilfield produced water is being investigated. Mass transport across the membrane occurs as a result of diffusive transport of water under the influence of humidity gradient. Selectivity of water versus dissolved contaminants is due to hydrogen-bonding interaction of water and molecular size differences. Varying concentrations of sodium chloride (salinity), magnesium chloride, and humic acid solutions have been selected as model contaminants. Methods used to evaluate the diffusion, solubility and partitioning coefficients of model contaminants are immersion/sorption tests to measure the rate at which the permeant/contaminant is absorbed by the polymer and permeation/diffusion tests to evaluate the rate of solvent transport across the membrane. Results show the average

water uptake by the membrane is 4.51 x 10-4 m3/m2/hr at room temperature. The diffusion coefficient D for water is 3.3 x 10-3m2/d at room temperature . The dominance of Fickian diffusion kinetics is confirmed by the initial linearity of amount of water absorbed with time in the sorption curve pattern plotted for water and contaminants which is representative of a solution-diffusion process. It was further observed that water uptake and diffusivity decreased with increased salts concentration due to ionic effects. These initial bench-scale tests have shown promising results for implementation of this system to provide reclaimed oilfield produced water for microirrigation at pilot-scale phase; future work will examine the removal of oil components (e.g. benzene, toluene).

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Bringing Systematic Innovation into Project Delivery - The Perspective of a Wastewater Network Project Office

Sarah Sinclair, Sinclair Knight Merz, New Zealand

Louise Webster, Ideas Accelerator Ltd, New Zealand

Systems thinking and systems innovation are popular tools to bring innovative , sustainable ideas into infrastructure development. However, the focus of these tools tends to be 'big picture thinking' such as a concept for a whole town, or a whole infrastructure system, where innovation will have 'maximum' impact on solutions.

Concepts are given to civil engineers and environmental scientists to turn into physical infrastructure. So, how do we ensure that systems thinking, consideration of broader effects and benefits, carries through into the construction of the infrastructure, when the focus tends to shift to programmes and budgets?

This paper covers the authors' experience on the development of innovation tools focussed on infrastructure problem-solving, starting with feasibility studies, then developing into detailed design and construction. It discusses the use of a Project Management system to embed the innovation tools by systemising them to become business-as-usual, in the context of an existing innovative culture.

Measuring innovation from an infrastructure perspective is also challenging, partly because the benefit from the innovation may not be realised for several years, and partly because people don't distinguish innovative ideas from 'we do that anyway'. The paper discusses experiences of trialling the tools developed, and the integration into PM systems, both for the project office and for the client group.

The paper concludes with how innovation was recorded and measured on the project, as an outcome of using the innovation tools.

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Sustainable Water, Sanitation and Hygiene (WASH) in Developing Countries: Learning from WaterAid's Approach

May N Sule, Imperial College London, United Kingdom

Safe water and sanitation are basic human rights and everyone in the world should have access to them. At the moment, around 884 million (1/8) do not have access to safe water; 2.5 billion people are without adequate sanitation (2/5); 4,000 children die every day due to water-related diseases and at any one time, half of the developing world's hospital beds are occupied by patients suffering from water-related diseases leading to 443 million school days lost each year. The economically poor and marginalised who often miss out are women and girls. They spend 40 billion working hours fetching and carrying water each year. Safe water, improved hygiene and sanitation underpin health, education and livelihoods, forming the first, essential step in overcoming poverty. A technology that is appropriate and sustainable is the solution. Some of the technologies used for water are hand-dug wells and tube wells that use rope pumps; boreholes with handpumps; rainwater harvesting; and tapstands in urban slums. The technologies for sanitation include dry pit latrines; ventilated improved pit (VIP) latrines; composting latrines; and communal latrine blocks in urban slums. WaterAid is an international nongovernmental organisation working in 26 countries and focused exclusively on improving poor people's access to WASH by working with partners and involving communities in all stages of the projects- from planning and construction, through to maintenance and management which encourages a sense of community ownership and responsibility. This has provided skills and support to manage practical and sustainable projects and has promoted behavioural change.

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Hungry for Power - Challenges for the Municipal Wastewater Treatment Industry

Amanda Lake, Jacobs Engineering, United Kingdom

At a time when the global community seeks to combat climate change through lower energy technologies and reduced natural resources consumption, improvements demanded in the quality of wastewater discharged to the environment necessitate ever increasing energy inputs.

Are these advances required in wastewater treatment coming at too high a cost in power and chemicals consumption? This paper provides an overview of wastewater treatment technologies, their development in response to water quality objectives and relative energy impacts with a focus on European practice in biological and chemical phosphorus removal.

The resulting nexus and potential conflict between improving water quality and combating global climate change is discussed. Key opportunities exist for participation by the wastewater industry in achieving water quality objectives within the European Union and for setting a socially and environmentally responsible example for others to follow. This will require improved participation and communication by an industry otherwise focused on science and engineering end of pipe solutions

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Learning from Mistakes

Kelly A Stokes, Townsville Water, Townsville City Council, Australia

In June 2009, Townsville Water called tenders for the construction of a small water booster pump station at Mount Elliot (Townsville). The local community responded to the tender advertisement, protesting against the location of the pump station and the perceived need for it in the area. Townsville City Council carries out community consultation for large projects, but did not conduct consultation for this small construction project. As a result, there were assumptions made by the community that were untrue and in the absence of information from Townsville Water, these accusations perpetuated until a public meeting was held. Rapport was achieved with the community after some time, but it came after Townsville Water worked to actively resolve issues and to regain the

community's trust. This paper will share the lessons that have been taken from this experience, so that other engineers and organisations can avoid the situation described.

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Moving Towards a Future with Appropriate Technology

Jackie M Carpenter, SWESE (Trelay), United Kingdom

Jackie will facilitate a workshop in which the participants will look at contemporary issues and possible solutions. Jackie's knowledge of community living and sustainable technologies such as renewable energy will inform the workshop. Sets of ideas such as "head, hands and heart", and "body, mind and spirit" will be considered in the discussion of technology and how it can be judged to be appropriate.

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Sustainable Building Design: Challenge and Opportunity

Kate E Dougherty, SKM, Australia

The change in our Earth's climate caused by man-made greenhouse gas emissions is one of the most urgent and complex predicaments that we face in the world today. Nearly 50% of those greenhouse gas emissions are generated by the buildings in which we live and work. The construction and operation of buildings have wide-ranging direct and indirect impacts on our environment. As Engineers, we have a challenge and an opportunity before us to change the traditional way in which we think about building design. It is critical that as we move forward, our buildings become more energy efficient and sustainable. In order to do this we must take a holistic, integrated, sustainable approach to building design.

A building should be thought of a living, breathing organism which can integrate with and utilise the natural renewable resources around it, such as the path of the sun and pressure differences caused by the wind. By employing the design hierarchy of first looking at passive principles, then energy efficiency measures and finally renewable and alternative technologies, we can create buildings for the future that respond to the environment in which they exist, instead of exploiting it. A considered approach to energy efficient design is presented and the principles and benefits of sustainable building design are explored through the use of case studies.

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Connecting the Dots: The Value of Systems Thinking in Sustainable Outcomes

Susanne Cooper, Sinclair Knight Merz, Australia

Objective

Achieving sustainable outcomes on projects increasingly requires a holistic, integrated view of its context risks and challenges. Applying systems thinking is an effective approach that encourages the full context and wider environment to be understood, and recognises the inter-dependencies between the elements of the project. Such an approach fosters sustainable outcomes though more integrated solutions with multiple benefits. This particularly applies to complex, multi-faceted engineering projects.

This paper will present a series of practical tools for applying a systems approach coupled with case studies of how they have been applied to a range of projects, including mining, highway design, power stations and water pipelines.

Results

The impacts from applying the tools and structured process include re-thinking the project boundary, recognising inter-dependencies and relationships between issues that at first did not appear to be closely connected, and understanding the multiple dimensions (social, environmental, economic, legal, technological) of key issues that can influence our approach to resolving them. Many of the examples demonstrate the link to innovative thinking that was only identified by taking a broad view, challenging existing assumptions, and looking for more holistic solutions that deliver multiple benefits.

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Capacity Building in Science Technology and Innovation (STI) Policy for Sustainable Development in West Africa - The Role of Women Engineers and Scientists

Peggy E Oti-Boateng, Technology Consultancy Centre, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

Rudith S King, Department of Human Settlement Studies, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

George K Essegbey, Science and Technology Policy Research Institute, Council for Scientific and Industrial Research, Accra, Ghana

The link between Science, Technology and Innovation (STI) for development is amply illustrated in the socio-economic advancement of new and emerging economies. Building the future through STI and higher education training for women presents a major challenge for many African countries. These include: i) understanding and managing the intricacies of science, engineering and technology for increased competitiveness; ii) limited capacity in STI policy development; iii) gender education and social demands that require reorientation and; iv) engaging all stakeholders. The aim of a UNESCO-funded workshop was to assist ECOWAS countries to harness STI for sustainable development, and develop a monitoring and evaluation system to assess its impact. The objective was to create the requisite capacity in STI policy formulation, implementations and monitoring and enhance its application for sustainable development. A three day workshop was organised for scientists, engineers, academics, social scientists, policymakers, private sector and development partners from ten ECOWAS countries to assess the policy environment for application and development of STI; provide a framework for STI policy training; capacity building in STI policy development, monitoring and review with emphasis on women and; develop in-country action plans/road maps. The result was the development of a critical mass of scientists, engineers and decision makers in STI policy to assist/inform national STI policy development and drive the STI agenda to support productive activities for sustainable socio-economic development and increase global competitiveness of ECOWAS countries. In conclusion, strategies for regional cooperation and STI policy framework have been developed for ECOWAS and worth adapting elsewhere.

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ADVANCE: Recruitment and Retention of Women in STEM - Accomplishments of The University of Illinois at Chicago's (UIC) Women in Science and Engineering System Transformation (WISEST)

Manorama M Khare, University of Illinois at Chicago, United States

Moyin S Tam, University of Ilinois at Chicago, United States

Linda Siebert, University of Illinois at Chicago, United States

The goal of WISEST is to increase the number, participation, and leadership status of women - majority and minority - in academic science and engineering through institutional transformation at the UIC. This poster presents the successes in the area of recruitment and retention of women faculty in STEM at UIC. In addition evaluation results for specific initiatives are presented.

Recruitment Successes: From 2006-2009, 12 STEM tenure track (TT) women faculty (3/12 are URM) were hired, through startup support, search training and collaboration with Heads and Deans. We piloted a unique 2 year postdoctoral program that recruited 5 URM STEM women to mentor and prepare them for academic careers. Four of the 5 postdocs are still in academic positions - 2 are TT faculty, 1 is a research faculty, the fourth refused a faculty position for another postdoc.

Retention Successes: From 2006-2009, UIC STEM has retained all women faculty (except for retirement) due to WISEST climate transformation efforts, which include new work-life friendly policies - automatic tenure rollback, modified duties policies and a pilot infant/elder care program; women networking luncheons - to reduce isolation and provide faculty opportunity to meet peers and interact socially; and WISER funds that support faculty after a life altering event.

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ADVANCE: Elder Care Impact on Higher Education

Gretalyn M Leibnitz, Washington State Universtiy, United States

National data indicate that elder care will have as much impact, if not more, on the United States workforce in the coming decades as childcare had in the mid to late 1900's. Given that anticipated context, relatively little research has explored the impact of elder care for employees of institutions of higher education, particularly faculty. We present information on a pilot study of the impact of elder care for over 300 employees (faculty and staff) of Washington State University. Consistent with national data in other employment venues, our study found significant gender disparity in the impact of caring for elders. More than 60% anticipated dealing with elder care within the next five years (40% currently dealing with the issue.) More than a quarter of employees were providing care for children as well as elders. Further, a culture of "silence" concerning elder care may be particularly evident in science, technology, engineering and mathematics (STEM) disciplines and thus exacerbate care-giver stress, particularly for women faculty. WSU ADVANCE has used research to support institutional revision of faculty friendly policies to include modified duties, and recommendation for revision of the part-time faculty policy to address dependent care concerns. Further WSU ADVANCE is exploring best-practices for provision of dependent (child and elder) care back-up support (support during non-traditional formal care-giving service times.) Results of the study, examples of supportive faculty-friendly institutional policies and procedures, as well presentation of promising emerging practices will be discussed.

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ADVANCE: The Outcomes of 19 Institutional Transformation Efforts to ADVANCE Gender Equity

Diana Bilimoria, Case Western Reserve University, United States

Xiangfen Liang, Case Western Reserve University, United States

We present the results of a study of the institutional transformation (IT) outcomes of the first two cohorts (19 universities) funded by NSF ADVANCE IT awards to improve gender equity, diversity and inclusion in academic science and engineering. We address the following questions in specific: What initiatives have been frequently used in ADVANCE IT projects and which have been institutionalized? Have ADVANCE IT efforts made a difference in the representation of women faculty at all ranks and in leadership? Do climate studies reveal that the inclusion of women faculty in academic S&E has improved through ADVANCE efforts? Has the representation of women faculty changed in specific disciplines at universities: engineering, natural sciences, and social and behavioral sciences? Findings from the study indicate that ADVANCE has engendered in these universities significant increases in women S&E faculty at all ranks, increases in women faculty in specific disciplines (engineering, natural sciences, and social & behavioral sciences), increases in women holding endowed professorships in S&E, increases in women in administrative leadership positions at department, school/college & university levels, and enhancements in gender-equity related climate. A general model of institutional transformation is derived from the findings, which highlights how universities can systematically transform their structures, processes, and work practices to enable gender equity, diversity and inclusion.

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ADVANCE: Retaining and Advancing Women Faculty

Canan Bilen-Green, North Dakota State University, United States

The Advance FORWARD project seeks to develop and implement a comprehensive research-driven strategy to increase participation of women in science and engineering faculty positions. Specifically, FORWARD strives to improve the climate across campus, enhance faculty recruitment efforts, increase faculty retention and advancement, and open leadership opportunities. The project consists of a multitude of programs. The junior faculty and midcareer mentoring programs focus on retention and advancement of women faculty. In the junior faculty cohort mentoring program, each cohort group includes three to four junior faculty and two senior faculty serving as mentors. Cohorts are same sex, as studies have shown that women strongly prefer other women as their mentors, and same gender relationships provide women with more support. One unique element of this mentoring program is that all incoming faculty are invited to participate in a single mentoring cohort through their third year review. Having access to a formal support network through this critical stage is important for junior faculty success and retention. The Mid-career Mentoring Program provides funds to encourage tenured women to create their own peer, mentoring teams which may be interdisciplinary and/or mixed gender; the teams meet informally once a month. In this paper we provide details about our junior faculty cohort and

midcareer mentoring programs. We share assessment measures we have used to evaluate the impact of these programs in retaining our women faculty. We will also discuss the benefits to the institution of retaining and advancing women faculty in science and engineering academic fields.

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ADVANCE: Building a Diverse STEM Faculty

Suzanne M Zurn-Birkhimer, Purdue University, United States

Christie Sahley, Purdue University, United States

To address the lack of diversity in the STEM faculty, ADVANCE-Purdue and the Center for Faculty Success have developed a two-pronged approach targetted to building a more diverse STEM faculty applicant pool and training search committee members on best hiring practices. To build underrepresented STEM faculty recruitment efforts and populate STEM departments with advocates for advancing women of color, the Presidential ADVANCE Advocate (PAA) program has been implemented. The PAA is an influencial, senior STEM female faculty member who is appointed to the position for one year. The PAA develops programs, activities and opportunities to engage STEM female doctoral students and encourage them to apply for faculty positions. To ensure that best practices are used during the search process, ADVANCE-Purdue offers a half-day, interactive workshop on search and screen procedures for faculty search committee members. The goal is to increase faculty search members' knowledge about current search and hire best practices and procedures leading to the employment of an excellent and diverse faculty. Evaluation data indicated that participants found the information about non-biased evaluation of applicants to be especially useful. Working both internally with the faculty search chairs and externally with potential candidates will lead to an increase in the diversity of our STEM faculty. Implementation strategies, evaluation outcomes and participant demographics for both programs will be presented.

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Women Engineering Deans in the United States: A New Model for Academic Leadership

Peggy Layne, Virginia Tech, United States

Women in the United States have made significant gains in doctoral degrees and academic careers over the past 25 years, but remain significantly underrepresented in engineering (Burrelli 2008). In 2009, women earned 21.3% of engineering PhDs, and comprised 12.7% of engineering faculty and 7.7% of full professors (Gibbons 2010). Almost 400 institutions in the U. S. have accredited engineering programs, and 38 were led by a female dean of engineering or equivalent in the spring of 2010. Thirty-one other women have served as dean at some point in the past 20 years. (ASEE, personal communication) Deans play an important role in defining the work environment and establishing the climate for faculty and students. A deanship is also a common stepping-stone to higher academic leadership roles, such as provost and president. (Wolverton, Gmelch, Montez and Nies 2001) It is thus important to understand the factors that influence female faculty members' aspirations for and ability to succeed in the role of dean.

Eleanor Baum became the first female dean of engineering in the United States in 1984. She retired in 2010, but women engineering leaders in academe remain scarce. What can we learn from the women who have successfully navigated the path to leadership in engineering education? How did they get where they are today? And what impact are they having on engineering and engineering education? Interviews with women deans over the past ten years illustrate the diversity of their career paths and similarities in their approach to leadership.

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Family-friendly Policies and Women Engineers Careers

Kim Ball, Griffith University, Australia

The recent review of the Equal Opportunity for Women in the Workplace Act 1999 reports that achieving equal opportunity requires removal of barriers to women's participation in the workforce and includes better management of work and family commitments by workers. Work-life balance is a particular concern for women engineers where professional norms and culture dictate working long hours. HRM policies and practices for balancing work and family life can create barriers for women engineers to achieve successful and satisfying careers, attaining higher management positions and retention in engineering organisations. The role that organisational policies and practices have on women engineers' careers requires investigation.

This qualitative study examines the effect that HR policies and practices for work/life balance have on the work experiences of the women engineers in three engineering consultancies. A critical social science approach, using document analysis of publicly available organisational documents is supplemented by interviews with the organisations' HR managers and women engineers.

The engineering consultancies address family-friendly policies to differing degrees through their company websites and other publicly available documents. EOWA documents are difficult to locate and access and are also at different stages of development in each organisation. Differences between the organisations are particularly evident when comparing the policies and practices of the engineering consultancy awarded an Employer of Choice for Women Award with the other two organisations' policies and practices. Dissemination of relevant policies differed across the organisations.

Improved career outcomes for women engineers require organisations to place greater consideration on family-friendly and practices.

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Women Leading Diversity at SKM

Alison McKechnie, Sinclair Knight Merz, Australia

Rowenna M Walker, Sinclair Knight Merz, Australia

Sally A Knox, Sinclair Knight Merz, Australia

Juliet M Woodward, Sinclair Knight Merz, New Zealand

Sinclair Knight Merz (SKM) has made a serious commitment to encourage diversity and equality in the business through the establishment of a funded employee led initiative that identifies, recommends and reviews opportunities for diversity and equality within the

business. In 2006, senior women in SKM's Melbourne office recognised the need for greater representative of females within management and leadership roles in the organisation, strategic recruitment and retention of female staff, and better mentoring and networking opportunities for current employees. Consequently, Women in Consulting (WiC) was established as an internal group whose mission is to engage women at all levels within SKM and provide opportunities for staff development and career progression. Fundamentally, WiC represents SKM's acknowledgement that diversity and equality is not just about providing a better workplace for all staff but is a financial imperative for the future of the business.

Some four years later WiC has established committees throughout Australia, New Zealand and the UK. WiC's achievements to date include being instrumental in influencing and developing internal SKM policy such as increasing parental leave and supporting flexible working arrangements including training. WiC has become a powerful voice in SKM with a seat on the Global Diversity Committee, pushing for EOWA Employer of Choice for Women status and provides extensive client and internal networking opportunities for women in SKM. In addition, a number of SKM's clients within the industry have approached WiC to help establish similar initiatives in their own organisations.

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How to Get the Best for Less - Engineering your Recruitment

Allyson M (Woodford) Black, Production Superintendent Lytton Refinery, Caltex Australia, Australia

David J Miller, Production Superintendent Lytton Refinery, Caltex Australia, Australia

The strategy presented in this paper was designed by engineers to recruit engineers. In times of low unemployment and record capital expenditure in the process industries, it is often difficult to attract and retain staff, especially graduates. What if your budget won't extend to a flashy advertisement in the national press? Do you simply stick up a cheap internet ad and hope for the best? What if you don't have a HR group to deal with the recruitment? How do you attract young women into a process industry that is traditionally male-dominated? The financial commitment to run an expensive recruitment drive and graduate development program is often not possible for small to medium enterprises nor is it necessary. Successful recruitment strategies that promote equality and diversity are built from solid foundations of reputation and brand. There are many ways to achieve a positive brand association with your graduate recruitment that can be developed and managed by engineers - guest lecturing, attending student functions on behalf of the company and a structured internship/ vacation program. The use of a boundary agent within an organisation to link in with local universities strengthens relationships and builds reputation. At the refinery this new approach has resulted in increased applications, 50/50 male/ female hire and increased retention. It is simple, sustainable and can be applied to most industries very successfully.

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Finding, Recruiting, and Retaining Women Engineers for National Security R&D Positions

Janet L Williams, Sandia National Laboratories, United States

Michael Kline, United States

Sandia National Laboratories is America's premier science and engineering lab for national security and technology innovation. We are a world-class team of scientists, engineers, technologists, post docs, and visiting researchers all focused on cutting-edge technology, ranging from homeland defense, global security, biotechnology, and environmental preservation to energy and combustion research, computer security, and nuclear defense.

As the "Silver Tsunami" hits the workplace, and the Baby Boomer generation looks to retire, the task of finding highly talented US citizens with advanced degrees in electrical, mechanical, and computer engineering for our national security missions becomes increasingly challenging. Statistics from American Society of Engineering Educators from 2009 (Gibbons, 2010) confirm that the annual pool of non-foreign graduates earning MS degrees in these fields number about 5800 annually. Of that total, only about 1 in 4 is female. Sandia's stringent hiring standards further narrow the talent pool and make finding female candidates for our national security positions a real challenge.

This paper describes a number of world-glass benchmark programs developed and deployed at Sandia to attract and retain the best and brightest female and minority candidates into the talent pool. The most successful programs have been our Masters Fellowship Program (MFP) and Critical Skills Masters Programs (CSMP).

High-performing BS candidates with high academic achievement are hired before they graduate and are sent to one of the country's top graduate schools, all expenses paid, plus stipends for living expenses. These programs have tackled the problem of a limited MS pool by and removing financial considerations from BS graduates' decisions regarding pursuit of a graduate degree. It also allows Sandia to "grow its own" graduate engineers from the relatively more populous BS population of females and minorities. Upon graduation these candidate's receive a substantial bump in pay to our MS start rate. A large proportion of participants in these programs remain a significant time period at Sandia, often for their entire careers, and many assume leadership positions as their careers progress.

Another successful technique used to attract outstanding candidates is Sandia Science & Engineering Expo (SEE) a program that identifies top recruits and invites them en masse to our location for a day of multiple interviews in a variety of mission areas across the company - a sort of "speed dating" format. This technique makes the matching function more efficient and speeds the timeline for hiring. Sandia seeks out top MS and PhD engineering and science students desiring full time employment after graduation. In an era of increasing competition for highly qualified scientists and engineers, Sandia must take advantage of every opportunity to showcase its capabilities to tomorrow's technology leaders. SEE gives top masters degree and doctoral candidates from across the nation an opportunity to visit and see the most exciting in basic and applied research and development facilities that Sandia has to offer. The strategic recruiting event provides an opportunity for managers and staff to meet and interview very highly recruited new graduates and, we hope, bring them to Sandia. This is one important way we can keep this laboratory competitive into the next decade and beyond.

This paper will discuss the structure, parameters, and implementation of these programs, along with retention and benefits of these successful programs.

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Are We There Yet? How Wollongong City Council is Progressing Towards Being an Employee of Choice

Melissa Gaspari, Wollongong City Council, Australia

Rosemary Crowhurst, Wollongong City Council, Australia

Lisa-Marie Walsh, Wollongong City Council, Australia

At the close of the Year of the Women in Local Government, the question is being asked; Are We There Yet? Whilst the statistics still scream 'no', depending on the individual and their perspective, responses to that question are diverse. Some areas are moving forward, but is there enough stamina to reach the destination while maintaining business as usual?

At Wollongong City Council (WCC) business is not easy, but when is it in Government? In recent history, WCC has endured workforce shortages; corruption scandals; an introduction of Administrators; numerous restructures; and budget cuts. But guess what? WCC is heading towards equality, even if only with a ripple. Our paper demonstrates how council officers are leading from within the organisation to make long term changes to the shape of the industry, not just the organisation.

The number of women within the organisation in upper management positions is above the average, many employees work flexible hours, are on parental leave and WCC has recently signed on to the 50:50 Vision Bronze Award. Nevertheless to get there, it is going to need more than just theory and policy. This paper will explore how the individuals within WCC are managing the myth of work/life balance and their personal solutions to it. This paper will also showcase how these council officers are contributing to creating an environment in which both men and women are able to be professionals, work to their fullest potential and maintain a healthy personal life.

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Equal Gender Representation in an Engineering Team - Getting There and Staying There

Sarah Hughes, Parsons Brinckerhoff, Adelaide, Australia

Elizabeth Hobart, Parsons Brinckerhoff, Adelaide, Australia

Rebecca Tennant, Parsons Brinckerhoff, Adelaide, Australia

Phylia Yu, Parsons Brinckerhoff, Adelaide, Australia

Augusta Lane, Parsons Brinckerhoff, Adelaide, Australia

Michelle Clanahan, Parsons Brinckerhoff, Adelaide, Australia

In the engineering consulting world it is uncommon to see women dominate engineering teams. So how has the Parsons Brinckerhoff (PB) Adelaide Water Team achieved equal gender representation in just four years? In 2006 there were no female engineers in the team, now 50% of the team are women.

This paper explores the reasons for the successful integration and retention of women in this team thus far. It focuses on the personal reflections of the six female engineers working in the team, discussing what attracted them to PB and engineering, why they have stayed, whether they will remain, barriers and issues they have encountered and continue to face, and what they want and see for the future.

The context for development of this team is presented, including the reasons given by management for the rapid recruitment of women to the team - was this strategy or just "natural selection"? The "unwritten" policies and behaviours that have attracted and retained women are discussed, including the overall approach of the organisation and team, support from management and camaraderie built within the team.

The paper also raises questions based on our experiences and current thinking. What do we as women want? Will today's influx of young female engineers be reflected in the next generation of industry leaders, or is engineering just a pre-family career? Are we own worst enemies, placing limitations on ourselves? Answers to these questions may contribute to the ongoing retention of women in this team, and the wider engineering industry.

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Training Material for WiE Attraction, Retention and Higher Management Development

Suzelle Barrington, McGill University/ Universite Europeenne de Bretagne; Eng. Can WFEO WiE representative, Canada

Marie Helene Therre, Chair, WFEO WiE standing committee, France

Women still make up a low percentage of the engineering workforce when in other professional sectors, they have reached almost 50% representation. There are three main issues associated with increasing the number of women engineers within private and public organizations and project groups: attraction, retention and promotion to high management levels. Policies for work force diversity aimed at increasing the number of women engineer is beneficial and is well known to improve: innovative capacity, organization competitivity, performance and profitability and employee loyalty and productivity. To acheive a higher degree of workforce diversity, this workshop is designed to produce material which can help organizations train their managers and employees. The workshop will consist of 4 speakers each representing a company which has developed a workforce diversity program; each speaker will present the components of their organiation's program and the level of success acheived as well as the cost versus benefits. Following these 4 presentations, the guest speakers will interact with the audience in the form of a workshop to arrive at the required program components and training material for workforce diversity in engineering. The Chair of this workshop will use the results of the event to develop material to help organizations and project managers acheive a higher level of workforce diversty in terms of women engineers. This workshop will be a contribution from the Women in Engineering Standing Committee (WiE) of the World Federation of Engineering Organization (WFEO).

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INWES Projects - Achievements and Plans

Pamela R Wain, International Network of Women Engineers and Scientists, United Kingdom

Roseni Dearden, Thomson Reuters Accounts, UK, United Kingdom

Objectives: This paper is about the projects that the International Network of Women Engineers and Scientists (INWES) has carried out, and about what it hopes to do. The format of the presentation is expected to be interactive, as the intention is to encourage more activity among the member organisations.

Methods: INWES is basically a network of networks, and works through its member networks where possible. Projects take various forms, from those carried out by a single organisation in a single country with the help of INWES expertise and funding, to ones where INWES contributes real-world experience of women members to a big international project organised by others. INWES spreads good practice about projects successfully carried out elsewhere in the world.

Three projects will be discussed in more detail, the essay competition first run in Nigeria and now being replicated in other countries, leadership trainings using INWES expert members to train different groups, and one of the international research projects that INWES is participating in.

Results: The essay competition was a strong success which is currently being replicated. The leadership trainings are in wider demand than expected, and are being adapted for different audiences. The research project is ongoing.

Conclusions: INWES is working to strengthen its member organisations by sharing good practice on useful projects, and by sharing information about good governance through leadership trainings. It is also contributing to international research which will improve discussions about appropriate measures to be taken to support women engineers and scientists.

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Establishing a Broader Commercial Vision

Carla Cher, Watermark Intellectual Asset Management, Australia

Successful transition from technical to leadership positions requires significant changes in focus. Engineers/scientists are problem seekers, often requiring focussed approaches to solving problems. Successful leaders, however, require wide vision, constantly looking to exploit new ideas, processes and markets.

One aspect of this wider vision is to understand the opportunities available in the organisations we are called to lead. Our engineering and science enterprises contain deep wells of 'intellectual capital', represented by the knowledge, skills, ideas and innovation contained within the organisation. This intellectual capital is constantly working within successful enterprises, generating improvements to products/processes which in turn provide a competitive advantage.

This advantage is often limited without understanding the capability of the intellectual capital to be realised into an 'intellectual asset' - something which the organisation can leverage into broader commercial success.

A common example in engineering and scientific environments is not appreciating solutions to technical problems may have wider commercial value than immediately apparent. Asking simple questions like 'would this be useful in other industries?' can immediately broaden horizons.

All engineers and scientists should look for wider opportunities for commercial success from technical innovations. We should be encouraged to think about long term threats and opportunities which innovation present. A strategy to capitalise on this highlights that engineering and science leaders must better equip themselves for success in a global environment.

Basic tools which can be used to identify, capture, manage and profit from intellectual assets in engineering and scientific environments will be discussed, and showcased through a relevant case study of an organisation/industry which leveraged engineering and scientific innovation into intellectual commercial success.

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Reflections on a Year of Engineering Leadership

Doug Hargreaves, Engineers Australia, Australia

Peter Evans, Australia

Doug Hargreaves has completed a year as President of Engineers Australia, a 90,000 strong membership based organisation representing the engineering profession. In preparing for the year Doug decided that the core of his own leadership is his values and that the legacy he wanted to be remembered for at the end of his year, was how his values underpinned everything he did.

The framework for this values approach was a book he co-authored entitled 'Values Driven Leadership'. The essence of Doug's philosophy is that a leader who bases their leadership on a strong sense of values will create an environment where people have a strong sense of Belonging, Identity, and Purpose.

This paper reflects on Doug's year of leadership of Engineers Australia and offers insights and examples of where his values driven leadership approach played out and contributed to various scenarios he encountered over the year. The paper will share Doug's approach to leadership and offer an understanding of how an effective leader actually does what he does. Too often leadership is seen as a nebulous capacity that people either have or do not have. In this paper, we will identify the specific skills and abilities within a values framework that will allow any leader to be more effective in their role.

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Women in Engineering and Entrepreneurship

Smita Francis, Polytechnic of Namibia ,WIndhoek ,Namibia, Namibia

Deon Kallis, Cape Peninsula Unviersity of Technology, South Africa

Wilfred Fritz, Cape Peninsula University of Technology, South Africa

Women make up over 50 % of the population in the Southern African countries of Namibia and South Africa. However, in spite of their numerical strength, their contribution to the overall social and economic development has not reached its full potential (Namibian National planning Committee report 2002). African society is predominantly male dominated and post independence

has seen the governments of the two countries proactively involved in initiatives to enhance the status of women. Both countries have ministries dedicated to gender and development issues of women.

Post independence has also seen a larger proportion of women enrolling within the higher educational sector, and within programmes that were usually male-dominated, such as engineering. Encouraging Women to take up engineering as a career is been a daunting task. However, due to the cooperative efforts of stake holders in both countries, the enrolment of women in engineering is increasing. The challenge is to retain these women within the engineering fields of study and to encourage a spirit of entrepreneurship so that their talents can be best utilized in the overall development of their respective economies.

A consistent and dedicated effort encouraging women in the field of engineering studies and entrepreneurship is essential. The empowering and development of women will give rise to new dimension to the African women; empowering women contributes towards the overall development, advancement and enrichment of society.

This paper investigates the initiatives of two higher education institutions in their attempts at increasing the participation of women in engineering and entrepreneurship.

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The Study of two Phase Flow Wall Erosion using a Generalized Computational Fluid Dynamics Prediction Model

Dorina Ionescu, University of Johannesburg, South Africa

Solid particle erosion in a two phase flow is a complex mechanical process, by which material is removed from a solid surface due to the impact of solid particles on the metal surface. Experiments showed that the particle velocity has the greatest contribution toward wall erosion. The aim of the present research was to induce a vortex flow to control the flow velocity keeping it above saltation values. To this end, a vortex flow was created by subtracting a spiral volume, from the inner volume of a horizontal pipe, just before an upward/downward bend, generating a changed volume The modelling was done through Discrete Phase Model, sub-modelling capability Erosion/ Accretion. The comparison between the control volume and the changed volume showed significant erosion reduction. The changed volume erosion represents only 79 % of the control volume erosion. The wall erosion in mm-wall thickness loss per hour is 0,032 mm/hour for the control volume against 0,02 mm/hour for the changed volume. Furthermore the maximum impact points in the changed volume are scattered in a spiral pattern in the bend avoiding the total wall perforation for a longer time. Considering the wall thickness of the pipe used, the life expectancy of the installation where the changed volume was used is approximately 1, 6 times more than that of a installation without the changed volume. Most importantly beside the difference in erosion between the upward bend and the downward bend, the bend radius has a significant influence over the erosion magnitude and location.

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Quad-tree Grid Generation using the Concept of Linked Lists

Ansook Sul, Korea Anvanced Institute of Science and Technology, Korea

Jang Hyuk Kwon, Korea Anvanced Institute of Science and Technology, Korea

The grid system of CFD(Computational Fluid Dynamics) is divided into two parts: the body-fitted grid system and the non body-fitted grid system. The former has strong points, as it imposes boundary condition simply and directly but it has some difficulties in generating grids around a complex body and high dependence of user's grid generating skill. The later has merits that it generate grid efficiently around a complex body and has non user dependency.

This paper combines the cartesian grids that is one of non body fitted grids. The cartesian grids apply quad tree data structure and store information of cells' heredity. It is efficient to make adaptive cartesian grid and find its mother or child cells' information. It is expected to apply solution adaptation simply for analyzing the flow.

This paper apply the concept of linked lists using by FORTRAN for grid generation. The linked lists is easy to treat cells' data when the creation and destruction of cells are repeated and it is efficient to access to cells' information. The grid system generated by this process is used for solving the governing equation like a Navier-Stokes equation with Immersed Boundary Method or Cut-cell Method.

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Cultural Communication for Plant Conservation: The Case of the Isukha Living Around Kakamega Forest

Genevieve A Mwayuli, The Catholic University of Eastern Africa, Kenya

The Isukha are a proud people with rich customs and traditions living on the fringes of one of the remnants of the equatorial Guineo rainforest in East Africa. Kakamega forest has provided numerous and invaluable resources to them for hundreds of years. Fuel wood, grass for thatching, medicinal plants and trees, and land for grazing are some of the services that the forest has provided. The forest has rare species of plants, birds, snakes, insects and primates. However like in many areas in Africa, flora are under siege from over harvesting, urbanization, and infrastructure building, poor management, weak policy enforcement, habitat loss and increasing commercial pressure. There can be no hope of finding viable solutions to environmental problems unless and until education and communication at all levels is suitably modified to enable people from all backgrounds to comprehend the fundamental interrelationships between humans and their environment. While the modern methods of communication were not in the Isukha way of life, communication nonetheless took place. Based on literature survey, observation, in-depth interviews of scientists and Isukha community members, and lessons from local folklore as well as early childhood experiences of the author growing up in the village this paper reflects on the traditional plant conservation communication approaches and practices that were used by the Isukha with a view towards recapturing some of the approaches that might be possible today and derive lessons for policy and practice in community based plant conservation.

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Responding to Climate Change: Use of Public Participation GIS to Understand Preferences of Adelaide Park Visitors

Delene L Weber, University of South Australia, Australia

Greg Brown, University of Queensland, Australia

Climate change provides a wonderful example of the need for transdisciplinary research. However, the difficulties of bringing various partners together to contribute to climate research in a strategic manner has thwarted many well-intended researchers. Whilst the use of geographical information system (GIS) technology in mapping biodiversity, hydrology and even fire risk has been prolific, little attention has been provided to how this technology can also facilitate the collection of social data and provide a platform that allows for coherent integration of results among disciplines. A study in a selection of parks in the Adelaide metropolitan area revealed strong support for strategies such as improving public transport, increasing use of water sensitive grass, addition of urban forests, and the establishment of community gardens. Low levels of support were associated with strategies such as allowing natural water features to dry up, increasing the amount of paved areas and seasonal closure of some parks. Through using an internet based PPGIS system with a Google(TM) map interface, study participants are able to map the areas of the parks they use, how they use them and indicate whether or not they would still use them this way, if the temperature increased. They can then map those areas they feel would be most appropriate for a variety of climate mitigation strategies. The project is the first step in a larger project that will provide valuable insights into ways to optimise use of Adelaide's parks from a variety of perspectives, including climate change, economic, biodiversity and health.

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Join the Queue: The Difficulty of Engaging Rural Communities in Park Based Volunteerism

Barbara Koth, University of South Australia, Australia

Delene Weber, Univeristy of South Australia, Australia

Denni Russell, University of South Australia, Australia

Rural communities are often touted as being the "backbone of Australia"; pragmatic people who put sustainability concepts into practice. It seems logical that rural residents could serve as excellent volunteers for parks, especially if a rural town was the gateway to a large protected area. However, this study of the Lameroo/Pinnaroo region and adjacent Ngarkat Conservation Park highlights a number of barriers to park based volunteerism. Key among those barriers is the existing large commitments of many residents. It was found the majority of residents volunteered for between 3 - 7 organisations or committees. The use by residents of the nearby protected area was found to be low and their concerns centred more around fire and weed management. The perception that management was improving in the area, along with the fact that people had their "own area to manage" also hindered willingness to volunteer. The disappointing result however, was the lack of belief among rural residents that they as individuals could make a difference to our environment. Many respondents cited the 2010 federal election as an example of rural areas having limited political power compared to "urban greens" who the believed could make changes to the environment. It was suggested that if a park agency wants to improve community engagement, rather than a traditional model of inviting volunteers to come and help, it may need a more dynamic model of partnering with existing organisations, building social capital amongst youth, and offering innovative programs that encourage greater participation in the park.

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Preparation of Mesoporous Titania Photocatalyst for Water Treatment Application

Xingdong Wang, CSIRO, Australia

Patrick Hartley, CMSE, CSIRO, Normanby Road, Clayton Vic. 3168, Australia, Australia

Rachel A Caruso, CMSE, CSIRO, Normanby Road, Clayton Vic. 3168, Australia, Australia

Objective: To address the issues of environmental pollutions, titania-based photocatalyst materials are widely researched. However, Titania suffers from a relatively low photocatalytic activity caused by (i) a wide band gap which requires high energy UV radiation to induce the reaction; and (ii) the recombination of photon induced electron and hole pairs. Hence the ability to either decrease the band-gap of titania to allow photoactivity on irradiation with visible light or decrease the electron/hole recombination rate is attracting more attention.

Methods: A solvothermal treatment was applied to prepare the mesoporous titania materials. It involves using sodium hydroxide to control the hydrolysis of titania and the resultant salt as a template to produce the porous structure, coupled with sol-gel technique to obtain the titania materials.

Results and conclusions: The properties of the resultant materials, including porosity, crystal phase and size, optical property and morphology were examined. The photocatalytic efficiency of the materials was assessed by studying the photodecomposition of methylene blue in the visible light. Both the material properties and photocatalytic activity varied as a function of pH during the synthesis. The material prepared at pH 11.5 showed highest photocatalytic activity which may be due to increased light absorption in the visible range and the fiber like structure may benefit mass transport.

Acknowledgement:

We acknowledge Australia Synchrotron for the access to powder diffraction.

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Comparative Adsorption of Copper from Synthetic and Real Wastewater by Un-calcined Sodium Exchanged and Acid Modified Montmorillonite

Christianah Olakitan Ijagbemi, Mechanical Engineering Department, Federal University of Technology, Akure, Nigeria, Nigeria

The comparative removal of Cu2+ from synthetic and real wastewater using un-calcined sodium exchanged (Na-MMT) and acid modified montmorillonite (A-MMT) in a batch adsorption technique has been attempted. Parameters optimized were contact time, pH, and concentration of adsorbate. It was observed that the removal of Cu2+ using Na-MMT and A-MMT was highly influenced by pH, initial Cu2+ concentration, reaction time and temperature. The rate kinetics for the adsorption of Cu2+ onto Na-MMT and A-MMT followed the pseudo second-order kinetic model for the range of concentrations studied. Isotherm models were applied. The Redlich-Peterson and Dubinin-Radushkevich model fit best the equilibrium data of Na-MMT and A-MMT, respectively. Thermodynamic parameters, such as ΔGo, ΔHo, and ΔSo were also determined and evaluated. Sorption of Cu2+ by Na-MMT and A-MMT was feasible, spontaneous and endothermic in nature. The application of the adsorbents in real wastewater treatment operation was studied. Na-MMT has a better adsorption potential than A-MMT. The potentials of un-calcined Na-MMT and A-MMT can be explored as effective adsorbents for the removal of toxic heavy metals in industrial effluents.

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Effective Planning and Management of Water Resources through Borehole Profiling

Faith Njoki Karanja, The University of Nairobi, Kenya

The provision of clean and sufficient water is a basic human rights issue. With the ever increasing world population coupled by the many fragile wetlands and other water catchments which are not being protected, the governments of today should seek ways of ensuring that there is adequate and sustainable water. Indeed according to a World Bank Report of 2004 Kenya receives a renewable supply of freshwater of less than 650m³ per person per year as opposed to the recommended 1000m³. The Kenyan Government undertook reforms in the Water Sector to ensure effective, efficient, sustainable and autonomous developments with one of the specific mandates being the drilling of boreholes. The overall objective of this study was to develop a GIS database to be used for profiling boreholes for management purposes using Nairobi as a case study. This entailed capturing the spatial and attribute data specifically the location of the boreholes in x,y,z using GPS and their descriptive information on the name, yield, status, soil type, quality of water and the catchment it serves. The results obtained showed that there are 703 boreholes with varying depths of between 18m and 473m of which 40% have a yield of over 10,000m3. The ground elevations were found to range from 1439m to 2244m above sea leavel. The distribution of the boreholes was found to be within 1500m and 1750m elevations. Profiling of boreholes was found to be useful for the promotion of orderly planning and development of water resources in the country for sustainability.

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Making the Move or Keeping the Connection? Engineering Women as Manager and Leaders - An Australian Study

Melissa J Marinelli, Curtin University, Australia

This paper describes the initial stages of current research exploring the advancement of women engineers to managers and leaders in technical organizations in Australia. The aim of the research is to provide an understanding of women engineers' transition to manager and leader from the perspective of those that have lived through this experience. In doing so, it extends existing research on women in non-traditional work, management and leadership and engineering practice. The voice provided by this study broadens and enhances the view of management and engineering in leadership. By focusing on successful transitions, the research findings can inform policy and practice to retain and advance women in engineering - a profession in which women are overwhelmingly underrepresented.

The study uses a qualitative research design guided by phenomenological and feminist perspectives. In depth semi-structured interviews have been used to capture the experiences of women working in non-traditional, male dominated workplaces. This paper presents preliminary analysis of the interviews. Emerging themes of Technical Competence, Retaining the Technical Link and Me as Manager are discussed. These themes highlight aspects of the participants' experience of becoming a manager and leader. They also reveal how management and leadership are conceptualised in engineering, specifically by women engineers who have advanced to senior positions in the engineering field, and begin to inform a broader and more inclusive view of management and leadership in the engineering profession.

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'I Like the Challenge': A Study of Women Engineers Who Have Stayed in the Profession

Mary E Ayre, University of South Australia, United Kingdom

Julie E Mills, University of South Australia, Australia

Judith Gill, University of South Australia, Australia

Evidence that women leave the engineering profession at a higher rate than men continues to emerge. This paper reports on a two-phase study (an online survey, followed by interviews with some of the participants) of a group of women who have stayed in the engineering profession. The group studied comprised all women who graduated in civil engineering from a single institution (a technical university in Australia) between 1974, when the first woman graduated, and 2008. Ninety-five percent of this cohort are still working in the profession - a statistic which far exceeds that of most comparable studies. The survey used was virtually identical to a national survey undertaken by the authors in 2007 of all female members of Engineers Australia (EA) - the professional organisation for engineers in Australia. On nearly all the indicators of workplace satisfaction, the single institution respondents responded more favourably than the women in the national survey. Yet 40 per cent of this cohort had children compared with 22 per cent of the national survey respondents. These results raise questions about what is different about the characteristics of the women in the university study and their workplaces: why/how they have stayed in engineering, and successfully combined

work and family when many women engineers leave the profession. The paper analyses the survey data and preliminary interview findings to offer some potential answers to these questions.

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Korean Policies for Promoting Women in Science and Technology and their Outcome

Lee Kong-Ju-Bock, Korea

The world's lowest birthrate and the fast shift towards an 'aging society' has been big issues in Korea. The most important factor in economic growth of Korea was human resources in last decades even though the main players in economy was men. The issues of low birthrate and aging society urged the Korean government to draw attention to women resources and resulted in legislation of an Act on Fostering and Supporting Women Scientists and Technicians in 2002. In this presentation SWOT analysis for women in science and technology based on statistical figures and social characteristics, key policies to overcome the weakness and threats, outcome of each policy, and recommendation for effectiveness will be introduced.

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Part-time Academia: Work-family Balance Utopia or Female Ghetto?

Kate O'Brien, University of Queensland, Australia

Part-time work seems to provide an ideal alternative to the "either/or" model of family and career; women can maintain their careers while still spending significant time with their families. This model can be very effective for women working in a clearly defined role in which they have existing recognised expertise. In that case, the mother can set clear boundaries between work and home while performing to high standard at work, and can maintain and develop her expertise over time.

However this model is much more difficult to achieve in academia, for a number of reasons. The longer training time means that women are on average 30 years old by the time they finish their PhD and post-doc, or industry experience in the case of engineers. The early thirties, prime child-bearing years for women, are also the time when academics need to build their research expertise and reputation. This period of intense research activity is very important in building deep knowledge in one's field, a respected research profile and the track record essential for future research success.

Women who have children during this period and choose to work part-time or take extended maternity leave simply do not have the opportunity to build the same depth of knowledge or profile as those working full-time. From this position, it is very difficult to develop the required research track record whilst juggling both research and teaching responsibilities part-time. Meanwhile, these women are frequently assessed against full-time colleagues using metrics which do not effectively account for either their part-time status, or their position on the "research start-up" curve. In engineering and science, there may be only one part-time academic in any department, which means an absence of role-models working in the same paradigm. These factors combine to create a discouraging situation where capable and effective women can work hard and still be judged poorly against their colleagues.

This paper assesses the challenges currently facing part-time academics, and those returning from career interruptions to care for their families. Suggestions are provided to assist part-time academics navigate to success. Suggestions are also included for how university leaders and research group managers can enable part-time academics to flourish rather than flounder, which will ultimately increase the pool of talent available for research, and enable greater female participation in senior academic roles.

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Baseline Study on the Status of Women in Engineering and Technology at Tertiary Institutions in Kenya

Siphila W Mumenya, University of Nairobi, Kenya

Keren K Kaberere, Jomo Kenyatta University of Agriculture and Technology, Kenya

Rose N Mbugua, Kenyatta University, Kenya

Jane Mutulili, Kenyatta University, Kenya

Lucy N Macharia, Nairobi City Water and Sewerage Company, Kenya

Shunning of Science subjects by girls in Secondary schools jeopardizes the capability of women to effectively compete in a shrinking job market, which favours practical technology based expertise. If unchecked, the trend is poised to adversely affect Kenya's ability to tackle the developmental challenges.

This study aimed at establishing the past and current gender based tertiary enrolment of women in science, engineering and technology in five public universities and their constituent colleges. Questionnaires were used for the study. The questionnaires were administered to chairpersons of departments, lecturers, and to the female students. The study captured information on women enrolled in the instutions as well as those who had graduated from the institutions over a five year period.

The study established a clear gender imbalance with respect to the number of girls enrolled in engineering and technology courses. However, the study found that over the past five years, there was an increasing number of female students enrolling for engineering and technology.

This baseline study is the starting point towards the development of a Monitoring and Evaluation framework, whose long term objective is to establish the effect of enhanced performance of secondary school girls in science and mathematics on female enrolment in Science, Engineering and Technology at tertiary institutions in Kenya.

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Athena SWAN Charter for Women in Science, Engineering and Technology

Sarah Hawkes, Equality Challenge Unit, United Kingdom

Within the UK only 39% of academic staff in science, engineering and technology (SET) departments are female compared with 48.4% for non-SET departments(1). Looking at the SET academic pipeline, women comprise 30.3% of all full-time researchers, 26% of lecturers, 18.3% of senior lecturers and only 9.3% of all professors(2). It is painfully not a new observation. However, institutional efforts to introduce initiatives to address underrepresentation are gaining momentum, and Athena SWAN works to encourage and recognise excellence in recruiting, retaining and advancing women in SET.

The Charter was launched in 2005 and membership is open to all UK universities

that are committed to the advancement of women in SET. Universities accept the Charter principles and pledge themselves to action, which is recognised by the Athena SWAN awards. There are currently 51 members and 77 award-holding universities and SET departments.

Members are already seeing changes in their academic profile since awards: for example the Department of Chemistry, University of York now has 69% of female academic staff on senior grades, comparable to 68% of male staff; and Queen's University Belfast have seen increases in women's presence in the professoriate and senior management. Further research is currently underway to assess the impact of Athena SWAN.

(1) Equality in Higher Education: Statistical Report 2010. Equality Challenge Unit, London.

(2) Kirkup, G., Zalevski, A., Maruyama, T. and Batool, I. (2010). Women and men in science, engineering and

technology: the UK statistics guide 2010. Bradford: the UKRC.

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Projection on the Future Ratio of Women Scientists at Japanese Universities

Asuka Hoshikoshi, National Institute of Science and Technology Policy, Japan

Maki Kato, National Institute of Science and Technology Policy, Japan

Japan's 3rd Science and Technology Basic Plan (FY2006-FY2010) set its gender policy by establishing both an overall hiring target and field-wise targets for women scientists working at universities. The overall target was achieved in 2007; however, our analysis reveals considerable disparities among fields. For example, in the fields of engineering and science, where the populations of women are relatively small, the proportions of women scientists for the employment amount to only about half the targets. At the same time, the hiring ratio of foreign-born female doctorate recipients from the Japanese universities is also low. Nevertheless, larger problem is that the use of such hiring targets alone is not enough to come up with a clear future vision for women scientists at universities in scale. On the other hand, in 2003, the Japanese government announced its goal to boost the ratio of women in leadership positions across all areas of society to 30% by 2020. Defining professorship as a leadership position at universities, we used data in 2007 to project years necessary to achieve the goal. The results indicate that possibilities of achieving the goal by 2020 would be extremely low. Indeed, it becomes clear that in cases where turnover of women scientists is higher than that of men, achieving the goal would be significantly delayed. We also illustrate the necessity of increasing the number of female students as a prerequisite to meeting the goal, and discuss the support mechanisms and policies required to reduce the turnover of women scientists.

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Innovative Practices to Retain Women Scientists & Engineers in Academia

Priti N Mody-Pan, University of Washington, United States

Suzanne G Brainard, University of Washington, United States

The US National Science Foundation, through its ADVANCE program, has sponsored numerous programs and activities to support the advancement of female faculty into leadership positions in science and engineering. The Center for Workforce Development (CWD) at the University of Washington has evaluated numerous ADVANCE-funded projects across the United States and has indentified key practices to implement and sustain such programs beyond grant funding. The portfolio of these program evaluations will be examined to provide ICWES participants concrete information about innovation in policies, programs, and activities to advance women and advocate for change at the institutional level.

Using quantitative and qualitative evaluation data from several ADVANCE-funded projects at universities and professional associations, key practices for enhancing recruitment, retention, and leadership development of female scientists and engineers will be discussed. Strategies will be differentiated for women at various stages in their career from postdoctoral fellow through the dean-level at institutions of higher education. In addition to strategies designed in promote women into leadership positions, the presenters will discuss successful strategies to improve the climate for female scientists and engineers in university settings through consensus-building, leadership from the top, and grassroots leaderships. Interwoven through these topics will be the specific assessment methodologies adopted to collect and analyze data to measure program success.

This presentation will be of interest to female scientists and engineers who are looking for strategies to be change agents at their institutions as well as those who are interested in implementing successful programs similar to those funded by NSF ADVANCE.

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Gender Differences in Publication Output: Towards an Unbiased Metric of Research Performance

Suriya M Mayandi Thevar, Annamalai University, India

Quantifying the gender gap in research productivity has become a matter of serious concern among the policy makers. The objective of this study is (i) to measure the contribution of women to the scientific endeavour of the nation; (ii)to analyze the scientific areas where women have contributed more and (iii) to assess the gender equity in scientific productivity.

This study reviews the publication productivity of men and women in S&T by drawing samples from contrasting social, political and economic systems in Europe, North America, Asia, Australia and Africa in order to identify the social structure in which women outperform men since the scientific discoveries are the outcome of a particular social context.

Methods: The correlation between gender and research productivity will be computed by gathering the publication data from the 'SCOPUS' database and they will be aggregated into different socio-economic situations such as industrialized and semi-industrialized nations etc. This study will address important gender issues such as (i)what is the level of women's productivity in the sample regions and how does it compare with the numbers of women scientists in those countries? (ii)in which disciplines are women represented and what type of research do they favour? (iii)what is the level of international and domestic co-operation among women scientists?

Results and Conclusion: Based on the findings of this kind of studies, national, local and institutional policies can be revived to make women as the best

contributors to scientific knowledge, scientific education and scientific occupation.

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Emerging Technologies: Will the Chevy Volt Succeed or Fail?

Suzanna Cottrell Olsen, Arizona State University, United States

The Chevrolet Volt has been herald as the car that will revolutionize the auto industry. The Volt is viewed as revolutionary because it is the first mass produced extended range electric vehicle in the industry. A Volt owner will be able to plug his/her car in to a home outlet, allowing the car to charge overnight and, once charged, it will be able to travel up to 40 miles on pure electricity. Beyond 40 miles, the car will keep on going by using a range-extending gas generator that produces enough energy to power it for hundreds of miles on a single tank of gas. In fact, Chevrolet estimates the car will get a 230 mpg (city) EPA rating. With an EPA rating that good, there is speculation that Chevy might just be able to surpass Toyota as the leader in green technology for vehicles. This car might be the very thing Chevy/CM needs to pull itself up, so the question is will Chevy succeed with the Volt or will it further drag itself behind other Asian competitor's when it comes to green technology? This paper will provide discussion of government legislation and how economic events might impact the success of the Volt. Then this paper will explore the disruptiveness of the Volt's technology by comparing it to the current hybrid technology. Finally, this paper will analyze General Motors' management strategy and its potential impact on the Volt's success.

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Current Trends in the Application of Atmospheric Plasma for the Improvement of Wind Turbine Efficiency through Separation Control

Mei C Cheong, University of Adelaide, Australia

Brad A Gibson, University of Adelaide, Australia

Maziar Arjomandi, University of Adelaide, Australia

Wind turbine aerodynamics remains a crucial area of research in the field of sustainable energy. Major challenges faced are problems associated with adverse aerodynamic loads encountered by wind turbines during operation. These problems, found to have a significant impact on the efficiency and life span of the wind turbines, advanced the studies and works for aerodynamic control methods for mitigating adverse aerodynamic loading on wind turbines. This work presents an innovative method of active airflow control to improve the performance of wind turbines using Dielectric Barrier Discharge (DBD) plasma actuators. These devices are capable of manipulating and modifying the flow field around a profile wall resulting to flow changes similar to those observed when the geometry of the profile itself is altered. The advantages of these devices being fully electronic without heavy and complex moving parts presents a great potential as being a viable active airflow control alternative to the wind industry. Results of this work have concurrently demonstrated that flow separation is delayed through the use of DBD actuators on the profile wall. This indicated that with the use of DBD actuators, wind turbines may be capable of operating at higher angles of attack, with better operating efficiency and a longer lifespan.

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Effect of Sawdust Addition on the Thermo-Physical Properties of Some South-Western Nigerian Clay Blends

Christianah Olakitan Ijagbemi, Mechanical Engineering Department, Federal University of Technology, Akure, Nigeria, Nigeria

Thermal and physical properties of some south-western Nigerian clay were studied to determine their suitability as lining materials for heat loss prevention in heating appliances. Ikere-Ekiti clay compares favourably with fire clay in chemical, thermal and physical properties but with a relatively low load-bearing capacity of 3610 kN/m2. To improve on the strength of Ikere-Ekiti Clay, blends of Ikere-Ekiti / Ikeji Arakeji clays in proportions of 70:30, 60:40 and 50:50 were done, as Ikeji-Arakeji clay has a good cold crushing strength (CCS) value of 4870 kN/m2. The effect of sawdust addition (1-30%) on physical and thermal properties which include bulk density, porosity, shrinkage, sintering temperature, spalling resistance, crushing strength, thermal conductivity of the clay blends were measured using standard methods of American Foundrymen's Society (AFS). The results obtained showed that with a little addition of sawdust to the clay blends, there are considerable improvement in the desirable insulating properties such as low thermal conductivity, low linear shrinkage, low bulk density and high porosity but with reduced strength and no effect on sintering temperature and spalling resistance. For applications at operating temperatures up to 1300°C, a 10% sawdust addition to any of the clay blends makes it a good insulator.

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Optimising Hydropower Generation through Fluid Dynamics Research

Jessica M Andrewartha, University of Tasmania, Australia

Jane E Sargison, University of Tasmania, Australia

Xiao Lin Li, University of Tasmania, Australia

A team of researchers from the University of Tasmania are leading the way in realising efficiency improvements and optimising hydropower generation. The headworks of hydropower stations are often several kilometres long with tunnels, open channels and pressurised pipelines transporting water from storage dams to the turbines. Significant efficiency improvements can be made by removing the thin biological slimes that grow on the walls of these conduits. The team is studying the physics of the flow over these biological growths in both open channel and pipeline environments to understand the mechanisms for drag production through full scale testing on hydropower schemes and an extensive experimental program using dedicated laboratory rigs. This paper discusses the results to date, including: improvements of up to 25% in headloss in penstocks, modifications to the structure of the boundary layer and significant increases in friction coefficient, and details the new experimental pipe rig under development to further these studies.

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Transformation Planning for Integrating Unmanned Aircraft into National Airspace

Kristina L Richardson, Department of Systems Engineering - The United States Military Academy (West Point, NY), United States

The research presented combines Enterprise Architecture and Technology Strategy for analyzing, evaluating, and recommending appropriate solutions for integrating Unmanned Aircraft Systems (UAS) into the National Airspace System (NAS). The discussion includes: Issues/interest surrounding UAS operations; Architecting the current state enterprise, discussion of the future of UAS integration in the NAS; leadership for success and future work. Technology Strategy coupled with Enterprise Architecting in an incremental systems approach that emphasizes the development and application of ways of thinking that bring clarity to the complex co-evolution of technological innovation, the demand opportunity, systems architecture, business ecosystems, and decision-making and execution within the business.

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Comparison of Solar Sorption Cooling Systems Using Trnsys Software

Rebecca Selwyn, University of Bristol, United Kingdom

Marie-Esther Guillerm, Ecole Nationale Supérieure d'Ingénieurs en Informatique, Automatique, Mécanique, Energétique (ENSIAME), France

Hind Saidani-Scott, University of Bristol, United Kingdom

Since the Montreal Protocol set out a timetable for the phasing out of conventional refrigerants used in vapour compression systems, a lot of research has been undertaken into sorption cycles as an alternative. Absorption and adsorption use environmentally friendly fluids, such as water, as the refrigerant. The research in this area mostly focuses on improving the cycles, which currently have a lower COP than vapour compression systems. Few papers make a direct comparison between the two cycles for different applications.

This paper presents a numerical model of a sorption cooling system built in TRNSYS which uses real-world weather data at the given location. The model is run for absorption and for adsorption using three different working pairs and applied to human cooling and to food refrigeration. The results are assessed against a range of performance criteria and compared to determine the most suitable cycle for each application.

It is found that absorption systems have a higher cooling power per unit of absorbent and therefore are more suitable for small scale air conditioning systems. Adsorption systems are more suitable for low temperature applications, such as food refrigeration. Both systems studied rely solely on solar energy which makes them suitable for food preservation and air conditioning applications in countries where the power supply is unreliable but solar energy is abundant.

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Kingsgrove to Revesby Rail Quadruplication - Innovations in Design and Construction of the Overbridges

Gillian Sisk, BEng (Hons) PhD CEng MIEI, Sinclair Knight Merz, Sydney, Australia

Sally Cox, BEng (Hons), CEng, FICE, Leighton Contractors, Sydney, Australia

Naomi Stone, BEng (Hons), CEng, MIET, MIRSE, Leighton Contractors, Sydney, Australia

This paper provides a high level overview of the Kingsgrove to Revesby Quadruplication project. This project is being delivered by the Transport Construction Authority (TCA) in an alliance with Leighton Contractors, AECOM (formerly Maunsell Australia), Sinclair Knight Merz, MVM Rail and Ansaldo STS (the K2RQ Alliance). The project scope includes constructing two additional fast tracks between Kingsgrove and Revesby (approximately 7.2km) and it is the single biggest rail project currently under construction in NSW.

The site presents unique constraints necessitating the incorporation of many interesting innovations in the design and construction processes. This paper's focus is on those adopted for extending the existing overbridge structures to accommodate the two additional tracks underneath. Examples include developing innovative overbridge pier design and steel strengthening solutions and adopting coordinated construction staging to ensure safe, flexible delivery of detailed bridge designs.

This paper also describes the Alliance Management team organisation which is incredibly diverse in its makeup. Not only are the team from a wide range of countries, they are also diversely skilled in their engineering backgrounds. The women of the team hold varying experience and have imposed themselves in a very positive way on the project. These include filling critical lead roles such as Construction Manager, Engineering Manager and Structures Design Manager but also extend to Senior Project Engineer and Community Manager. The diversity in the leadership team plus the ongoing extensive interaction between the Designers and Contractor has contributed to the ongoing successful and sustainable delivery of this project.

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Towards a More Sustainable, Resilient Infrastructure System: Regional Risk Assessment of Coastal Bridges during Hurricane Events

Candase D Arnold, Rice University, United States

Jamie E Padgett, Rice University, United States

Several hurricanes in the last decade have shown that bridge and roadway infrastructure systems in coastal communities are vulnerable to damage from hurricane induced surge and wave forces. Bridges represent vital links of the roadway system, connecting coastal communities to the mainland, and often experience significant loads due to their prevalence as water crossings. In order to mitigate the likely damage to the bridge network and promote actions that improve the sustainability of coastal communities, a viable approach is needed to measure hurricane risk to bridge networks across expansive regions.

This paper describes ongoing research to develop new models of bridge reliability under hurricane loads considering the common failure modes of bridges that were seen in Hurricanes Katrina and Ike, such as unseating of bridge decks or scour of foundations and approaches. These tools are then applied to a regional risk assessment of the bridge network in the Galveston,TX bay area, focusing on utilizing such research to create a more sustainable system. By analyzing the failure probability of each bridge in the

network for a set of scenario hurricane events, risk mitigation decisions can be supported such as prioritizing bridges for potential upgrade or identifying routes that will be viable for transporting emergency response and recovery personnel. This will help create a more sustainable and resilient roadway system by decreasing repair and rebuilding costs after an event, preventing the unnecessary use of additional materials and by providing an infrastructure system that facilitates rescue and recovery efforts in coastal communities.

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Improving the Thermal Performance of Framed Window Systems

Lizette JC McNeill, Institute of Engineers Australia, Australia

The drive toward sustainable practice in building engineering has seen the inception of regulatory bodies, whose purpose is to provide direction for industry development in the face of climate change. One such organisation is the Australian Building Codes Board (ABCB), responsible for producing the Building Code of Australia (BCA) to which all buildings must conform.

In 2006, Section J was introduced into the BCA. This section outlines measures to reduce greenhouse gas emissions through energyefficient design. In 2010, these provisions became more stringent, with Section J calling for thermal properties of vision glazing to be based upon the combined or 'total' system: glass plus frame. Historically, designers have relied on glass manufacturer's advice for thermal values for individual components.

This paper examines the thermal performance of glass curtain walls, guided by National Fenestration Rating Council (NFRC) procedures and subsequently as adopted by the ABCB. Combined glazing and frame systems are analysed using NFRC approved thermal simulation software (Optics 5, WINDOWS5.2 and THERM5.2), which was developed by the Lawrence Berkley National Laboratory. The results demonstrate that the thermal performance of a typical framed window system within a curtain wall is considerably reduced when all frame components are considered, as per the new BCA 2010 requirements.

The paper also discusses potential improvements for curtain wall systems that are commonly available within the Australian façade industry by focusing on enhanced thermal performance due to reductions in thermal transfer.

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Challenging Design: Foundations for Tall Buildings

Frances Badelow, Coffey Geotechnics, Australia

Helen Chow, Coffey Geotechnics, Australia

The design of foundations for tall buildings is a challenging task for geotechnical engineers as the engineers are required to consider all geotechnical aspects of the project, aimed at managing and reducing the exposure to geotechnical risks. In the design of foundations for tall buildings, lateral loadings are of great importance as are the vertical loadings. A small rotation at the foundation will be magnified to a very large magnitude at the top due to the height of the building which will affect the serviceability and functionability of the building.

This paper presents the foundation design process for two cases - the 1km high Nakheel Tower in Dubai and the 151 storey Incheon Tower in South Korea. The role of the authors as an internal reviewer of the analyses and an engineer undertaking the numerical analyses in different project phases will be discussed. Analyses of the proposed foundation were carried out by computer programs using the boundary element method and 2D & 3D finite element methods based on the limit state approach. Key issues, in particular the overall performance of the foundation, will be addressed. The paper concludes with a summary of the design processes and the basic design criteria for tall buildings.

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Accelerated Drainage in Sand Piles by Convoluted Perforated Pipe

Eliza Hashemi, RMIT University, Australia

Muhammed Bhuiyan, RMIT University, Australia

Niranjali Jayasuriya, RMIT University, Australia

In most sand quarries, a wet process is used to obtain sand and then separate it from minerals. The final wet product with 20% moisture is stockpiled to dry, since it can not be sold unless reaching a moisture level close to 5-6%. Quarries keep the sand in the plant for about two weeks to dry. Space limit and delays in the production process are common problems faced in quarries these days. Water embedded within sand particles gradually drain through the particle spaces and some remains entrenched at the base of the pile. In this project, drainage system consisting of a perforated pipe and a suction pump has been designed to remove water out of the sand pile base. As such the moisture reduction trend was monitored. Results show that the system designed and tested can significantly reduce the time required for the drying process.

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Rules for the Provision of Earthquake Resistance in Small Buildings in Ghana

Carlien D Bou-Chedid, Ghana Institution of Engineers, Ghana

Although earthquakes do not occur frequently in Ghana, damaging earthquakes with magnitudes greater than 6.0 on the Richter scale have been recorded in the past. Attempts to ensure that buildings are provided with adequate seismic resistance have generally been directed towards the provision of a modern seismic code for the design of reinforced concrete structures. This approach however does not address the problem posed by the majority of buildings which are one and two storey structures constructed by artisans and other individuals. These buildings are essentially non-engineered and this paper examines building practices used in the construction of such buildings. The paper finds that many of these buildings will not be able to withstand the levels of seismic action likely to be imposed on them in the event of an earthquake. The paper proposes simple rules for the construction of one and two storey buildings based on observed behaviour of similar construction in earthquakes. The rules are intended for use by builders and those responsible for enforcing building regulations.

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Improving Gender Equity and Diversity in the Science Profession: A New Zealand Perspective

There is increasing global evidence that women and diversity in workplace teams and on company boards improve profitability and performance. Yet, women remain under-represented and

under-utilised in the sciences both at governance and at senior management levels, and the largest proportion of those leaving the sciences as a profession are women. This paper explores gender issues evident in the New Zealand science sector, in particular, and looks at initiatives already in place and requiring implementation to improve gender equity and diversity in the science and innovation profession both nationally and internationally.

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Perceptions and Experiences of the Workplace among Canadian Computer Science and Engineering Students - A Gender Analysis

Jennifer Fender, University of Guelph, Canada

Valerie J Davidson, University of Guelph, Canada

Julita Vassileva, University of Saskatchewan, Canada

Nadia Ghazzali, Universite Laval, Canada

Elizabeth Croft, Canada

This presentation will discuss the results of a national survey on the career intentions of upper-year Canadian undergraduate students in computer science and engineering programs. This survey was conducted in spring and summer, 2010, by the regional Chairs for Women in Science and Engineering and included approximately 600 respondents. The presentation will offer gender and discipline-based analyses of the survey results, with particular attention paid to students' perceptions and experiences of the workplace. In designing the study, it was hypothesized that a higher proportion of female students might choose not to pursue employment in their field of study after completing their undergraduate program because of negative education experiences and/or workplace expectations. While survey results reveal some gender differentiation in terms of educational experiences, similarly high proportions of male and female students intend to either pursue employment (65-66%) or graduate programs in their field of study (17-20%). However a significant proportion of female students (51-66%) expected to face gender-based discrimination in the workplace while less than 5 percent of male respondents indicated similar concerns. This result and other measures of workplace expectations and experiences suggest that perceptions and experiences of hiring practices and workplace climate remain barriers to attracting and retaining women in these fields. As such, attention to making changes in these areas is vital.

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Can Labour Saving Technologies Help Rural Women in Uganda? The Case of the Manual Forage Chopper for Smallholder Dairy Farmers

Florence B Lubwama Kiyimba, National Agricultural Research Organization, Uganda

Labour-saving technologies have been prioritized in reducing household labour requirements, especially during the peak production season when labour requirements are running high, as well as reducing production costs for hand and hired labour. Women have been specifically targeted in the development and dissemination of most of these technologies with the objective of helping them divert time from farming and domestic activities into more productive income generating activities. The forage chopper is one such technology that was developed with the assumption that it will save labour for the rural women, giving them control over their own labour and freeing them for other income generating activities. This study explored a labour saving technology-in-use to evaluate how it consolidated or transformed existing gender relations in smallholder dairy farm households. With a technographic approach, the research analyzed the introduction of the forage chopper in four dairying sub-counties of Masaka district to evaluate the effectiveness of the technology as a labour saving device for the women, and how existing gender relations influenced the nature, use and ultimately the impacts of the forage chopper technology. The study showed that targeting women in technology development in itself is not enough to guarantee that women will benefit, let alone that it will lead to their empowerment, because the use and impacts of technology are in part determined by intra-household behavior and individual's bargaining power. Exploration of how gender relations are negotiated and transformed is therefore a pre-requisite if labour saving technologies are to have desired effects for women.

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Women Engineering Career: The Case of Nigeria

Christianah Olakitan Ijagbemi, Mechanical Engineering Department, Federal University of Technology, Akure, Nigeria, Nigeria

Women Engineers are known to be resourceful, result-oriented, committed and hardworking. The low participation of women in engineering profession has been taking its toll in infrastructural development of the Nation - Nigeria. The practice of Engineering which is accepted universally to be the bedrock of development of any Nation would have been more profound in Nigeria particularly in the area of service provision if women are encouraged into and retained in engineering career jobs. This paper discusses the environmental and cultural limitations amongst other factors influencing the engineering career of the Nigerian women and recommends appropriate measures for a successful engineering career as a woman.

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Effectivity of Entomopathogenic Fungus Beauveria Bassiana to Control White Grub Lepidiota SP

R.R Rukmowati Brotodjojo, Dept. of Agrotechnology Universitas Pembangunan Nasional "Veteran" Yogyakarta, Indonesia

Chimayatus Solichah, Dept. of Agrotechnology Universitas Pembangunan Nasional "Veteran" Yogyakarta, Indonesia

Entomopathogenic fungus Beauveria bassiana is soil inhabited fungus that is known to have a wide range of hosts. Previous work showed that this fungus can be cultured in solid media using rice bran. The objective of this research was to study the effectivity of B. bassiana cultured in rice bran to control Lepidiota sp. in semi field experiment. Two grubs were inoculated into seven-weeks old soybean planted in a polibag. The fungus was applied one week after grub inoculation, in three levels of dose, i.e. 1 g cultured fungus/100 g soil; 1.5 g cultured fungus/100 g soil; 2 g cultured fungus/100 g soil, and control with no fungal application. The applications of the fungus were conducted with two methods, first, the solid cultured fungus was applied directly into soil around root area, and second, the solid cultured fungus was diluted into 400

mL water and the fungal solution was poured on the soil. The results showed that the mortality of treated grubs was not significantly different from those untreated grubs. However, the weight of fresh root, fresh plant and dry plant of plant treated directly with 1.5 g cultured fungus/100 g soil was significantly higher than those of other treated plants and untreated plant. The direct application of 1.5 g cultured fungus/100 g soil was resulted in higher number of seeds per plant than that of other applications. In conclusion, this fungus can be used to control Lepidiota sp., although higher dose may be needed.

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Study of Integrated Pest Management (IPM) Application to Increase Yield, Quality and Income of the Cocoa Farmers in Kulon Progo, Yogyakarta, Indonesia

Dwi A Puspitaningrum, Dept. of Agribusiness Universitas Pembangunan Nasional "Veteran" Yogyakarta, Indonesia

Sri Wuryani, Dept. of Agrotechnology, Universitas Pembangunan Nasional "Veteran" Yogyakarta, Indonesia

RR Rukmowati Brotodjojo, Dept. of Agrotechnology, Universitas Pembangunan Nasional "Veteran" Yogyakarta, Indonesia

This study was aimed to assess the success of Integrated Pest Management (IPM) Technology application on cocoa farmer in Kalibawang Kulon Progo, Yogyakarta,Indonesia. This technology consisted of 5 (five) activities. i.e. frequent harvesting, pruning, fertilizing, sanitation, and pod sleeving. The first program was to socialize the IPM program that will be implemented on the field. With Proportional Random sampling method, 35 farmers were chosen from cocoa farmer population in Kalibawang Kulon Progo. Selected farmers were those who had been trained in Integrated Pest Management (IPM) Course previously. The result of the study showed that application IPM Technology increased yield of cocoa product up to 69.80%. Furthermore, IPM Technology also improved the income of cocoa farmers up to 69.6%. In addition, post harvest losses decreased for 7.75 %, whereas the overall quality showed no significant difference between before and after application of IPM Technology.

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Production of Biogas from Cowdung and Food Waste by Countinous Feed Process

Olayinka A Abdul, Lagos State Development and Property Corporation, Nigeria

James O Akanmu, University of Lagos , Akoka, Nigeria

Anthony A Kwemesi, University of Lagos , Akoka, Nigeria

Adebowale O Kosoko, Lagos State Government, Nigeria

Biogas is a bye-product of the breakdown process from biodegradable waste such as waste food, cow dung, cassava peels, pigs and poultry waste also a renewable energy source.

This research project intends to address the issue of the production of biogas from food waste and cow dung, which can produce biogas through the process called 'anaerobic digestion'.

Recently, developed countries have been making increasing use in biogas treatment systems for municipal waste. The project has as its main thrusts to; design a process of converting food waste and cow dung into biogas; study the process of converting food waste and cow dung to biogas using continuous feeding process method; and determine if methane is produced / constituent of gas produced under hydraulic retention period of 14 days.

The digestion process produces the principal acids which are processed by methanogenic bacteria to produce methane.

Conditions necessary for the optimum production of biogas are: pH value and temperature as well as a continuous feed digester. The biogas production plant comprises of - the digester, the scrubber, the gas holder; the gas mains.

Biogas containing methane could be efficiently produced from food waste and cow dung slurry in a continuous feeding process digester.

KEY WORDS

Bio-gas, digester, scrubber, pH, temperature, cow dung and food waste.

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The Production of Biodiesel from Oils and Fats

Ji-Yeon Park, Korea Institute of Energy Research, Korea, Democratic People's Rep

Jin-Suk Lee, Korea Institute of Energy Research, Korea, Democratic People's Rep

You-Kwan Oh, Korea Institute of Energy Research, Korea, Democratic People's Rep

Deog-Keun Kim, Korea Institute of Energy Research, Korea, Democratic People's Rep

There has been an increased interest in the use of the biodiesel produced from triglycerides as an alternative fuel for diesel engines, due both to the instability in the price of petroleum and to environmental concerns related to the air pollution generated by vehicles. The biodiesel production has typically focused on edible oils such as soybean oil, rapeseed oil, and palm oil. Recently, waste oils and fats such as used frying oil, trap grease, soapstock, acid oil, and tallow has been proposed and used as biodiesel resources. As the supply of biodiesel increases, the interest in the use of non-edible oils such as jatropha oil, tung oil, and algal oil as an alternative feedstock for the production of biodiesel has grown. The alkali process for biodiesel production can achieve high purity and yield of biodiesel in a short time. However, oils and fats that are high in free fatty acids result in the production of soap and the loss of catalyst in the alkali process. To overcome this, the free fatty acids should be removed before the transesterification reaction. The free fatty acids react with alcohol under an acid catalyst, producing ester and water. To ensure that a uniform quality of biodiesel is produced from the vegetable oils or animal fats, the European Commission mandated the European Committee for Standardization. It developed standard specifications for the minimum requirements and testing methods for biodiesel to be used as fuel for biodiesel engines and for heating purposes. There are Korean Biodiesel Standards in Korea. Palm oil, soybean oil, and used frying oil are typically used as biodiesel resources in Korea. The production of biodiesel from algal oil is being investigated by our research team.

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Growth Performance, Yields and Economic Benefits of Nile Tilapia Oreochromis Niloticus and Kale Brassica Oleracea Cultured Under Vegetable-Fish Culture Integration

Genevieve A Mwayuli, The Catholic University of Eastern Africa, Kenya

Ammon p Shoko, Tanzania Fisheries Research Institute, Kigoma Centre, Tanzania

Albert Getabu, Kenya Marine and Fisheries Research Institute, Kenya

Yuda D Mgaya, University of Dar es Salaam, Tanzania

On-farm trial was conducted for 210 days to demonstrate role of vegetable-fish-culture integration in growth, yields and economic benefits of fish and vegetables. Two 200m2 earthen fishponds were stocked with Nile tilapia at 20,000 fingerlings per hectare. One fishpond was fertilized using animal manure and fish stocked here fed on 35% crude protein supplementary diet. Another fishpond was not fertilized and fish stocked here received no supplementary diet. Twelve vegetable plots, 7.2 x 3 m were planted with kale seedlings at 0.45 x 0.6 m spacing. First, second and third sets of three plots were irrigated by stream-water, treated fish pond and non-treated fishpond respectively. Last three plots were not irrigated. Sampled Kale leaves were weighed to nearest 0.01 g. Kale yield was determined as sum of fresh leaves over course of the experiment. Fish and water sampling were conducted monthly using a small mesh seine and water sample respectively. Results showed fish reared under integrated systems attained significantly higher growth than those reared under non-integrated systems (t-test, t=14.38, d.f =118, P<0.001). One way ANOVA showed significant difference in kale leaf yields and income (F=63.17; P<0.05; d.f.=3) among plants in different water regimes. Plots receiving water from treated fish pond attained highest yield and income. Gross and net yields of both fish and vegetables were highest from integrated systems. Partial enterprise budget analysis showed net returns were higher from integrated than non-integrated ones. Results demonstrate possibility of improving yields and profits by integrating fish farming with other on-farm activities.

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The Promotion of Women Engineers in Management Positions, Problems and Solutions

Dorina Ionescu, University of Johannesburg, South Africa

In the last decade legislation encouraging women empowerment has been progressively adopted across the world. Unfortunately, for various reasons the empowerment of women still has a long way to go. A survey conducted of South African engineering businesses shows that the employment rate of women engineers has not increased. One of the major engineering businesses surveyed, employs 46 women, amounting to about 30% of the total staff complement. This percentage promotes a skewed view of female employment rates, as in reality there are no female engineers and only 5 female machine operators. The other 41 female staff members are cleaners, kitchen helpers, etc. The reality confirms that implementing women friendly legislation is not enough and more radical measures are called for. The current legislation requires businesses to report on the number of women employed but does not require them to specify the job descriptions of these women. As a result, the businesses meet some government targets without actually contributing toward women empowerment. The survey showed that engineering companies advertise for experienced engineers, making it difficult for new female engineers to meet this requirement. For real progress to be made in empowering women, companies must focus on three major points:

1. The number of women employed should be reported together with their qualification and the job they perform to avoid skewed statistics,
2. In-house training for new employees should be prioritised in order to groom them for management positions,
3. The balance between work and family life should be promoted.

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Attracting and Retaining Women in Science and Engineering

Sangeeta Wij, Prime SD Engg. Consultants Ltd., India

Women are underrepresented in science and engineering professions and rarely ever reach the Top Positions. Improving their representation depends on acknowledging and resolving barriers and highlight and award excellence in their performance.

The number of women decreases drastically while moving up the corporate ladder as family and other social commitments take a priority over career goals.

To create awareness and to encourage women engineers and scientists to and promote women scientists and engineers them reach the top --- WISE - India has been created . WISE is supported by International Network of Women Engineers and Scientists and looks forward to its guidance and cooperation for its future activities. The Vision of WISE is to build better prospects for women in science and engineering through their active participation and involvement.

It is trying to create career opportunities for women by increasing awareness, providing support, enhancing capacity building and by influencing policies for promoting women in the field of science and engineering and also provide a platform for dissemination and sharing of knowledge, mentoring, professional development and networking opportunities to facilitate the success of women.

We need to identify the Economic, Social and Cultural barriers towards the entry of women in these fields as well as their professional growth and then take focused measures to address and resolve the problems. WISE is determined to play a key role in strengthening the knowledge base, networking and leadership skills among women so that they are professionally equipped to break the Glass ceiling.

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The Retention and Renewal of Women in Engineering in New Zealand

Tracey Ayre, IPENZ, New Zealand

Elena Trout, IPENZ, New Zealand

There are approximately 31,000 engineering and related professionals employed in New Zealand and of these only 13 per cent are women. In addition, women represent just six per cent of Chartered Professional Engineers. The Institution of Professional Engineers New Zealand (IPENZ), the professional body for New Zealand's engineers, is concerned at these figures and considers that New Zealand needs a step change to encourage more school leavers to become professional engineers. The Institution notes that opportunities are being missed through low female participation in the profession. These opportunities include the ability to ensure the profession employs the best and brightest, increased competitiveness and the ability to ensure the engineering profession is relevant and representative of the society it serves.

In 2010 the IPENZ Governing Board approved a plan for developing and encouraging the female engineers. The Institution launched this major programme in March 2011. The Institution's long term vision for women in engineering is that:

"As a result of its diversity, engineering is seen as making a highly relevant contribution to New Zealand's economic growth and well-being. The engineering profession is recognised as an employer of the best and brightest. Engineering workplaces are diverse and have exemplary employment practices. The number of engineers is sustainable in the long term."

The success of the programme will be reflected in the diversity of the Institution's membership in the coming years.

This paper outlines the programme which encompasses actions centred on research, leadership, culture and recognition.

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Science Made Simple - Support for Elementary School Science Teachers

Rebecca Swabey, University of Guelph, Canada

Valerie MacDonald, Research in Motion Ltd., Canada

Jinty Smith, Research in Motion Ltd., Canada

Bethany Deyell, University of Guelph, Canada

Valerie J Davidson, University of Guelph, Canada

Despite directives in the provincial curriculum guidelines to incorporate hands-on, experimental science education, teachers face a number of challenges in effectively introducing such activities in their classrooms. To address these challenges, a one-day workshop, "Science made Simple", was developed for elementary school teachers at Grade 4 to 6 levels. Interactive sessions provided a number of examples of simple, low-cost activities and opportunities for the participants to experiment. The Ontario Chair for Women in Science and Engineering developed a complete science unit tied directly to energy. The unit includes background information, instructions and materials for a hands-on, design activity, as well as multiple learning worksheets. The design activity illustrates basic concepts in science and introduces skills such as teamwork, persistence through failure and communication. Previous evaluation has shown that the design activity has been successful in engaging female students and in dispelling stereotypes about engineering.

The "Science Made Simple" model offers valuable learning opportunities for teachers who gain new excitement about the possibilities for science education and greater confidence in teaching in a field in which their background may be somewhat limited. The presentation will provide background on the development phase of the workshop which was supported by the STAO (Science Teachers Association of Ontario) and Research in Motion. Feedback from the participants was positive and follow-up activities will be reported.

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Women in Engineering: Are we re-inventing the Wheel?

Sujeeva Setunge, RMIT University, Australia

John Buckeridge, RMIT University, Australia

Tom Molyneaux, RMIT University, Australia

Under representation of females in engineering has been a topic of intense discussion for many years and the myth that women are excluded because of perceived inabilities or intellectual deficiencies has been well exposed. There have been many initiatives adopted to recruit and retain women in Engineering, including the introduction of new disciplines such as Environmental Engineering, where a significant increase in female student numbers was expected. Whilst we succeeded in attracting female students into the early years of the Environmental Engineering degree, the numbers have recently been on the decline and we again have low female participation in most Engineering undergraduate programs.

We explore the history of integration of females into work force, analyse any barriers that have been identified in earlier research and discuss many of the solutions developed and implemented. We then present current numbers and trends in engineering undergraduate programs of three diverse universities in Australia, Sri Lanka and Germany. The observed trends, the success stories and analysis of the responses of first year female students on project based courses will be used to develop a better understanding of the recruitment and retention of females in Engineering.

In conclusion, this paper seeks answers to where we may have gone wrong, and provides some solutions to improve female participation in the discipline. We conclude with a challenge, to which we provide an answer to the affirmative, about whether Engineering is really a suitable profession for females.

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System Fix: Transforming Education and Recruitment of Engineers by the Experience of WiE Advocacy and Experiment

Bronwyn Holland, The University of Technology, Sydney, Australia

The opportunity exists to bring together best practice in retention and career development for engineers with agendas for addressing the skills shortage and re-investing in higher education in Australia. While advocacy and policy intervention have renewed attention to the persistently low female enrolments to the non-traditional fields, and the low rate of retention of qualified women in the profession, today's students do not share insights into the systemic and cultural reasons for these phenomena. As a consequence, they are not empowered or motivated to redress them. This is lamentable when they will be line managers themselves within 5 years of graduating.

This paper will argue that the system-wide change necessary to remove the barriers to women's successful recruitment, retention and sustained contribution to their chosen field warrants attention to literacy about equity and diversity in the education of engineering students. The recent intervention to include gender inclusive curriculum as a criteria for course accreditation confirms that this dimension is a legitimate aspect of a contemporary engineering qualification which is expected to equip graduates to engage with complexity and risk and with diverse stakeholder values and priorities.

There is no shortage of sites from which to increase literacy about equity and opportunity and inclusion, including in introductory stages of their course, when students are introduced to the ethic of teamwork and accountability, and in pre-internship seminars. Cohort solidarity and voluntarism can be a strong feature of undergraduate engineering, and training for engineering communications and competition activities can include inclusive strategies for engaging with audiences and stakeholders. As resources for change accrue and the momentum for change gathers, the equity literacy and motivation of tomorrow's engineers has to be mainstreamed: in the classroom, the faculty and the boardroom.

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An Analysis of Environmental Policy - A Systems Approach

Lizette JC McNeill, AECOM, Australia

Climate change has been a hotly contested issue for several decades, with governments world-wide only recently recognising the need to move to a more sustainable pattern of inhabitancy. The central problem is how to do so: with so many potential stakeholders, individual and corporate, even considering the concept of climate change is one fraught with difficulty.

This paper attempts to shed light upon the direction of climate change policy using case studies such as the Garnaut Review. It underlines some Systems Thinking methodologies that are available to us and have powerful potential for greater use in policy making processes. Systems Thinking, as a response to the deterministic age in which we live, can effectively serve to reshape the ways in which we think about these types of problematic situations. By employing Systems Thinking methodologies, we can involve multiple stakeholders in the initial problem-forming stages in order to achieve successful policy solutions.

In an area of such high political stakes as environmental policy and climate change, much needs to be done in order to halt the environmental regression of the planet. This paper thus explores the current debates and describes how Systems Thinking methodologies, such as system dynamics, could explain the relationships or interdependencies between policy, society, and the environment. It concludes with suggestions of how we might move forward, laying literary and conceptual groundwork for further systems model-making and analysis.

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An Agent of Change? Reflections and Insights on Implementing a Sustainability Change Program

Susanne Cooper, Sinclair Knight Merz, Australia

Objective

In 2007, Sinclair Knight Merz embraced a major company-wide objective to 'embed sustainability into all that we do', and invested in a global implementation program to deliver this laudable but lofty objective. This presentation traces the journey of designing and delivering this program, and the reflections around the lessons learnt along the way. The challenges and the responses are relevant to most organisations. Specific reference will be made to the individual professional who is interested in, or currently working with sustainability change at the project or organisational level.

Results

The presentation will address the key challenges, illustrated with practical examples of the activities and initiatives, and reflections of what worked well and why.

Some initial reflections include:

* the importance of understanding learning and behaviour change - not just sustainability content
* the value of hard-wiring is into business systems parallel to awareness
* the changed focus from the 'what and why' of sustainability to how, with the need for practical tools and approaches.

The above are relevant to all organisations seeking to embed sustainability into their policy, planning and project design.

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A Digital Future and Resource Depletion

Jackie M Carpenter, SWESE (Trelay), United Kingdom

This paper will look at the ways in which resource depletion will affect a digital future, both positively and negatively. We tell ourselves stories about the future, and various stories are considered. Global warming and the depletion of oil reserves will act as a positive driver to digital communication. As petrol becomes scarce and transport difficult, there will be a trend towards more home-working and digital conferencing. New economies will rely on local skills but on global knowledge, so the internet will become increasingly valuable. However, the manufacture, disassembly and reuse of electronic components will pose a significant challenge as resources such as oil, precious metals and rare earths become scarce. Is it possible that we shall be forced to turn our backs on the digital age sooner than expected, because the raw materials needed are no longer available? Looking at this wider picture, can we devise appropriate technologies

that provide the best way forward for the future? How can women help to address the resource depletion challenge? A conclusion is that technical women have a major contribution to make towards securing a resilient future.

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Sustainability in the Built Environment - Common Excuses and Solutions

Jillian M Hardie, Arup, Australia

Moira Sammut, Arup, Australia

INTRODUCTION

There is an increasing awareness of the need for sustainable solutions in the built environment with rating tools, corporate sustainability policies and CO2 reduction targets gaining media attention; however sustainable solutions are not always achieved in practical applications.

This paper will discuss the issues surrounding implementation of sustainable designs and provide some potential cost effective and achievable solutions.

BACKGROUND AND DISCUSSION OF ISSUES

Despite the general agreement that something must be done to develop sustainable building designs, a number of perceived barriers often lead to a lack of practical applications in existence. Constraints, including risk, cost, progress and aesthetics, can lead to concept ideas being disregarded.

This represents a potential missed opportunity to make a positive impact on the building industry, leaving the end user with not only a building with a smaller ecological footprint but also potential reductions on operational costs and long term return on investment.

THE WAY FORWARD

This paper will investigate a number of common barriers to implementation and suggest realistic solutions to negate these hurdles. The proposed solutions will lead the way in providing justification against the negativity often experienced with real life projects. It will discuss innovative solutions to enable code compliance with respect to sustainability and will consider both new build and retrofitting of existing buildings as these present different challenges.

Real life case studies will be presented to illustrate that it can be done!

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Trelay - A Sustainable Cohousing Community in England

Jackie M Carpenter, SWESE (Trelay), United Kingdom

Trelay Farm, a 32-acre agricultural holding, was acquired in April 2007 by a not-for-profit company SWESE (Trelay) Ltd. It is a cohousing mini-ecovillage in the South-West of England. There are currently sixteen residents across a wide age range, and the cohousing group is slowly expanding towards about 25 people. The aim is to live in a low impact, sustainable manner, working towards self-sufficiency in renewable energy, water, fruit, vegetables, meat, eggs and honey. Experimental research includes projects such as an interseasonal heat store and small-scale aquaponics. Educational work is important, with many different courses held in the beautiful surroundings of Trelay Farm, which looks over the Atlantic. The residents live in private living spaces but come together often to eat, socialise and work towards the community objectives. The essential values of the group are freedom and respect - respect for each other, their neighbours, their land, their trees and plants, their animals and their buildings. They work hard but they also have fun. As a member of this community, Jackie has kept a record of its development and will present her findings about how such communities can provide a beacon of hope in a world that she believes is moving through a transition to a low carbon localised future.

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Demonstrating Carbon Dioxide Capture through Pilot Plant Operation

Clare J Anderson, Cooperative Research Centre for Greenhouse Gas Technologies, The University of Melbourne, Australia

Kathryn A Mumford, Cooperative Research Centre for Greenhouse Gas Technologies, The University of Melbourne, Australia

Kathryn H Smith, Cooperative Research Centre for Greenhouse Gas Technologies, The University of Melbourne, Australia

Sandra E Kentish, Cooperative Research Centre for Greenhouse Gas Technologies, The University of Melbourne, Australia

Geoff W Stevens, Cooperative Research Centre for Greenhouse Gas Technologies, The University of Melbourne, Australia

Capture and storage of carbon dioxide (CO2) can have a significant role in the near-term reduction of CO2 emissions and thereby reducing the impact of global warming. Demonstrating capture of CO2 from emission sources on a pilot plant scale is a significant step towards commercialisation of carbon capture and storage technology.

As part of the Victorian Government's Energy Technology Innovation Strategy (ETIS), successful capture of CO2 from synthesis gas has been demonstrated using solvent absorption pilot plants located at HRL's Coal Gasification Facilities in Mulgrave, Victoria and International Power's Hazelwood Power Station in the Latrobe Valley, Victoria.

Performance results and operability issues associated with the pilot plants will be presented along with future research directions. Opportunities and challenges related to maternity leave and part-time work will also be discussed.

518

Steps to Attract and Retain more Female Engineers

Bethany G Indrawan, Hatch Associates, Australia

In 2010, it was found that 60% of female engineers felt that they need "to prove themselves where men are assumed capable." This study investigates the workplace conditions to complement surveys by professional bodies, such as Engineers Australia and APESMA, resulting in concrete steps forward to attract and retain more females to Engineering.

Contrary to other surveys about gender equality, this study used a survey with open questions. This was distributed to qualified female Engineers, including those who are not currently practising Engineering. By doing this, the author will be able to find reasons why women leave the profession and make more informed recommendations to attract more varied groups of women to Engineering.

A large proportion of the respondents quoted mentoring as one of the methods to attract more women into the engineering workforce. This can be supported by better publicity of the positive impact made by the presence

of female engineers in the industry. Additionally, better behaviour from male colleagues (and management) would assist in keeping them in the workplace; many women are still often mistaken for "admin staff" and feel unappreciated because of their gender.

It was found that personal as well as financial factors play an important role in someone's decision to enter, stay or leave the profession. A combination of flexible working hours and diverse, challenging work are the main factors that will keep women in their Engineering. Finally, equal recognition to their male counterparts will increase job satisfaction, which in turn increase retention.

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An Opportunity for Change

Angela E Hili, SMEC Australia, Australia

"Why are you questioning the system?! The system works!"

This paper will look at changing leadership opportunities for young women in engineering. It will discuss effective avenues to seek out, develop and manage their potential to become the future leaders and decision makers in engineering.

This will be achieved by an extensive literary review spaning the past 40 years in order to establish an historical picture of the place of women in engineering. It will map their professional development progress to date and identify the strategies that enabled advancement.

The identified strategies will be compared with new trends in leadership and management. This will be done in order to suggest positive ways to manage, train and develop opportunities for young women engineers to reach their potential in the workplace.

Do young women in engineering have the resources, support and opportunity to meet their potential?

The aim of this paper is to educate those in engineering of the progress that has been made over the last 40 years, explain the significance of these changes and suggest strategies to maximise the momentum of professional progress for young women in engineering.

Change is needed, and this is the opportunity.

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Secrets of Successful Women

Rosaline Ganendra, Minconsult Sdn Bhd, Malaysia

The objective of this presentation is to inform and encourage women of the younger generation of the achievements of women in engineering and the opportunities available to enable them to achieve their full potential as engineers and leaders. This presentation will touch on the following areas:-

(i) Success Secret 1- Successful People Realize The Importance Of A Mentor/ Advocate/Cheerleader/Coach, the role of mentor and finding a mentor.

(ii) Success Secret 2- Successful People Know How To Increase Their Visibility through professional portfolio, inviting yourself to be more visible, influence and visibility in the organization and making presentation.

(iii) Success Secret 3-Successful People Know How To Develop and keeping track of an effective network.

(iv) Success Secret 4- Successful People Have Learned To Communicate Effectively by one to one communication, improving one to one communication, being heard in meetings, business is business not personal, preparing yourself in the event of conflict, negotiating effectively, adapting your style to the environment and socialization.

(v) Success Secret 5- Successful People Know How To Balance Work and Home by knowing where to start, work and home, making choices, what organizations can do, strategies and balance and the workaholic.

(vi) Success Secret 6- Successful People Know When To Take Smart Risk by identifying barriers of a women, assertiveness as assets, overcoming personal insecurities and when do I take risk or leave a bad situation.

(viii) Success Secret 7- Successful People Understand The Politics Of The Organization when taking some risk, move ahead and overcoming bias.

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Barely Surviving or Trailblazing? Professional Life of Women Engineers in Shipbuilding, Mechanical and Construction Industries in Taiwan

Wen-Ling Hong, National Kaohsiung Marine University, Taiwan

Even though much effort has been given to attracting female students to engineering in Taiwan, they only consist about 12 % of all college engineering students. Never the less, we know very little about how women engineers start and thrive in engineering professions; or leave after all. In this research, we focus on the professional experiences of Taiwanese women engineers in three extremely masculine industries: shipbuilding, mechanical and construction. In-depth interview were conducted to gain understanding of their work life balance, professional performances, dealing with workplace culture and self-imaging. Interviewees' education backgrounds, family status, work years, job requirements are also taken into consideration when analyzing. The interviews reveal women engineers who work in an office setting feel marginalized by the workplace culture, which worships field experiences and male perspectives. A common thread among many of them is the non-existence of passions for engineering. They separate work and personal life definitely, some spend great effort in pursuing personal interests. Other field women engineers tell different stories. They immerge in the harsh field conditions using their own feminine ways for protections, or non-protection at all. They eagerly seek opportunities to be involved and interact with colleagues and subordinates of both genders. Attitude towards dealing with field practical work is clearly one of the key factors, among many found in this research, for women in engineering seeking a pleasant professional life. The result can be used to design a greater scale study in the near future.

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Good Practices to Promote Women in Science and Engineering: The Indian Context

Prerna Sohal, M/S Tandon Consultants Pvt. Ltd, New Delhi, India, India

Nilanjana Rao, DLF Universal Ltd., New Delhi, India, India

Rahul Gaba, Emergent Ventures India Pvt. Limited, Gurgaon, India

Emergence of India as a major economic engine has created not only a new marketplace for goods and services, but also created new competitors whose major strength lies in their vast resources of human capital. There is a growing consensus amongst Indian industry, academia and governing bodies that women make up half of the human resource pool available and if this talent is untapped development of the country is bound to suffer.

This paper presents the statistics of Indian women pursuing careers in the field of science and engineering and compares it with the potential that the country holds. Data were collected and analyzed from secondary sources like reports published by Ministry of Human Resource Development, Government of India, Indian National Science Academy, etc An analysis of the reasons for not being able to harness this vast potential and recommendations for the key steps that should be taken to address the issue are presented. Also, surveys were conducted at educational institutes and industrial organizations across the country to understand the success level of government policies supporting women in these fields. The surveys also help determine and validate the good practices which if enforced would considerably catapult the percentage of women engineers and scientists. Conclusions establish that, in India, gender disparity and traditional mindset are the major deterrent factors and reveal the immense scope of having several times more women engineers and scientists in the mainstream than the present level, thus corroborating the need to intensify efforts in this direction.

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Women in Engineering: The Illusion of Inclusion

Cheryl B Leggon, Georgia Institute of Technology, United States

The "illusion of inclusion" refers to the situation in which it appears that women are both better represented among engineers and more integrated into the discipline/profession of engineering than is is in fact the case. Often this illusion results from making the unwarranted assumption that academic degrees and professional certificates are synonymous with inclusion into the engineering profession; however, these are entry credentials only. Therefore, women with the requisite engineering credentials often can and do remain on the periphery rather than in the center of the discipline. Another aspect of the illusion stems from a little visibility going a long way; that is, seeing "one or two" women engineers is cited as evidence of women's inclusion in engineering. This paper explores the extent to which women are integrated into engineering by assessing relevant indicators such as the following: numbers and levels of engineering degrees earned; the numbers of women engineers in positions of decision-making (and controlling resources) in the public and private sectors-including academe; and peer recognition as operationally defined as awards, prizes, and memberships in honorific societies. Such indicators serve as powerful catalysts to developing, implementing, monitoring, and evaluating policy, programs, and practices at the national, regional, and international levels to enhance the genuine inclusion of women in engineering.

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Making Change Stick! - Systems for Sustaining Change

Alexandra L Meldrum, UNSW - AGSM., Australia

We've all seen the fads and fashions. Changes are here today and gone tomorrow. The challenge for many engineers who wish to make a difference, is "How do I create change which is sustainable?"

This brief workshop will provide some basic foundations for achieving "Change that sticks!" - sustainable change.

This workshop will define "sustainable change", then share some foundations for creating sustainable change:

- What is sustainable change, and why do we need it?
- A starting point - organisational diagnosis - strategy, structure and culture.
- Governance - what is this, and now does it help with sustainability?
- Don't take your eye off the ball! Accountability, monitoring and control
- A word of caution… Don't be trapped by Greenwash.

These foundations will draw on organisational models for sustainability, including a brief introduction to the systems model. This model can be applied to organisations, or sections of organisations.

Alexandra will draw on her academic teaching and on her personal experience managing change. This workshop will provide practical examples of each of the themes, and give participants some practical approaches to use in the workplace.

The insights developed will be applicable to a broad range of change management settings relevant for engineers who wish to create a sustainable difference.

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50/50 or 80/20: A New Way of Thinking About Gender Diversity

Joanne M Conradi, Parsons Brinckerhoff, Australia

Across all industries, our progress in achieving stronger gender diversity is not great. Despite best intentions, a 2010 Equal Opportunity for Women in the Workplace Agency (EOWA)report highlights that we have made little / no progress in the influence of women in senior management roles over the last eight years. Even within our own industry, we have witnessed little change in the gender profile, averaging a professional female population of approx 20%.

To date, the focus appears to have been on equality and achieving a more balanced representation of females, but we are yet to see any significant change. Perhaps it is time to change how we view this challenge. Perhaps an element of business logic - the Pareto Principle - holds the key to bring about a long term, sustainable change in gender representation in organizations. The Pareto Principle (also known as the 80-20 rule or the law of the vital few,) states that, for many events, roughly 80% of the effects come from 20% of the causes. Given that a 50/50 representation seems unlikely in our industry for the foreseeable future, perhaps it time to change our focus - to ensure the 20% representation we do have is sufficiently empowered and leveraged to achieve its maximum impact.

This paper proposes a Pareto approach for how we look at gender diversity in engineering / scientific organizations. Specifically, it considers a case study reviewing the gender diversity practices of the Australia-Pacific region of Parsons Brinckerhoff, a global infrastructure engineering consultancy.

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Engineering Career for Women: An Examination of Orissan Women's Less Access to and Retention in Engineering Careers

Dillip Pattanaik, IRMA-India, India

The enrolment of women in Engineering in India is far below what it should be. The decline in the rate of growth of women enrolling in engineering paints a fairly gloomy picture and has raised concerns among many engineering educators. Some of the underlying factors that may be responsible for the lack of interest amongst women towards engineering which need to be determine properly. There are several barriers in between. Engineering education is now highly commercialized even at primary and secondary level. Due to high enrollment fees, girls from low income families are not in a position to afford. This limited picture of engineering and technology education and profession primarily an urban phenomena in India where there is not much space for women from the middle class or poorer. It has also been found that increasing the enrolment of women in engineering depends very much on the manner in which the message about engineering is conveyed to students at the secondary level of education. Career options in engineering for girls are not well known by most adults, let alone teenagers, and are not well represented in high school curricula or through career guidance counseling. This affects girls disproportionately, as they typically have less access to information about engineering outside the school environment. There is a need of discussion of the matter at policy level to control the fee structure to facilitate better participation poor and marginalized girls in engineering education. My paper will give details on the said topic.

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The Formation of Women in Engineering: Townsville

Kelly A Stokes, Townsville City Council, Australia

Engineers Australia declared 2007 as the Year of Women in Engineering. In February 2008, the Careers Review of Engineering Women report was published, which showed that despite the efforts made in 2007, much remained to be done to ensure women engineers are considered an important part of the inclusive engineering team.

In response to this report, female engineers in Townsville sought to improve this situation, and formed Women In Engineering: Townsville in June 2008. Female engineers in the Townsville region wanted regular networking and social interaction with a professional society of female colleagues with similar experiences. The mission of the group is:

To promote and encourage professional women in engineering related fields in the Townsville region by:

- Providing a platform for open communication on aspects of their professional and personal development;
- Advocating the value and contribution of women in engineering; and
- Fostering the leadership capabilities of our members.

It was recognised that a "social" atmosphere produced the informal networking opportunities that our members desired, and so WIE holds combined events with other professional women's groups, and hosts casual drinks in a relaxed setting. The committee consists of volunteers, and committee members support one another in their roles, so that female engineers gain experience in leading and decision-making in a non-work environment.

This paper details how WIE Townsville was formed, how it operates, and gives tips to conference attendees on how they can form their own female engineer networking group, to encourage women into leadership and decision-making roles.

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Being a Female Engineer and Role Model - A Personal Perspective

Shya Jackson, Parsons Brinckerhoff, Australia

In the recent past there have been a number of articles presented for female role models. A number of women are profiled as epitomising the qualities required to attain success in their chosen fields and careers. There are initiatives for ensuring representation of Women on Boards and highlighting the diverse qualities that women bring to these roles. My question is "Do these role models provide incentive for the majority of women in the workforce" or are they simply in the class of elite "super models" that we mere mortals can only be in awe of. Does one woman who works part time and manages a team of professional staff mean that all women can be part-time managers within an organisation - is it therefore a right to not be hindered by your part time status or must one bring other qualities to the table to pull this off?

This paper explores the qualities that some women seek in order to gain inspiration to move forward with their chosen paths. What are the other qualities that are required to make this possible and what aspects of their personal lives, experiences, up-bringing and cultural

heritage also impact on bringing about a successful outcome for their careers. How much of this pathway is cleared by the initiatives advocated by business and the policies that are implemented.

I will showcase here what has worked well for some in the past and how we have managed around obstacles with humour and resilience.

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From Inception to Delivery: How Effective Use of Innovative Geospatial Technology adds Real Value throughout a Projects Lifecycle

Rachael Potts, Parsons Brinckerhoff, Australia

Guifen Lin, Parsons Brinckerhoff, Australia

Geospatial technology has rapidly developed in the last two decades and is now being called an "enabling technology". This is due to the benefit it offers a wide variety of disciplines such as engineering, environmental science, planning, geology, social science, finance and marketing. The growing awareness of geospatial technology has been aided by the advancement of technology leading to greater demand for geospatial services. Despite this, many are not aware of the innovative solutions geospatial technology can deliver.

Data management is a key element in controlling successful projects. Geospatial technology can provide the platform to manage data through a local or web interface. Accessible for the whole project team, spatial and non spatial data is placed in a central repository, enabling greater understanding of how information relates to the project. Spatial data visualisation and 3D modelling have been utilised for public consultation and design review, providing a visual medium and therefore a better picture of outcomes for key stakeholders.

Advantages that come by incorporating geospatial technology from inception to delivery on projects include greater collaboration across multi-disciplinary teams, stream-lined data management as well as methodical and quantitative support in decision making. At Parsons Brinckerhoff, geospatial technology has been innovatively applied to projects for organisations including ElectraNet, Origin Energy, Department of Transport Energy and Infrastructure, Powerlink Queensland and Department of Transport and Main Roads.

Ultimately geospatial technology is a valuable tool that should be used for the entire lifecycle, as it delivers results that contribute to the successful delivery of projects.

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Drinking Water Source Protection Planning in Remote Indigenous Communities

Natalie Fries, Parsons Brinckerhoff, Australia

Jamie Burgess, Parsons Brinckerhoff, Australia

Objective:

To protect quality and sustainability of water supplies in remote Indigenous communities in Western Australia, through application of a Drinking Water Source Protection Plan framework through the Remote Area Essential Services Program.

Methods:

A DWSPP framework was developed based on multiple barrier, risk-based approach to protect community drinking water sources. Defining a Water Reserve based on scientific methodology is the 'first barrier', with subsequent barriers being implemented at the water storage, treatment and distribution stages of a water supply system.

Within a Water Reserve, land uses considered hazardous to the drinking water source are restricted; the area is designed for the overall protection of the current and future water supply. Water Reserve boundaries are determined with consideration of the following:

* Hydrogeological setting
* Groundwater flow direction, and
* Potential contaminants of concern.

The establishment of water reserves in the communities was enhanced by a review of monthly bacteriological water quality data to determine effectiveness in treatment methods and demonstrate which communities were at high risk from water quality failure.

Results:

Through identification of communities experiencing microbiological derived water quality issues and determining where protection barriers were compromised, funding could be targeted to improve the effectiveness of water quality management approaches.

Conclusions:

The understanding and knowledge of water supply protection in remote communities by managers and residents is essential to the ongoing sustainability of these supplies and therefore these communities.

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Structure, Hydrogeology, and the Geothermal System of Mount Ungaran Area, Central Java, Indonesia

Sari B Kusumayudha, University of Pembangunan Nasional (UPN), Indonesia

Andriyanto P Markam, University of Pembangunan Nasional (UPN), Indonesia

Indonesia is well known as a country of volcanoes. There are hundreds active and dying volcanoes, one of which is namely Mount Ungaran. It is a Pleistocene age volcano, located in the Semarang region, Central Java Province. In the present time the volcano is identified being in its post volcanism stage. Some observable fact related to the stage of the volcano is there has been no more volcanic eruption record for a thousand year. In contrary, there exist fumaroles and sulfuric hot steam through fissure on the flank of the volcano. The geologic structures obtained at the surrounding area are reverse faults, strike slip faults, and normal faults. On the other hand, the hydrogeologic system is compiled of fractured complex aquifer system, containing volcanic breccias, sandstones, and lava deposits of andesitic to basaltic composition. Due to the high density of fractures, cracks, and faults, the aquifers are able to transmit surface water and groundwater down to contact with such hot plutonic bodies in the volcanic environment to perform geothermal system. This geothermal system is expressed by the occurrence of side and fissure fumaroles eruption. Therefore it can be stated that structures and hydrogeologic condition play important role to the occurrence of the geothermal system in the study area.

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Women Professional Engineers at Work

Ikuko Imoto, NPO The Geoecological Conservation Network, Japan

Yukiko Tanaka, I.N.O. Consulting Service Co., Japan

Keiko Yamamoto, Japan International Cooperation Agency, Japan

Aguri Nakano, Employment and Human Resources Development Organization of Japan, Okinawa Polytechnic College, Japan

Ryo Kimura, Sakae Sekkei Co., Japan

Nami Kubo, The Woman Professional Engineers Society of Japan, Japan

Maki Iwakuma, Environmental Monitoring Research Co., Ltd., Japan

We will approach situations and challenges of women engineers working for various companies and firms from different countries. Cultural and social situations of women engineers are supposed to be different from country to country. For example, in japan, many woman professional engineers, about 30% in ratio, experienced separation from their job. One of the reasons of the separation is a traditional gender difference of work role remaining in the society, which leaves child care and housekeeping works mostly to women. And women hardly become senior engineers as senior class engineers are required to work from very early morning until very late evening every day.

Five women will be invited to this workshop from different countries and they will report women's situation in companies, firms and various business scenes. From those reports we will share the cultural and social situation and problems which women engineers are facing now. A free discussion time will be a good occasion for every attendee to think and speak out one's situation, knowledge, and solution. The aims of this workshop are as shown below;

1) To share and understand other country's society and culture.
2) To create a new international relation and friendship among women engineers.
3) To exchange practical advices and future visions from various cultural backgrounds and experiences.

Five members to report are planned as two from japan, one from Korea, and one from other countries.

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Innovation Survey in Mozambique: Case Study in Business Enterprise Sector for Maputo Province

Julia Eva Baltazar Zita, Ministry of Science and Technology Mozambique

The Mozambique Science, Technology and Innovation Strategy (MOSTIS) was approved in June 2006. It makes the case for the stimulation of innovation to promote economic development and poverty reduction. One of the points raised in the strategy is the importance of the process by which individuals and groups "devise new ways to solve immediate problems" (Ministry of Science and Technology 2006: 55). The case study in probes the solution of immediate problems in private sector firms, and the economic consequences. This activity is a form of user innovation (von Hippel 2005)

The purpose of the study was to establish the presence of user innovation in firms that have been identified by the Mozambican National Innovation survey 2009.

Why User Innovation

- To explore the presence of user innovation in the firms that have been identified by the Mozambican National Innovation survey 2009.;

There are two important issues for the case study:

- The first is the type of innovation strategy that would support user innovation.;
- The second is the type of statistical indicators that could be developed to show the presence of user innovation in firms.

Contribution

- Probe the solution of immediate problems in private sector firms, and the economic consequences. This activity is a form of user innovation (von Hippel 2005);
- The focus is on the problem solving that helps the firms to move goods and services to the market;
- In firms that do not do R&D, the problem solving in the firm that creates value by improving the production process requires policies that are quite different from those that support R&D in the business sector;
- There is a second reason. Work by Gault and von Hippel (2009) suggests that firms that are user innovators have a higher propensity to give away, or freely reveal, the intellectual property that results from the problem solving in the firm. This has implications for intellectual property policy;
- This study will also provide the policy makers a useful tool for new policy measures for promotion of innovative activities in the country.

The Methodology

- Based on results of the Mozambican Innovation Survey 2009, 22 firms carrying out innovation activities were selected for Maputo province;
- A questionnaire fitting to the Mozambique situation was prepared and pilot tested. Note was taken of a 2007 questionnaire used by Statistics Canada (Statistics Canada 2008).;
- A personal interview approach was adopted to capture information;
- Information collected will be analyzed with respect to the different evaluation parameters and conclusions drawn;
- Based on the analysis a report will be prepared and published.

Some Results on Process Innovation

- Mainly your enterprise or enterprise group 62%
- Your enterprise together with other enterprises or institutions 23%
- Mainly other enterprises or institutions 15%

Enterprises doing it themselves

- Software development and modification of existing software
- Modification of equipment and procedures related to construction
- Modification of equipment and procedures on packing cement
- Modification of equipment and procedures on cleaning
- Modification of equipment and procedures on metal mechanics

Enterprises doing it with other institutions

- Modification of practices for cleaning services
- Modification on Graphic printing procedures
- Modification on Telecommunications services

Enterprises where other institutions did it

- New to the firm innovation in practices related to cleaning services
- New to the firm innovation in practices related to the production of hygiene products and cleaning

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Canadian Survey of Working Conditions for Engineers

Valerie J Davidson, University of Guelph, Canada

The "2010 Survey of Working Conditions for Engineers" provides a snapshot of issues facing Candian women and men in the profession, and builds on an earlier (1994) survey that covered key issues related to gender and engineering, including career and job satisfaction, access to opportunities and how women and men are viewed in the profession. The 2010 Survey reflects the changing nature of the profession to include issues around licensure, training, the role of mentoring, the impact of 'unwritten rules' in the workplace on both men and women, retention, the perceived experiences of discrimination and the availability, use and impact of leave. With more than 80% of women and men reporting they are satisfied with engineering as a career choice, there is some evidence of positive change in workplace conditions for women since the 1994 Survey. However, issues around work-life balance, advancement and access to opportunities remain, as do incidents of discrimination and bullying.

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Proximate Composition of two Paleamonid Prawns from Ovia River, Edo State, Nigeria

Flora Ehigiator, University of Benin, Nigeria

Ijeoma M Nwangwu, University of Benin, Nigeria

The proximate composition of the whole prawn, exoskeleton and edible portion of Macrobrachium vollenhovenii and M. macrobrachion collected from Ovia River, Edo State, Nigeria were determined. All parameters analyzed were present in all the body parts of the two species, but the crude fibre was not detected in the exoskeleton of M. macrobrachion. The proximate composition of the body parts of M. vollenhovenii for whole prawn, edible portion and exoskeleton was: 93.12%, 94.13% and 94.17% dry matter; 7.09%, 5.87% and 5.97% Moisture; 25.33%, 20% and 34.67% Ash; 74.6%, 80% and 65.33% Organic matter; 53.38%, 53.85% and 38.50% Crude protein; 11%, 15.67% and 4.67% Ether extract; 1%, 1% and 0.33% Crude fibre; 9.29%, 9.48% and 21.83% NFE; while for M. macrobrachion the values are: 92.66%, 92.37% and 94.43% Dry matter; 7.43%, 7.63% and 5.7% Moisture; 22.6%, 21% and 40.67% Ash; 77.33%, 79% and 59.33% Organic matter; 56.16%, 58.92% and 40.56% Crude protein; 10.33%, 10.67% and 6.67% Ether Extract; 1%, 1% and 0% Crude fibre; 10.18%, 8.41% and 12.10% NFE. There was no significant difference ($P>0.05$) in all the parameters analyzed for the two species except in the exoskeleton and the moisture content of the edible portion of that showed a significant difference ($P<0.05$). Proximate composition results showed that these prawns can serve as an alternative source of high quality protein for human consumption and for feed formulation for animals.

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Length-Weight Relationship and Condition Factor of Three Macrobrachium Species in Ovia River, Benin City, Nigeria

Flora Ehigiator, University of Benin, Nigeria

Cassidy J Agbogbo, University of Benin, Nigeria

The length-weight relationships and condition factors of three palaemonid prawns Macrobrachium vollenhovenii, (Herklots, 1857) M. macrobrachion (Herklots, 1851), and M. felicinum (Herklots 1918), from the Ovia River, Edo State, Nigeria were estimated. The length-weight relationship were determined using the Linear regression model $W = aL^b$. Weight growth in M. vollenhovenii, the mixed population and male of M. macrobrachion found to be positive allometric, indicating that these species gets plumber as it grows larger, while that in female M. macrobrachion was Isometric. M. felicinum, negative allometric growth. The condition factor was observed to be highest in M. felicinum. The implication of these findings to the assessment of the three palaemonid species in the Ovia River was discussed.

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Recent Trends in Rates of Student Enrolment in Cell and Molecular Biology Subjects in Relation to Gender Policy

Jedida A Kongoro, Kenyatta University, Kenya

About five years ago, the cut-off point for girl enrolment in the public universities in this countrywas lowered from 67 to 65, with a view to mitigating gender parity in tertiary education, as a means of alleviating poverty. However, the impact of this change has not been fully studied in the various areas of the curriculum. Understanding of the various aspects of molecular biology is important as it has an increasing bearing on agriculture, medicine and environmental issues. This study aimed at elucidating any changes that may have resulted from the gender affirmative policy, regarding student enrolment in molecular biology subjects, including biochemistry and molecular genetics. Results show a significant increase in rates of undergraduate girl enrolment in these subjects between 2005 and 2009, followed by a slight decrease from 2009 to 2010. However, great gender discrepancy still persists in enrolment, in favour of male students. Interestingly, the current enrolment rates among the postgraduates approach gender parity, although female students take much longer to complete thesis submission. These observations indicate the need for greater affirmative action in order to achieve greater parity among learners in tertiary institutions.

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Bioremediation of soil polluted with engine oil using mycelia and spent substrate of Pleurotus ostreatus

Lauretta Nwanneka Ofodile, Yaba College of Technology, Nigeria

This study was conducted to investigate the efficiency of substrate ramified with mushroom

mycelia and mushroom spent substrate of Pleurotus ostreatus in reclaiming engine oil polluted soil. Flasks containing contaminated soil from mechanic workshop moistened with distilled water were mixed with specific weight of mycelia and spent substrate of P. ostreatus respectively and incubated in the dark at room temperature for 10, 20, and 40 days. Levels of pH, total petroleum hydrocarbon (TPH) and heavy metals Chromium (Cr), Cadmium

(Cd), Lead (Pb), Nickel (Ni) and Iron (Fe) were determined before and after fungal treatment. Results showed that contaminated soil without mycelia or spent substrate had higher value of TPH but reduced after 10, 20 and 40 days of incubation with substrate ramified with mushroom mycelia or spent substrate respectively. The concentration of Cr, Cd, Pb, Zn, Ni, and Fe decreased significantly while the hydrogen ion concentration value increased. The reduction in TPH values as well as the reduction of heavy metals and slight increase in the hydrogen ion concentration by the fungus is of importance for the remediation of engine oil polluted soils because it suggests that the mycelia and spent substrate Pleurotus ostreatus could be used in the bioremediation of soil contaminated with engine oil.

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Tharwa Bridge

Macia Prelog, Aurecon, Australia

Introduction:

Tharwa Bridge, located in the A.C.T., is a four span timber Allan truss bridge originally constructed around 1895. It is the oldest four span Allan truss bridge in Australia and is considered to be of exceptional national heritage significance. Due to deterioration of the timber elements, the trusses and deck are being restored, keeping as close as possible to the original design intent, whilst adhering to a very detailed conservation management plan, and making the necessary modifications to be in accordance with AS5100 Bridge Code and AS1720.1 Timber Design Code.

Innovative modifications to the design have been made to enhance the durability and capacity of the structure. This paper discusses the design innovations adopted to solve a number of construction challenges and enhance the long term durability of the bridge including:

- Bottom chord of truss, which is normally timber was replaced by steel with timber fascia
- Increase in durability of timber elements through painting and flashing protection
- Low temperature, high grade steel for the specific environment
- Quality management of timber sourcing and preparation to minimise wastage
- Strengthening to the approach span piers using new generation carbon fibre technology
- Strengthening and protection of main span concrete piers against flooding
- 110m long stressed laminated timber (SLT) deck, to be constructed away from the bridge and launched into position over temporary rollers. This is understood to be over double the longest SLT deck span launch ever undertaken
- Reducing impact to local community by minimising road closures

Each step of the design process has involved refinement through consultation with Roads ACT, RTA NSW, ACT Heritage, timber specialist Keith Crews and a peer review team. Constructability has been improved by utilising the existing skills of the RTA Bridges team and Ray Taylor for the SLT deck.

This project embodies the key to successful future restoration works through close collaboration, thereby achieving the best outcome for all parties involved.

The work is scheduled for completion in April 2011.

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Growth Analysis of Smartphone Market

Saira Zahid, University of Dundee, United Kingdom

Smartphones are pervasively and ubiquitously integrating into our on-the-move digital work environments by replacing laptops and conventional mobile phones. The main reason of their popularity is all-functions-in-one-device philosophy. Smartphone market is one of the fastest growing markets in the world today but there is hardly any detailed research that studies its dynamics. This paper is based on two analysis, first the demand analysis and second the forecast analysis of smartphone industry. In demand analysis, two models have been proposed to underline the factors that are playing a crucial role in today's smartphone market. First one is the "Aggregate Demand Model" which explains the factors affecting total demand/sales of smartphones in a region. This model has been applied on US and China markets. "Company Demand Model" explains the factors affecting worldwide demand/ sales of a particular company within the industry. Demand analysis of four biggest smartphone manufacturers namely Nokia, Research in Motion (RIM-Blackberry), Apple and HTC has been done using this model.

In forecast analysis, Holt-Winters and deterministic trend regression technique has been found to fit the data best. On the basis of these two techniques future sales of smartphones have been predicted for the period of 2010-2014. The analysis concludes that the smartphone industry will grow with a CAGR of almost 27% in the next five years with US and China as promising markets. Nokia's growth will be slowest while Apple and HTC will grow quickly over the years to come.

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Power: An Attribute of Software?

Veronica VN Akwukwuma, Universityof Benin, Benin City, Edo State, Nigeria., Nigeria

Emmanuel A Onibere, Universityof Benin, Benin City, Edo State, Nigeria., Nigeria

In many fields such as engineering, power is defined and hence its presence in engineering products is identifiable. In Software Engineering however, the attributes of Software that make Software powerful have not been identified neither has there been a precise definition of Software power. Yet, the term 'powerful' is so often used to describe Software products. The question is: On what basis are software products referred to as powerful by the Software community?

The objective of this research was to find out if power is an attribute of software products and if that is the case, what are the attributes of Software that impact on Software power?

A comprehensive list of Software attributes was compiled in the form of an open-ended questionnaire. The instrument was designed to assess the respondents' opinion on what attributes of software impact on Software power. The instrument was administered to Software engineers, Software developers and sophisticated users of software, Electrical /Electronic engineers, IT and IS engineers, physicists and computer Scientists.

The data collected revealed that all the respondents endorsed more than one attributes of Software as having impact on Software power. From the research findings, a list of composite attributes of software power was derived. The presence of these attributes in a software product indicates the presence of the quality attribute, power, of the software product.

It was then concluded that power is indeed a composite attribute of software and hence should be added to the growing list of software attributes.

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Installation of Biogas Plants for the Mitigation of Global Warming in Uganda

Wilbrod Birabwa, Solar promotion, Uganda

Uganda is one of the countries that subscribe to the concept of global warming mitigation. It is therefore the reason why all types of global warming reduction technologies are promoted.

The objective of the installation of biogas plants is to check deforestation and reduce global warming subsequently. This technology is mainly used for cooking activities. Over 70% of Ugandans use firewood and charcoal to prepare meals. After the production of biogas, the residue is used as manure.

Biogas production is through anaerobic digestion of organic waste. The fermentation process is carried out by the bacteria in an airtight tank called the digester. Biogas is composed of CH4 (methane) and CO2 (carbon dioxide). The percentage of composition vary according to the organic material used to feed the digester but the ranges are 60% to 70% for CH4 (methane) and 30% to 40% for CO2 (Carbon dioxide).

Results from this project are that effects of global warming have been checked, clean energy has been accessed, deforestation has been checked, cooking has been made easy, technical information has been disseminated and many others.

In conclusion therefore, biogas technology is multi- purpose. This is highly evidenced by the objectives and the results. The major objective is to reduce global warming, but while doing so, clean energy is accessed and pulmonary diseases avoided, deforestation is checked, cooking is made easier, technical information is disseminated and at the end of the process manure expelled from the digester is utilized. The technology checks adverse chain reaction.

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Attracting, Developing and Retaining Women Engineers and Scientists

Rufina Dabo, Ministry in charge of education, Senegal

To attract, develop and retain the women engineers and scientists, it is better to start by giving a report about the girls and the women from the school to the university and the world of work. In a context of rejection of sciences by the girls on a world level, Senegal suffers from the deficit of women scientists.

The educational community in Senegal agrees on the weakness of manpower of the girls especially the scientific studies. According to the national Report on the situation of education (ME/DPRE, 2009), the share of the girls in manpower of the scientific series is 35.4%.

The major objective is to be able to increase women in the world of work by girls scientific education.

Several methods can be tested to attract the girls:

1. Scientific awakening
2. Sensitizing
3. Scholarships
4. Presentation of scientific Role-models
5. Organization of meetings at the national and international level (ICWES, others)
6. Creation and animation of associative entities of networks (International INWES, INWES Africa, others)
7. Professional insertion without discrimination

The anticipated results go in the direction of having more women in the world of work. The women represent more than 51% in the world population. Their scientific competences and others must be taken into account in the durable development by their leadership and their capacity of innovation.

In conclusion, it is desirable to have initially a political goodwill, best practices to enable girls earlier in science in order to attract, develop and retain women".

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Architecture as a Profession for Women in India

Monicca Jaain, Intercontinental Consultants and Technocrats Pvt. Ltd, India

Objective: Understanding the obstacles to gender parity in architecture,as well as a range of statistics concerning women's education and employment in India.

Method: A statistical analysis of the ratio of male to female architects in terms of the current scenario of 110 architecture schools across India,education facilities,self-employment and age group comparisons in consultancy firms.Case studies of Indian women's contribution in the world of architecture are highlighted.

Result: A cornerstone of this discourse is the identification of engineering and technology as a masculine profession. India being a mega-nation state, encompassing an array of indigenous cultures and ethnic populations experiences high rates of economic growth and demand for skilled professionals.Reasons pertaining to Women's avoidance of aggressive participation in some technical activities and males'monopoly should be addressed which may otherwise handicap women as they move ahead.

Conclusions: Attracting and retaining women in the workforce is significant as in spite of our large young population, it is now acknowledged that we are short of critical talent in various sectors. In approaching the comparison of the complexities of women's enrolment in engineering programs in India, the histories of modern engineering education and the cultural configuration of gender regimes developed through the interaction of traditionalism and modernity must be grasped to provide valid interpretations for the development of policy initiatives. The case studies prove the exorbitant change in their recognition showing an extensive involvement in international practice, research, low-cost housing, sustainable design, activism and historic preservation and conservation.

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Chemical Information Service through Information Technology (IT)

Myung Hee Jung, Research and Policy Center for Chemical Technology, Korea Research Institute of Chemical Technology, Korea

The Research and Policy Center for Chemical Technology at the Korea Research Institute of Chemical Technology (KRICT) runs a portal site that serves professionals who are in need of information related to fine chemistry in Korea. The support of the Korean government over the past 40 years has resulted in a remarkable growth in research and development (R&D) in the chemistry fields. Moreover, at KRICT, scientists at the Bio-Organic Science Division, Advanced Materials Division and Green Chemistry Division have accumulated valuable resources including research papers, patents, conference papers, and materials of group study projects over its 35 years of history. With the belief that a centralized collaborative web portal would be beneficial to the Korean fine chemistry community, the "Chempolicy" portal site as a service hub of chemical information has accumulated these resources and opened them to the chemistry public in Korea. Since its opening 4years ago, efforts have been made to establish the infrastructure. The site has especially become an information window to the Korean pharmaceutical industries and drug development specialists by providing medical and pharmaceutically pertinent chemical information. "Chempolicy" currently has over 3,200 members among which 800 are corporate members. Since 2010, in order to encourage information exchange and networking among those in convergence technology, homepages of specialized research groups are open for fast and reliable communication on the web. The chempolicy portal wishes to continue being a site for information exchange and sharing, especially for those who are in need of collaborative research in the chemistry field.

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Art and Science of Anatomy: Hemi-section of the Head and Neck

Alexandra Koba, San Francisco State University College of Sciences and Engineering, United States

Laura Johnson, San Francisco State University, United States

Knowledge of the structure of the human body from what can be seen with the unaided eye (gross anatomy) down to the molecular level is fundamental to understanding bodily function and how both structure and function are modified by disease. A Hemisection, or sagittal section, is by definition a cut dividing the body into left and right equal portions. The purpose of performing a Hemi-section is to study and observe the relationships between the various anatomical structures. Studying the Hemi-section was primarily to master the head, neck, and chest because they are of particular interest to anatomists as this is the center of our sight, hearing, digestion, respiration, and many other functions in the human body. A Hemi-sectioned cadaver has provided a unique view of the complexity and intricacy of the head and neck which is all too often left unexplored due to the convolution of the tools needed to perform this dissection.
Keywords: Hemi-section, Saggital, Cadaver, Disease, Head and Neck.

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Novel Lattice-Reduction-Aided Receiver for Multiple-Input Multiple-Output Satellite Communication Systems

Dong-Young Kwon, Korea Aerospace Research Institute, Korea

Na-Young Lee, Korea Aerospace Research Institute, Korea

Moon-Jin Jeon, Korea Aerospace Research Institute, Korea

Day-Young Kim, Korea Aerospace Research Institute, Korea

Gyu-Sun Kim, Korea Aerospace Research Institute, Korea

In multiple-input multiple-output (MIMO) satellite communication systems, the lattice-reduction-aided (LRA) receiver is the modified zero-forcing (ZF) receiver scheme, which perturbs data symbols to makes ill-conditioned channel condition to well-conditioned. As increasing the number of antennas, however, the performance of LRA-receiver is significantly degraded by antenna correlations. In this paper, we propose the novel lattice reduction aided (LRA) MIMO (Multiple-Input Multiple-Output) receiver, which is used dual-basis reduction algorithm instead of the conventional primal-basis reduction algorithm. The proposed scheme has lower antenna correlation than conventional LRA-receiver, especially when the number of the antenna is large. From the simulation results, we show that the proposed scheme has better bit-error rate (BER) performance than the conventional scheme. In spite of the performance enhancement, the computational complexity of the propose scheme is the same as that of the conventional.

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University-centered Policy for Female Entrepreneurs in Taiwan

Tien-Chi Lin, National Cheng-Chi university, STPI/NARL, Taiwan

The local and regional universities take the important roles in entrepreneurship promotion in Taiwan to create more start-ups. The central government develops the support system based on universities as platforms to reach potential entrepreneurs. The objective of the paper aims to disclosure and discuss the funding, business model, information and social support system from government and universities to the female entrepreneurs in Taiwan. The methodology is based on Triple Helix perspectives, through data collection, paper review and in-depth interviews with the related stakeholders to construct the concept to evaluate the University-centered support system. The conclusion goes that female entrepreneurs can get enough management and funding support to start their own business, however the social caring system for child and elders still not enough to release the pressure of the female entrepreneurs, and that become the key factor whether or not female entrepreneurs can run a new start-up successfully.

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Woman Entrepreneurship to get Bioproducts - The case of Bacillus Thuringiensis Biopesticide

Iracema Oliveira Moraes, PROBIOM TECHNOLOGY, Brazil

Samara Ernandes, UNILAGOS, Brazil

Regina Oliveira Moraes Arruda, UNIVERSIDADE GUARULHOS, Brazil

Rodrigo Oliveira Moraes, PROBIOM TECHNOLOGY, Brazil

It is very important to do research and development but, if you can install a small enterprise to do this, you can develop a serie of bioproducts. After 40 years in the university, Dr Iracema Moraes, decided to change the activity and in 2004 was created PROBIOM TECNOLOGY. The bacteria Bacillus thuringiensis var. israelensis (Bti) is one of the microorganisms used to develop a bioproduct. It generates certain toxins with pesticide action, which can be used on the control of transmissible diseases by culicides, specially Aedes aegypti, the dengue´s vector. This biopesticide has been produced by submerged fermentation or by solid state fermentation and Brazil import this type of product. For the implementation of a viable vectors control program through biopesticides, some studies about culture media are essential in order to join efficiency and low costs. So, agroindustrial wastes or by-products have been utilized as nutrient source for the culture media production. In this study, corn steep liquor, a corn industrial processing by-product and triptose, both with / without sugar addition, were compared as culture media. Cellular growth was evaluated by optical density at 620nm, spore production by total viable cell count and LC50 by bioassays against 4th instar larvae. Among the four examinated substrates, the medium composed by glucose plus corn steep liquor presented the better spore production and bioassay results. Celular concentrations were more than 10-8 and the mortality of the larvae was very high, roughly 100%.

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Biotechnology for Economic Empowerment of Farmers

Mary N Mwangi, Biochemistry and Biotechnology Department, Kenyatta University, Kenya, Kenya

Maina M Mwangi, 3Department of Agricultural Science and Technology, Kenyatta University, Kenya

Jessica N Mbaka, Kenya Agricultural Research Institute, Kenya

In Kenya, the banana tissue culture technology (TC) was introduced in 1996. By 2001, 107600 plants had been planted by about 5000 trained farmers. By 2004, the technology had been adopted by over 500 000 farmers. This intervention greatly revamped banana production, increasing the total yield from 98000 in 1996 to 153000hg/ ha in 2007, the quantity produced from 250,000 to 1.2 million metric tonnes and area harvested from 25000 to 77000 hectares. Total annual consumption also increased from 178000 tonnes in 1996, to 190000 in 2003. Yield losses caused by pests and diseases also reduced considerably. However, TC technology adoption remains low, due to limited knowledge and inaccessibility to clean planting material. A recent survey reviewed that only 10% of farmers are aware of the technology and less than 5% actually grow TC bananas. Also, many farmers who previously embraced the technology have reverted to conventional seedlings, with 60% obtaining suckers from their farms and 30% from their neighbours. Currently, TC seedlings are sold by 3 private companies and 2 public institutions. All except one are located around the capital city. At an average cost of US$1.5, the seedlings are out of reach of the majority resource poor farmers. They are also more delicate and susceptible to drought, pests and diseases. There are also misconceptions about the technology as some farmers perceive TC bananas as GMOs. Considering the economic potential of TC, it is recommended that concerted efforts be made to address the technology adoption setbacks among Kenyan farmers.

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New Method of Thermoluminescent Dosimetry of Complex Radiation at High Energy Accelerators and Thermonuclear Fusion Facilities

Barbara Obryk, Institute of Nuclear Physics (IFJ) Polish Academy of Sciences, Krakow, Poland

Radiation monitoring in and around large nuclear installations is a demanding task. There is a large and growing number of such installations for electricity generation (441 nuclear power plants in operation, 63 under construction and several hundred planned) and for cancer treatment (over 60 in operation and under construc-tion). Radiation protection has to cover not only protecting people but also electronic equipment used in these facilities. Monitoring of radiation field in such case may require several thousands dosimetric devices, so passive dosemeters have to be applied, as they are cheap and reliable.

The thermoluminescent (TL) detectors are well developed technology in the field of passive radiation sensors. Very popular among them are lithium fluoride TL detectors. The MCP (LiF:Mg,Cu,P) detectors, due to their very high sensitivity and a simple signal to dose relation, are now becoming standard in modern environmental TL dosimetry, they are able to measure doses at microgray levels, even below.

The new method (based on own recent discovery of high temperature high dose TL emission: B.Obryk, PhD thesis) has been developed and tested. This method allow to measure doses in the range of twelve orders of magnitude with the single TL (LiF:Mg,Cu,P) detector. This method for ultra-high dose range monitoring can be used for dosimetry at high energy accelerators, especially at LHC at CERN where it is already applied, thermo-nuclear fusion facilities (e.g. ITER, Cadarache, France and ESS, Lund, Sweden) and in particular has a great potential for accident dosimetry.

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Expression of HCV Core Antigen (121aa, 174aa) Fused to HBs-Ag Gene in Transgenic Potato Plant

Hamideh Ofoghi, Biotechnology Dept. IAT, IROST. Tehran, Iran, Iran

Nina Sharifi, Biotechnology Dept. IAT, IROST. Tehran, Iran, Iran

Farzin Roohvand, Dept. of Hepatitis and AIDS, Pasteur Institute of Iran, Tehran, Iran, Iran

Transgenic plant cells are ideal bioreactors for production and oral delivery of vaccines by eliminating the need for expensive fermentation, purification and cold storage. Various antigens and antibodies have already been expressed successfully in plants and shown to retain their native functional forms.

Hepatitis C virus (HCV) infection poses a serious health problem and causative agent of chronic hepatitis worldwide. Presently, the virus cannot be grown in tissue culture and there is no vaccine or effective therapy against it. Among HCV proteins, core antigen (Ag), besides its importance for diagnostic application is a prime candidate for component of a vaccine.

The aim of this study is to clone and express hepatitis C virus (HCV) core (121aa and 174aa) genes in transgenic potato. The core fragments were amplified by specific primers from pIVEX-2.4 , subcloned in pBI121 binary vector in N-terminal of hepatitis B surface antigen (HBsAg) under the control of 35S CaMV and Nos terminator. The accuracy of expression cassettes were tested by restriction enzyme analysis, sequencing and PCR. Agrobacterium tumefaciens pGV3850 cells were transformed with the pBI121-HBsAgHCV121 and HBsAgHCV174 by freeze and thaw method. In vitro grown mini-tuber discs of solanum tuberosum, Kardal were transformed using recombinant Agrobacterium tumefaciens. Transgenic shoots were regenerated in selective medium containing 100µg/ml kanamycin.

Molecular analysis, including PCR, RT-PCR, Western and Northern dot blot hybridizations showed that HCV core antigens have been successfully expressed in potato transgenic plants and resulting transgenic potato could be used for immunological inspection as a vaccine candidate in animal lab.

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Attracting Girls to Physics, Developing and Retraining Them

Francisca N Okeke, University of Nigeria, Nsukka, Nigeria, Nigeria

One of the vital ingredients for development of any nation is based on the knowledge of the field of basic science, of which physics is the root source. Okeke, (2004) noted in her work that there is very poor enrolment of women in the field of science and technology at both secondary and tertiary levels of education, particularly in physics. Part of this poor enrolment, she attributed to the fact that, in the past, science optimizes the male characteristics of competitiveness and aggressiveness among others. While the characteristics that are most worthily accepted for females in our societies include; passivity, emotionality, intuition and receptivity. These contributed strongly to sciences, in particular, physics being regarded as a male, not a female domain. This aspect, though, could be regarded as old ideology, still has a great influence in involvement of most African women in science and technology. This has great impact on women in Africa, in choosing science as a course career in our countries. It is the aim of this study to carry out survey and employ statistical analysis to address this problem. This paper addresses strategies for encouraging girls in choosing physics as a course career. Teaching of physics to girls from secondary schools, using the suggested tools and ideas will go a long way solving the existing problems facing women in engineering and sciences. Consequently, the development and retraining follows with the achievemnet of attracting them.

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Problems in Urban Infrastructure Development in India and Innovative Engineering Solutions

Prerna Sohal, M/S Tandon Consultants Pvt. Ltd, New Delhi, India, India

Urban productivity is highly dependent on the efficiency of its transport system to move labor, consumers and freight between multiple origins and destinations. Urbanization has thus spawned a combination of short bridges and long elevated structures, fulfilling their utilitarian function of permitting traffic to cross over obstacles like roads, rail tracks, rivers, etc. and providing signal free highways across the Indian cities.

However, to disregard the repercussions of implanting a large and permanent structure within the existing environs can have detrimental effects on the very environment it is trying to improve. The construction technology, building material, durability, construction methodology, architectural shape etc should be studied in the conceptual stage of the project in great detail so that the detrimental effects on the environment can be minimized if not completely nullified.

Whatever be the size of urban transportation structures, the physical constraints, above and below ground, pose the biggest challenge to planning. While physical constraints above ground can be visualized in advance and taken into account in the design stages, the location and identification of haphazard underground services throw up greater problems.

Vandalism and terrorist activities have unfortunately become synonymous with urbanization, and it has become increasingly important to focus on strengthening the urban infrastructure and minimize their potential of being regarded as 'soft targets'.

This paper aims to illustrate some of the appropriate and flexible design and construction technologies implemented in Indian cities so that the issues outlined do not become irrevocable roadblocks.

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Innovative Performance Diagnostics of Wheelchair Athletes: Application of Fractal Dimensions for Signal Processing

Clara C Usma-Alvarez, RMIT University, Australia

The Cooper's test is one of the most important performance and training tests across wheelchair athletes. During the Cooper's test, only distance travelled over 12 mins results in performance margin. Behaviour of athletes during test time is disregarded. It is unclear when fatigue occurs, and whether fatigue affects the acceleration amplitude of pushes and/or push frequency. This project aims to determine changes of performance during entire test with a new continuous method of performance analysis.

Methods: Australian wheelchair rugby Paralympians performed test under familiar procedures. A software was developed which calculates the fractal

dimension (Hausdorff dimension), continuously for a 2.5 second sliding window. The Hausdorff dimension depends on the signal amplitude and frequency, and represents the performance of an athlete as a single parameter where the higher the push frequency and acceleration amplitude, the higher the performance.

Results: Performance levels of the athletes investigated correlated well with the distance measured. Some athletes maintained a constant performance throughout the test whereas in others, fatigue set in after 2/3 of the time, resulting in a linear performance decrease.

Conclusions: This innovative performance method allows performance monitoring over entire time instead of getting a general result at the end of the test. The trainer is able to detect performance cause and use game strategy with available players instead of just learning the test's effect thereof (distance). Further innovative aspects include successful applications of fractal dimensions for signal processing and quantification of the athletes' performance expressed as a ranked value and visualised with time.

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Construction of Sheds as a Good Practice of Adaptation to Climate Change

Griselle F Vega, Sustainable Human Development Institute, Peru

In the southern highlands of Peru, the weather has serious effects for alpaca producers, because the young alpacas are vulnerable to diseases caused by cold weather. In order to avoid this situation, we adopted the construction of structures that protect animals, especially at night and in periods in which there are severe cold weather conditions. The sheds are very effective, but the low economic status of families involved in alpaca farming is not allowed to have economic surplus for this type of investment, even when they are very aware of the economic benefits if they will do these constructions. The realization of these structures was signed between the Regional Government of Ayacucho, the regional Agrarian Direction and Association of Alpaqueros. The design of sheds is done at modular level and the population built with the community cooperation. This structure of protection decreased the mortality of newborns, but only a few producers would do about the high cost. These sheds are used as places for healing animals. Well-designed sheds used to collect the feces of animals and use them in the pasture improvement.The construction cost is $ 875. As a result we have that the level of mortality of alpacas down 11% to 5%, which corresponds to 4 of 73 alpacas per family. Earns $ 751 per implementation of sheds, socially it will help reduce migration in the community. Environmentally the shed allows safe handling of animals.

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Characterisation of Salmonella Isolated from Nile Tilapia (Oreochromis Niloticus) Along Lake Victoria Beaches in Western Kenya

Sarah Awuor Wandili, Kenya

Background: Food borne Salmonella infections have become a major problem world wide. Chemotherapeutic selection may have additional consequences for virulence evolution through acquisition of linked virulence genes. However, there is scant information on likely reservoirs and sources of infection. This study aimed at characterization of Salmonella isolated from Nile tilapia (Oreochromis niloticus L.)

Methods: The study was carried out in selected beaches along L. Victoria in Western Kenya between March and June 2007. One hundred and twenty fish specimens were collected. Salmonella isolates were confirmed using serotyping, biochemical testing in addition to malic acid dehydrogenase (mdh) and fliC gene sequencing.

Results: Twenty Salmonella isolates were confirmed by mdh gene sequencing. Nine (45%) were S. enterica serotype typhimurium, four (20%)were S. enterica Serotype, enteritidis and seven (35%) were S. enterica serotype typhi.

Conclusion: Nile tilapia have a role in transmission of Salmonellosis in the study area, poor sanitation was a major cause of pollution at the beach inshore waters.

Keywords: mdh, fliC

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Solid Acids: Phosphate - and Titanium Phosphate - Functionalized MCM-41

Galina M Zaitseva, Kiev's National Medical University, Ukraine

Tatiana V Kovalcuk, Ukraine

Mesoporous molecular sieves Si-MCM-41 (purely siliceous) and Ti-MCM-41 (containing a surface layer of TiO2) was modified with phosphate groups using POCl3. With the use of TEM, X-ray diffraction and N2 adsorption it was shown that the initial hexagonal structure, the high specific surface area and porosity are retained in the modified materials but are not as good as in the starting materials. 1 MAS NMR and 31P MAS NMR revealed that the surface of Si-MCM-41(P) consists of silicon phosphate and pyrophosphate species. That of Ti-MCM-41(P) additionally contains titanium dihydro-, hydro- and pyrophosphate species, the last being slightly predominant. TPD of ammonia for Ti-MCM-41(P) revealed the presence of medium and strong acid sites. The functionalized materials were active in the esterification of acetic acid with ethanol. The catalytic performance of Ti-MCM-41(P) was poorer than that of Ti-MCM-41, but both were relatively stable in two consecutive runs, whereas the activity of Si-MCM-41(P) fell markedly, probably due to hydrolysis.

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Woman in Engineering in Poland and Eastern Europe from Marie Curie untill Today

Lidia Zakowska, Cracow University of Technology, Poland

The goal of this work is to present the changes of women model in Engineering Education in Poland and in Eastern European countries.

From early 90. of past century the number of women studying at universities in Poland raised fife times, while men only four times. There are more women studying at those faculties, which were regarded as typically males, like technical ones. Polish women create 31 % of all students at technical universities.

However, only 7% of key positions in engineering scientific board members are represented by women.

The fact that more women are working to obtain engineering degrees overall does not necessarily correlate with an increase

in women working in the key jobs in engineering research and education. Many factors affects the development of academic career in engineering. Women's and men's path tend to diverge as women are promoted more slowly and as they abandon engineering work for other fields. Many girls are influenced by stereotypes that certain jobs are for men only. Much talent is being wasted if women turn away from engineering careers, and as women in engineering universities become discouraged by discriminatory treatments. With these disadvantages it can be difficult for women to play the key roles that lead in turn to promotion opportunities.

Stereotypes still exist. The author discuss the past and the present position of women in men dominated engineering community. The future tendencies and chances are also shown, with promissing examples.

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Studies on the Effect of Nigerian-like Diet on Cadmium-induced Infertility in Male Rats

Martina A Adaikpoh, UNIVERSITY OF BENIN, BENIN CITY, NIGERIA, WEST AFRICA, Nigeria

Fredrick O Obi, UNIVERSITY OF BENIN, BENIN CITY, NIGERIA, WEST AFRICA, Nigeria

The Nigerian diet is speculated to be effective in protecting against male infertility. This study was designed to establish or disprove this claim. Male Wistar rats (n=36) were divided into 3 groups; Control (n=12) and test groups (n= 24); divided into groups that received Cd only (CdT) and cadmium plus Nigerian-like diet (CdNd). Cadmium chloride, 5 mgkg-1 bd. wt.sc was administered only on day 1 of the 28 day study period. The testis, epididymis, prostate and blood from 7 rats in each group was used for biochemical and/ or histological studies. The remaining 5 males were exposed to females in the ratio of 1male: 2 females for 17 days, at the end of which the implantation sites in the females were examined for reproductive success. The CdT treatment significantly ($p<0.05$) increased catalase activity, malondialdehyde and cholesterol levels in the testes and serum Luteinizing hormone (LH)and deformed sperm cells relative to the control. Superoxide dismutase activity, Testosterone/LH ratio, epididymal sperm count and motility were significantly ($p>0.05$) reduced relative to the control. The Nigerian-like diet significantly ($p<0.05$) reduced testosterone and did not provide any significant protection against cadmium-induced alterations in the antioxidant parameters, LH, Testosterone/LH epididymal sperm count, motility and testicular cholesterol levels relative to the control. No successful fertilization was observed in both the CdT and CdNd treated rats when compared with the control. This study has demonstrated the inability of Nigerian-like diet to protect against cadmium-induced testicular dysfunction and infertility in rats.

Key words: Nigerian-like diet, cadmium, infertility.

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Perchlorate Biodegradation using Solubilized Waste Sludge

Yeonghee Ahn, Dept. of Environ. Eng., Dong-A Univ., Busan 604-714, Korea, Korea

Myoung Gyu Ha, Busan Center, Korea Basic Science Inst., Busan 609-735, Korea, Korea

Myoung Gyu Ha, Busan Center, Korea Basic Science Institute, Busan 609-735, Korea, Korea

Perchlorate is a major contaminant of soil, surface and ground waters. It is very soluble and chemically stable in water, resulting in extensive pollution in the environment. Perchlorate has been shown to block iodine uptake into the thyroid gland and cause a reduction in thyroid hormone production. Reduced level of thyroid hormone results in problems in metabolism and growth. Biodegradation of perchlorate is method of choice to remove perchlorate in the environment since microorganisms mineralize it to nontoxic end products such as Cl- and O2 while physicochemical methods transfer perchlorate from one medium to another. Conventional biodegradation of perchlorate employs relatively expensive organics (e.g., acetate, methanol, ethanol, etc) as electron donors for perchlorate reduction. In this study, feasibility of perchlorate biodegradation was batch tested by using solubilized waste sludge as an electron donor for perchlorate-reducing microorganisms. The batch test employed activated sludge as an inoculum. Solubilized sludge was prepared by microwave-treatment of waste activated sludge obtained from a local wastewater treatment plant. The solubilized sludge contained organics originated from disintegrated microbial cells in the waste sludge. The organics would serve as economical electron donor and carbon sources for perchlorate biodegradation. Result of batch experiment showed solubilized sludge could be used economical electron donor and carbon sources for the microbial perchlorate removal. The result also suggested that employing solubilized sludge for perchlorate removal resulted in additional advantage, treatment of waste activated sludge.

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River Water Flow Modeling Under Climate Change in Kura-Araks Basin

Nelli A Ajabyan, The Center for Ecological-Noosphere Studies, the National Academy of Sciences, Armenia

In this paper a model for heavy metals balance in system atmosphere-soil-river water is proposed. Modeling approach is used for estimation of local subsystems mutual impact, considered as point oscillators for idealized models of metal accumulation in parts of the river net.

One of main issues of studying the water chemical composition in a system with spatial heterogeneities and several sources of pollution is defining local parts with almost equal conditions. The boundaries for local subsystems associated with a point oscillator are identified on multidimensional statistical data for different regions. Long-term monitoring study of the quality and quantity of water in Kura-Araks watershed is used for reference and the model predictions verifying. Estimates for parameters of the strength of links between adjacent oscillators are derived through correlation matrix from empirical data.

Development of a model for the polluting substances transfer is directed to solution of tasks of water quality management in Kura-Araks rivers basin. The model will allow taking into account factors of both anthropogenic and natural pollution, as well as the impact of climate change in the region.

The proposed approach to modeling will be further developed and used for applied models of spatial transportation of pollutants in Kura-Araks rivers basin.

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Regional Assessment and Management of Water Resources in the Prydniprov'e in a Changing Climate

Larysa B Anisimova, Institute for Nature Management Problems and Ecology of the National Academy of Sciences of Ukraine, Ukraine

Iryna I Romanenko, Institute for Nature Management Problems and Ecology of the National Academy of Sciences of Ukraine, Ukraine

Goal

Environmental assessment of natural water quality in Ukraine is very important. To solve this problem need to monitor the water constantly.

The main river of Ukraine is the Dnipro. Its water resources are about 80% of the water resources of Ukraine and provide water to more than 32 million people and 2/3 of state economic potential.

Most pollutants dropped to Dnipro are 757 tons or 23% of all discharges. 60% of the Dnipro basin are plowed 35% of land are severely eroded, 80% of the primary natural landscape are transformed.

The Dnipro's reservoirs have become accumulators of the contaminants.

Methods

We used next chemical-analytical methods - gravimetric, colorimetric, tytrometric, statistical methods of calculation and processing of results.

The object of the study was the content of ammonium ions, nitrates and phosphates in natural, underground and surface water.

Results

Data were obtained within ten years. Sampling was carried out in all seasons.

The preliminary comparative analysis showed the content of ammonium and nitrate ions in natural water increase in spring and autumn seasons and at elevated temperatures in the environment.

Conclusions

To take measures aimed to eliminating floods to reduce the flow of contaminants into water in the condition of climate change toward improving water level.

To support the required sanitary sewage regime in the surface and ground water and river systems.

To implement the project of engineering protection against groundwater flooding of urban sites.

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Prevalence Study of Mycoplasma Gallisepticum Infection in Layer Chickens in the Accra Plains of Ghana

Matilda Ayim, CSIR-Animal Research Institute, Ghana

Achiamaa Asafu-Adjaye, CSIR-Animal Research Institute, Ghana

Gabriel Adu-Aboagye, CSIR-Animal Research Institute, Ghana

Carl Beckley, CSIR-Animal Research Institute, Ghana

Doreen Owusu-Ntumy, CSIR-Animal Research Institute, Ghana

Mycoplasma gallisepticum (MG) is the most economically significant of all avian Mycoplasma, causing chronic respiratory diseases in chickens. Very little information is available on the infection in layer chickens in the Accra plains of Ghana. 402 chicken sera were collected from 18 layer flocks. The SPA test using Nobilis MG antigen from Intevert International,Holland, was used to test sera for possible antibodies against Mycoplasma. The overall sero-prevalence of MG was found to be 62.7%. The infection significantly increased with increasing age

(X2=11.30, p=0.023) with larger flock sizes showing a much higher infection than smaller flock sizes (X2=16.19, p= 0.013).Birds kept in the deep litter system of production were more prone to infection (67.2%) than those kept in the slatted floor (57.4%) and battery cage systems (42.6%). Good management practices including the provision and adherence to bio-security measures should be put in place and adopted to help control the infection.

Key words: Mycoplasma gallisepticum, Serum Plate Agglutination, Prevalence, Management practices and Bio-security

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Generalization of Data on Dielectric Permeability of Liquid and Steam Phases of Water for the Purpose of Definition Water Coolant Void Fraction

Volga V Beliayeva, Joint Inst. for Power & Nuclear Research "SOSNY", National Academy of Sciences of Belarus, Belarus

Yuri V Mulev, Joint Inst. for Power & Nuclear Research "SOSNY", National Academy of Sciences of Belarus, Belarus

In thermal, and especially it is necessary for atomic engineering to supervise moisture content in steam before a separator, superheater, and also on an input in the turbine and in its low pressure steps. The known quality monitoring of degree of steam dryness in which sodium salt is used is combined in application, is long in time and can give the big errors. The method of definition of water coolant void fraction quality monitoring change of dielectric permeability of a steam-and-water mix can be an alternative method.

In work universal one-parametrical dependence of experimental values of dielectric permeability of water and water steam depending on the relation of density to temperature in different phase states which include a liquid, steam, values on a saturation line and a wide vicinity of a critical point is presented.

On the basis of available experimental data on dielectric permeability of steam-and-water mix calculations which have shown are executed that the received universal one-parametrical dependence allows counting of water coolant void fraction in a two-phase state in working conditions of the equipment of thermal and nuclear stations.

The carried out analysis can be considered, how a substantiation of a method of diagnostics of water coolant at phase transitions on the basis of measurements of dielectric permeability. Now working out of designs of gages of measurement of dielectric permeability of water for diagnostics of streams of water coolant in industrial conditions is spent.

Key words: Dielectric permeability, Water, Steam-and-water mix, Void fraction, Moisture content

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Bio-Inspired Design of Aerospace Composite Joints

Lauren A Burns, RMIT University, Australia

Stefanie Feih, RMIT University, Australia

Adrian Mouritz, RMIT University, Australia

David Pook, Boeing Research and Technology Australia, Australia

The objective of this study is to utilise the design strategies of structural joints found in nature in order to produce new design concepts for aircraft composite joints. The ultimate goal is to reduce the manufacturing, operating and environmental costs of composite airframe aircraft. The design of tree branch joints at different scale levels from the cellular to the macro-scale is investigated, and the design features are applied to carbon/epoxy T-joints to improve their damage tolerance. X-ray computed tomography of a pine tree revealed three main design features of tree branch joints which provide high structural efficiency: embedded design of the branch into the trunk; three-dimensional fibril lay-up in the principal stress directions; and variable fibril density to achieve iso-strain conditions through the joint connection. This study adapts the embedded design feature to a representative aerospace T-joint made of prepreg carbon fabric/epoxy composite. Experimental testing revealed a conventionally designed T-joint experiences brittle failure due to the geometric stress raiser of the radius bend coupled with low interlaminar tensile strength. T-joints with 50% or 75% of the stiffener plies embedded into the skin panel showed increased ductility and absorbed inelastic strain energy under through-thickness tension and stiffener bending loading conditions. Improvements in absorbed strain energy of up to 50% were achieved using the bio-inspired design feature. However, these improvements are achieved at the expense of reduced compressive load capacity of the bio-inspired T-joints. Experimental and numerical studies into optimising fibre direction in the lay-up of carbon fibre/epoxy T-joints are also investigated.

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Development of Smart Metering Control Protocol

Inji Choi, KEPCO, Korea

ByeongSeok Park, KEPCO, Korea

ChongHo Yoon, Korea Aerocraft University, Korea

The Smart Metering system on the Smart Grid provides specified services by the base on two way communication between consumers and the energy utility company. It can be received with the time base tariff system information like the Time of Use, the Real Time Pricing,the Critical Peak Pricing,and etc. in order to derive the consumer the active Demand Response as well as the automatic remote metering reading (AMR) has to be performed through the Smart Metering system. We introduce three Smart Metering system components which can become Smart Meters,Smart Metering Concentrators,and Smart Metering Control Server. Particularly,SMC provides the Smart Grid ICT solution of two way communication base as the concentrator supporting data acquisition and configuration efficiently between SM and SMCS. In this paper, we introduce design of the Smart Metering Control Protocol by the task-Script method of the text-based in which data and meters configuration are flexible. We define that the SMCP is the application layer protocol for the AMI data transmission and it can be transmitted on TCP or UDP. SMC receives the Task-Script from a server. Task-Script describes a series of jobs and schedule for SMC. SMC will send results after carrying out the task. Each detail jobs which SMC will have to perform are designed in a task-script to the attribute of 'key = value' format. The simulation result which after introducing the virtual scenario is shown in this paper. In the future, we have planning to extend the AMI system using the designed protocol by steps.

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Overview of Applications of the Ellipsometry Technique in Modern Science and Technologies

Agnieszka Chrzanowska, Institute of Physics Cracow University of Technology, Poland

Spectroscopic Ellipsometry (SE) is a powerfull non-destructive and non-invasive surface sensitive technique

of great interest to physicists, chemists, electronical and biochemical engineers that allows to measure the full spectra of the ellipsometric parameters as a function of wavelength from UV to IR with a high degree of precision and accuracy.

Such data can be processed further to provide the most accurate values to date of the dielectric functions of metals, semiconductors or organic materials as a function of wavelength, even if the investigated material is available only in the form of a very thin film. Moreover, the microroughness of the surface layer and the true near-surface temperature of the samples can be estimated as well as depth-profiles of interfaces or multilayer structures.

The overview presents a number of examples of ellipsometry measurements applications in semiconductor industry, in green energy technologies as photovoltaics and light emmiting diods or in biology, where it increases the knowledge about processes at interfaces of biological relevance or biosensors.

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Geomorphology Analysis to Unravel the Volcanic Evolution of Mount Bromo Complex, East Java, Indonesia

Ayu N Ciptahening, University of Pembangunan Nasional (UPN) "Veteran" Yogyakarta, Indonesia

Mount Bromo, a very famous volcano and tourism object erupted during 26th to 30th of November 2010. It is one of 129 active volcanoes of Indonesia. The volcano administratively belongs to four regions of Pasuruhan, Purbalingga, Lumajang, and Malang, East Java province, stands in the middle of the Tengger caldera together with Mount Bathok, Mount Widodaren, and Mount Kursi. This study is intended to examine the geomorphology of Mount Bromo and surrounding area, in order to reconstruct its volcanic evolution. Based on analysis using satellite and air photo images,

and topographic map, the study area can be divided into five geomorphologic units, they are the volcano main body, caldera, volcanic cones, parasitic cone, and hillocks. The volcano main body unit is classified into composite volcano. The caldera unit is occupied by pyroclastic and lava deposits. The volcanic cones unit involve Mount Kursi, Mount Widodaren, and Mount Bromo, composed of pyroclastic deposits. The parasitic cone unit is occupied by Mount Bathok, composed of lava dome and pyroclastic deposits, while hillocks unit is formed of laharic breccias. Result of this study concludes that the volcanic evolution begins from the existence of a big volcano called Mount Tengger, paroxysmal eruption producing a large caldera, silent period, occurrence of new volcanic activities of Mount Kursi, Mount Widodaren and Mount Bathok, and finally the present of Mount Bromo as the only active volcano in the study area up to now.

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Sustainable Cities: A Total Carbon Modelling Approach

Samantha J Coras, AECOM - Buildings Applied Research & Sustainability, Australia

A shift in public focus towards the responsible use of resources and climate change has drawn attention to the impact of carbon in all its forms in the construction industry. Although several sustainability rating tools exist to quantify the environmental performance of buildings, they are not well prepared for the emerging carbon economy. The capability to analyse a building, precinct or city using a Total Carbon Model (TCM) approach is being developed within the AECOM Building Engineering Applied Research Group, to measure and assist in driving sustainable design.

This paper discusses the technique of Total Carbon Modelling for buildings and presents a case study of the new Australian Institute of Architects headquarters in Melbourne Victoria, for which the process was applied. The paper also discusses how the Total Carbon Modelling process identifies different design drivers, and when applied to a precinct or city, may influence future aspects of environmentally sustainable master-planning.

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Woody Vegetation Assessment of Opada Forest Reserve as a Tool for Sustainable Biodiversity Management

Stella Osarenakhue Ebiloma, Kogi State University, Anyigba, Kogi State, Nigeria

Objectives were: to compile the species abundance and diversity of the trees in Opanda Forest reserve and to document the indigenous (Igala) names of as many species as possible for effective management of the resource.

Methodology: coordinates were taken along reserve boundaries to assess the integrity of its size with the aid of Global Positioning Systems and to produce the current map. This reserve in Kogi State, Nigeria has a total area of 215.96km2 and was gridded into 41 grids, 25% of these were randomly selected. Within each grid a 2km transect was established and 25m × 25m quadrants located at regular intervals of 500m along the transect line, there were 40 sampling quadrants altogether for the study. A woody plant was considered a tree when it had a diameter of 10cm and above at breast height of 1.3m. Results: 85 tree species were identified from just 40 plots, the species abundance of some trees was as many as 411 with a total number of 2,181 trees as documented in the full paper.

Discussion: There are some tree species which were not recorded because they were outside the study plots; this implies that the forest is rich in tree species and their sustainable conservation will greatly benefit mankind.

Conclusion: Climate change requires that sustainable biodiversity conservation practices need to be adopted to prevent the further extinction of the earth's present gene pool. Life, science and arts depend on biodiversity.

KEYWORDS: Opada forest, climate change, sustainable, woody vegetation and tree.

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A Model for Enhancing Development and Retention of Women in Science and Engineering Profession

Oyefunmke A Famose, Federal University of Technology, Nigeria

The International drive to improve gender equality and empower girls and women cannot be over emphasized. It is critical to our development as individuals, societies, it is an economic necessity. Encouraging women participation in Science and Engineering (SE) which is rooted in establishing gender equity in technology based profession and entrepreneur skills from primary to tertiary learning levels as a major way of increasing the largely untapped pool of talent amongst women. It is a powerful tool in creating a ripple effect of opportunity for our sustainable development and consequently boosts active role participation in social, economic and political decision-making. This paper critically examines its current status at secondary, tertiary education level and the working class. Furthermore, the paper presents an empirical analysis of the current status. Consequently, a model is presented to effectively realize this goal.

Keywords: Entrepreneurship, Science and Engineering,Sustainable development,Model

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Provision of Sustainable Road Transport Infrastructures - Urban Corridor in Delhi

kamini Gupta, Central Road Research Institute, New delhi, India, India

Ch Ravi Sekhar, Central Road Research Institute, New delhi, India, India

Ravinder Kumar, Central Road Research Institute, New delhi, India, India

B Kanga Durai, Central Road Research Institute, New delhi, India, India

Indian economy is rapidly growing along with it the travel demand is also increasing exponentially. The number of motor vehicles in India which were around half million in the year 1950 has now increased to more than 60 million. This increased motorization, urbanization; population growth leads to traffic congestion, particularly this can be seen on many urban arterial roads. Congestion reduces utilization of the transportation infrastructure and increases travel time, fuel consumption air pollution, and traffic accidents etc. The existing congestion measure depends on average travel time, unable to quantify the performance of the transportation system in terms of sustainability. Therefore, there is in need to investigate performance measures to evaluate Sustainable Transportation System. Sustainable transportation attempts to estimate travel time reliability, economic development, environmental, and social equity of current and future generations. The objective of this study is to evaluate sustainability of system by considering the delays in travel time and driving cycle patterns. Travel

time based performance measures are considered to evaluate performance of sustainability of transportation system. In this study an urban arterial corridor of 4km long on National Highway No.-2 of Delhi Mathura road has been considered and video graphic data in morning peak hours was collected for estimating travel time through license plate matching technique & driving cycle through V box. The benefits in terms of social, economical and environmental terms are studied & computed by providing suitable Infrastructure facilities.

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Relationship Between ENSO and Northward Propagating ISO over East Asia and its Interdecadal Change

Kyung-Ja Ha, Pusan National University, Korea

Kyung-Sook Yun, Pusan National University, Korea

The relationship between the northward propagating intraseasonal oscillation (NPISO) and El Nino/Southern Oscillation (ENSO) was investigated. To explicitly describe the northward evolution of the summer ISO, an EOF analysis was also carried out on the temporal-latitude section of the longitudinal average for 115°E-120°E. We found a significant lagged correlation between interannual variability of the NPISO and ENSO, with a quasi-biennial (QB) characteristic through the preceding summer and the concurrent summer. The NPISO is connected to the anomalous easterly wind, western North Pacific subtropical high (WNPSH), and the eastward evolution of an oceanic Kelvin wave.

To investigate the interdecadal change in the NPISO-ENSO relationship, we calculate the intraseasonal variance from the first two leading EOF modes. The interdecadal shift in the relationship is significantly shown in between two epochs of 1958-1979 and 1980-2001 years. Before the late 1970s, a preceding winter ENSO influences the early summer NPISO activity. The NPISO-ENSO relationship is immediately shown by the springtime IOSST warming. Since the late 1970s, a strong positive correlation is found during a later summertime. Because of an enhanced anomalous Walker-Hadley circulation, the Indian Ocean sea surface temperature (IOSST) warming is significantly maintained until the concurrent summer season, which in turn promotes a strong summertime suppressed convection anomaly over the Philippine Sea. Consequently, ENSO is intimately linked to the suppressed convection anomalies over the Philippine Sea and in turn WNPSH. The mechanism was suggested as follows: ENSO-related IOSST warming - the suppressed convection over the WNP - WNPSH - the reinforced NPISO activity.

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Use of Complementary and Alternative Medication by Asthmatics

Maria Habib, Wah Medical College, Wah Cantonement, Pakistan, Pakistan

Asthma is a very common chronic disease involving the respiratory system in which the air ways constrict, become inflamed and are lined with excessive amounts of mucus, often in response to one or more triggers. Complementary medicine is used by asthmatics now-a-days. Complementary medicine is defined as diagnosis, treatment or prevention which complements main stream medicine by contributing to a common whole, by satisfying a demand not met by orthodoxy or by diversifying the conceptual frame works of medicine. Most Frequently used complementary treatments are homeopathy, Acupuncture, Breathing exercises, Yoga, Chiropractic, Hypnosis, Herbal medicine, Massage. The study was carried out to determine the frequency of use of Complementary and Alternative Medicine (CAM) by asthmatics, types of CAM used by asthmatics and the side effects of CAM.

The study was conducted at the Pakistan Ordnance Factories Hospital where many cases of asthma were being reported in the vicinity of the Explosives Factory during the period 2009-2010. Only patients diagnosed as having Bronchial asthma were included in the study. Majority of the patients in our study were using CAM. Most popularly used among CAM are Steam and herbal medicine. According to the research conducted, homeopathy is not widely used since there is early and free availability of health facilities for the patients of Wah Cantt. None of the patients documented any side effects of CAM. The role of CAM for the treatment of asthma needs future evaluation since these studies are individual based and lack clinical trials.

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Performance Analysis of Linear Profiles

Seyedeh Zahra Hosseinifard, Australia

Profile monitoring is a relatively new set of techniques in the field of quality control. It is employed to monitor processes/services where their state is represented by a functional relationship between two or more quality characteristics. Such profiles can be modelled using linear or nonlinear regression functions. In today's competitive business and industrial environment, it is becoming more crucial than ever to assess precisely process losses due to non-compliance to the customer specifications. To assess these losses and evaluate the performance of the process, industry is extensively using process capability indices (PCIs). In this paper, we propose performance analysis methodologies to estimate PCI of linear profiles. Process capability indices are quantitative measures that are used by quality practitioners to decide whether to accept or reject the process outcomes based on conformance or non-conformance to the customer specifications. Here, the proportion of the non-conformance criteria is deployed to estimate process capability indices. The proposed methodologies consider the cases where specification limits are constant or are a function of fixed explanatory variable X. Simulated linear profiles with constant and functional specification limits are generated and used to assess the efficacy of the proposed methodologies. An example, based on real water quality data, is also given which demonstrates that the water profile capability indices using the proposed methods is very close to the actual water profile capability indices.

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Spatio-temporal Dynamics of Phytoplankton of a Tidal Coastal Creek, Lagos, Nigeria

Medina O Kadiri, University of Benin, Benin City, Nigeria

An annual study of phytoplankton and physical and chemical variables of Five Cowries Creek, Lagos, Nigeria, was undertaken from January 2002 to December 2002, to investigate spatial and temporal variations in water quality and phytoplankton flora. Samples were collected at monthly intervals from three stations. Phytoplankton samples

were collected for qualitative and quantitative analyses. While qualitative phytoplankton samples were obtained by towing a 55-micron mesh plankton net, quantitative samples were collected by concentration using sedimentation technique. Water quality measurements were made with Hach DR 2000 and phytoplankton were enumerated using the drop count method. The results showed spatio-temporal variations. There was a distinct seasonal variation in the parameters studied. The phytoplankton assemblage comprised moderately diverse taxa categorized into the divisions Bacillariophyta, Chlorophyta, Cyanophyta and Dinophyta. The diatoms or Bacillariophyta dominated the phytoplankton both qualitatively and quantitatively. There was no incidence of bloom-formation during the study period, though there was presence of bloom-forming species. The Creek is brackish, with slightly acidic to circum-neutral pH, with high levels of nutrients and prone to high levels of pollution. Regular and continuous monitoring of the creek is recommended to ascertain the possible onset of phytoplankton bloom and occurrence of harmful algae, to enable formulation of good management practices important or critical for fisheries, navigation, recreation and ecosystem health.

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Effect of Different Irrigation Application Levels and Potassium Doses on Tomatoes Grown Under Greenhouse in South East Brazil

Jokastah Wanzuu Kalungu, South Eastern University College - University of Nairobi, Kenya

Marcos Folegatti, University of Sao Paulo, Brazil

Rodrigo Sánchez Román, University of Sao Paulo, Brazil

Kennedy Mwetu, South Eastern University College - University of Nairobi, Kenya

The use of drip irrigation and fertigation for vegetable production has been practiced for many years in different climatic conditions. However, in Brazil, furrow irrigation is predominant for fresh tomato production. Due to economic and environmental reasons such as the need for higher yields and decreasing sources of irrigation water, drip irrigation is becoming a viable alternative, especially for tomato production. The objective of the study was to evaluate effects of different irrigation levels and potassium doses on production, quality and water use efficiency (WUE) of tomato (Lycopersicon esculentum Mills) under greenhouse environment. The treatments consisted of irrigation water levels equivalent to 50, 75, 100, and 125% of crop water requirement (CWR) with potassium doses of 208, 416 and 624 kg ha-1. Marketable yields reached a maximum of 64.4 t ha-1 at 416 kg ha-1 of potassium, produced at 75% CWR. This corresponded to an average irrigation rate of 4.72 mm day-1. Higher potassium dose of 624 kg ha-1 depressed total and commercial yields. Tomato fruit pH values were between 4.0 and 4.5 for all treatments, while the highest total soluble solids were 9.2%, found with irrigation level of 75% CWR. Maximum water use efficiency was 12.4 kg m-3 of applied water, also obtained at 75% CWR. An irrigation reduction of 25% CWR could hence optimize water resources and save significant water quantities through improved efficiency of water applications to the plant.

Key Words: Débora Plus tomato, drip irrigation, fertigation, greenhouse, water use efficiency.

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Various techniques for the preparation of metal nano particles and their performance in catalysis

Heeyeon Kim, Korea Institute of Energy Research, Korea

Recently, the many researches in catalysis have been focused on the synthesis of metal nano particles and the high dispersion of them on catalytic support. By reducing the size of metal particles, we can improve the catalytic activity per the same amount of used metal and also save the precious metal resources. For the enhancement of catalytic activity at a minimal cost, several techniques for the synthesis of nano-sized metal particles have been suggested; e.g., colloidal method, co-precipitation, electro-plating, sonochemical synthesis, electrochemical deposition (ECD), and chemical vapor deposition (CVD). In this study, we adopted sonochamical synthesis, ECD and CVD techniques, which have recently been used for the synthesis of catalytic nanoparticles. We obtained MoS2 nanoparticles supported on Al2O3 for the hydrodesulfurization (HDS) reaction, which shows more than 2 times higher activity compared to that of commercial one. Pt nano particles were supported on carbon black or carbon nanotubes (CNTs) for fuel cell electrode, which show remarkable enhancement in electrochemical activity compared to commercial Pt/C catalyst.

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Comparative Study Using Different Calibrator Types for GMO Quantitative Analysis

Hyong-Ha Kim, Korea Research Institute of Standards and Science, Korea

Woo Jeong Kim, Korea

Jung-Keun Suh, Korea

Among various GMO (genetically modified organism) analysis methods, real-time PCR (polymerase chain reaction) is primarily the method of choice for quantifying GM content, and is based on relative quantification using calibrators.

The aim of this study was to compare the differences/consistencies of quantification results when different types of calibrators were used for the same test samples. In this study, quantification was performed with known GM samples (2 % and 5 % GM maize powders) using 2 different standard plasmid DNAs and genomic DNA extracted from GM powder reference materials as calibrators. The GM contents derived from the analysis using different calibrators were compared with the certified value of the GM samples. Results showed that GM % of both test samples were within the range of the certified value/standard deviation of the 2 different plasmid DNA calibrators. In the genomic DNA calibrator's case, the quantification results of the 5 % sample was slightly lower than the range although the results of the 2 % sample was within it.

Factors affecting the results may be as follows. (1) PCR efficiency caused by amplifying different regions and/or DNA sequences, (2) DNA origins (i.e., microorganism and plant) and forms, (3) structural complexity of the matrix and/or purity of calibrator DNA, and (4) production process and buffer composition, etc. Therefore it is important to use the appropriate type of calibrator and reference materials as a control sample when determining GMO content to ensure the accuracy of the analysis.

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Development of Soybean Reference Materials for GM Analysis

Hyong-Ha Kim, Korea Research Institute of Standards and Science (KRISS), Korea

Ah-Reum Lee, Korea Research Institute of Standards and Science (KRISS), Korea

Yeon-Sil Hwang, Korea Research Institute of Standards and Science (KRISS), Korea

Woo-Jeong Kim, BIOnSYSTEMS, Korea

Korea has adopted labeling policies for GM (genetically modified) food with a threshold level of 3 %, and analysis methods for GMOs are also established according to the Korean Food Standards Codex of KFDA (Korea Food & Drug Administration).

The purpose of this study was to develop of soybean reference materials which can be used for qualitative/quantitative GMO analysis. Soybean powder was produced and sieved for consistent particle sizes and were carefully weighed and bottled. Between-bottle homogeneity and short-term stability was tested by quantifying the GM content for multiple samples. The homogeneity test results showed that samples were homogeneous with GM content lower than 0.02 % in all tests. Since the results were similar or lower than the certified value of the 0 % GM soybean CRM (IRMM-410S-0), the material was regarded as non-GM soybean. The short-term stability was tested at two different temperatures (-70 & 60 °C) for up to 4 weeks, and GM % for each time point and temperature was analyzed. The results showed that the GM contents were similar to the homogeneity study, and change in the GM % was negligible. This test verified that the material was stable for up to 4 weeks at 60 °C, therefore when shipping the material, no special conditions are necessary and room-temperature shipping is sufficient. This study has shown the development of a non-GM soybean powder reference material (GM % < 0.02). It can be used as a control sample for qualitative/quantitative GMO analysis.

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A Study of the Electromagnetic Pulse System

Taeyoun Kim, Korea Aerospace Research Institute, Korea

Jaewoong Jang, Korea Aerospace Research Institute, Korea

Gueewon Moon, Korea Aerospace Research Institute, Korea

In this paper the electromagnetic pulse system is described. It contains a MARX type electromagnetic pulse generator, bounded-wave electromagnetic pulse simulator and electric field probe (D dot). The purpose of this system is to evaluate vulnerability of electronic systems to the electromagnetic pulse. The paper presents the design, production and testing of the electromagnetic pulse system which generates a vertically polarized electric field with a rise time of 10 ns and length of 50 ns. The maximal electric field amplitude attains 50 kV/m. The experimental result obtained using the developed simulator is compared to numerical simulations and also discussed.

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Zircon U-Pb Geochronology of Triassic Granite Gneiss from the Central Yeongnam Massif, South Korea and its Tectonic Implications

Hosun Lee, Center for Research Facilities, Korea, Democratic People's Rep

Yongsun Song, Korea, Democratic People's Rep

Kyehun Park, Korea, Democratic People's Rep

During the latest Permian to early Triassic, Asian continent was assembled from various continental fragments and individual continental blocks experienced various kinds of tectonic events, including magmatism, high-pressure and even ultra-high pressure metamorphism. Continental collision between the North and South China blocks is surely one of the most interesting events even now. The discovery of ultrahigh-pressure metamorphic rocks from the Sulu Belt, Eastern China, brought debates about possibility of extension of the continental collision belt between North and South China blocks toward Korean Peninsula. The location of such collision boundary within the Korean Peninsula has remained unsolved yet.

The Korean peninsula is located in the East marginal of Asian continent which is consist of three Precambrian massifs (Nangnim, Gyeonggi and Yeongnam), late Precambrian to Paleozoic fold belts(Imjingang and Okcheon), and the Mesozoic to Tertiary Gyeongsang basin. In this study we report the results of Sensitive High-Resolution Ion Microprobe zircon U-Pb dating of the early Triassic granitic gneiss from the cenral Yeongnam massif and dicuss its tectonic implications. We newly recognized late Permian to Triassic granite gneiss and Triassic to Jurassic granitoids in the Yeongnam massif have histories of not only emplacement but also metamorphism. Such age data reveal not only the earliest Triassic magmatism in South Korea, but also shows evidence of early Triassic metamorphism shortly after emplacement, approximately matching the period of continental collision between South and North China blocks.

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Scramjet Engine Research of Korea Aerospace Research Institute

Yang Ji Lee, Korea Aerospace Research Institute, Korea

Sang Hun Kang, Korea Aerospace Research Institute, Korea

Soo Seok Yang, Korea Aerospace Research Institute, Korea

Scramjet engine is one of the most promising engine of hypersonic vehicle for next generation and being investigated by many countries. Unlike rocket propulsion system, scramjet engine can be operated without oxidizer tank in the atmosphere with hypersonic speed. This light weight makes scramjet engine to be a core engine of the hypersonic vehicle for single stage to orbit(SSTO) or two stage to orbit(TSTO). Korea Aerospace Research Institute (KARI) has been doing research on the hypersonic propulsion system for several years. KARI performed the first ground tests of the model scramjet engine, designated as S1 model at T4 free-piston shock tunnel of University of Queensland in 2007. S1 model has 2 Dimensional double wedge ramp intake with a notched cowl and a cavity flame holder combustor. The test condition of the S1 model was Mach 7.6 flight at an altitude of 31km. Supersonic combustion was observed in low and middle equivalence ratio condition and the notched cowl showed enhanced mixing characteristics compared with the flat cowl. Based on the S1 model

test results, design improvement of the model scramjet engine were done. Until now, the total 4 scramjet models including S2 model of the KARI were manufactured at Korea and tested in the Japan Aerospace Exploration Agency-Kakuda Space Propulsion Center (JAXA-KSPC) in 2008, 2009 and 2010. In this paper, current scramjet engine research activities of KARI will be described.

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Parametric Model of Human Skull

Yan Li, Massey University, New Zealand

Accurate pre-surgical planning is essential for operation safety and successful surgery. This article represents a modeling procedure in a computer-aided design (CAD) environment. The whole human skull is introduced as a mathematical surface, since this is the part on which the actual operation will be performed. The development of the modeling commenced with establishing a robust co-ordination system for the whole human skull as the original reference point. Mathematical methodology was applied to describe the arbitrary skull geometry. Therefore the whole skull was broken down into several small parts. A database with reference distances between different parts with original point was prepared to obtain the skull model. A computer-aided surgery (CAS) program was developed to establish modeling parameters and modeling procedures. Each part was reconstructed to a 3D solid module in CAD software and an assembled 3D model was included in this article as well. With the 3D models, surgeons can easily do the preparation before the real surgery.

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COMS LRIT/HRIT Dissemination Service Qualification During IOT Period

Hyun-Su Lim, Korea Aerospace Research Institute, Korea

Sang-Il Ahn, Korea Aerospace Research Institute, Korea

The first meteorological satellite of Republic of Korea, the COMS (Communication, Ocean and Meteorological Satellite) was launched on 27 June, 2010. It plans to provide user dissemination services, distribution of ground-processed data to end-users via the spacecraft and Internet in near real-time. The in-orbit dissemination test through the spacecraft started on 11 October, 2010 and it will be continued until the end of 2010. On top of the meteorological imager data in 15 minute frequency, ocean image data observed on the geostationary orbit and some kinds of meteorological products (cloud detection, cloud top height, cloud top temperature, and so on) are being disseminated to in the initial test period. When the calibration of level 2 system is completed, which is expected from the mid of 2011, full meteorological products such as typhoon and numerical weather prediction model will be contained in the LRIT service. The data formats to be serviced were determined into level 1b image data in hdf (hierarchical data format) and the end-user data format in LRIT (Low Rate Information Transmission) and HRIT (High Rate Information Transmission) for users' convenience and data compatibility. Basically, the image data in COMS LRIT/HRIT are compressed using JPEG for faster data transmission. This paper summarizes the plans and characteristics of COMS dissemination services and the main results of the COMS dissemination tests executed during the commissioning operation phase. In these COMS dissemination commissioning tests, end-users reception systems from Seaspace and Soletop were also participated to check the space link to end-users.

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Lipid Metabolism in Trypanosoma Brucei Rhodesiense Experimentally Infected Vervet Monkeys: Potential Biomarker of Late Stage Disease

Naomi W Maina, Jomo Kenyatta University of Agriculture & Technology, Kenya

Alex K Gaithuma, Jomo Kenyatta University of Agriculture & Technology, Kenya

Simon M Karanja, Jomo Kenyatta University of Agriculture & Technology, Kenya

Joseph M Ngotho, Jomo Kenyatta University of Agriculture & Technology, Kenya

John M Kagira, Institute of Primate Research, Karen, Nairobi, Kenya, Kenya

Human African trypanosomosis (HAT), is the third most important vector borne parasitic disease in Africa today and is also a neglected disease. Successful control of HAT is dependent on early case detection and treatment of those diagnosed positive. The current diagnosis is complicated by many factors. This study reports potential biomarkers for staging sleeping sickness in less invasive samples in the non-human primate model of HAT. Vervet monkeys were infected with T. brucei rhodesiense and subsequently given sub-curative treatment 28 days post infection. Ear prick blood for glucose determination and blood samples were obtained at weekly intervals. Biochemical analysis was carried out on serum and plasma samples by dry chemistry analysis. Hypoglycaemia was observed with blood glucose decreasing significantly to 0.8mmol/l at early stage of infection. Triglyceride levels increased significantly ($P<0.05$) from 0.82 to 5mmol/l in the first week of infection. On the other hand HDL cholesterol decreased significantly in the first week of infection and returned to pre-infection levels at late stage disease. However, LDL decreased significantly at early stage infection but at late stage it increased significantly to 3.094 mmol/L. Total cholesterol levels remained normal after infection but levels increased significantly ($P<0.05$) to 5.47mmol/L during late stage. These results suggest that serum/plasma cholesterol and LDL may be used in staging of HAT. Currently, staging of HAT depends on examination of CSF collected via a painful lumbar puncture. Diagnostic methods avoid the painful lumbar punctures and uses a less invasive sample are a high priority in HAT management.

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Performance of Diversified Legume Based Cropping Systems under Smallholder Farms in Northern Malawi

Wezi G Mhango, Bunda College of Agriculture, University of Malawi, Malawi

Sieglinde Snapp, Michigan State University, United States

George Y Kanyama-Phiri, Malawi

Low soil fertility especially nitrogen (N) is a major constraint to increased crop yields for smallholder farmers in sub Saharan Africa. Legume species can help to improve soil N through biological nitrogen fixation (BNF) and residue incorporation. In this study, the main objective was to evaluate the effect of diversified legume cropping systems on BNF and crop yields. Participatory on farm trials were conducted in northern Malawi in 2007/08 and 2008/09 cropping seasons. Treatments included

groundnut, pigeonpea, and maize planted in sole stands or intercrop. These were rotated with maize.

A baseline survey showed that soil fertility was highly variable and degraded with mean organic matter of 12±3.7 g kg-1. Farmers valued a wide range of legume traits that included food, yield, maturity period, soil fertility and market potential. Results from on farm trials showed that interspecific competition, inorganic P and plant density were drivers of crop growth and BNF. Under low yielding environments, sole groundnut and groundnut intercropped with pigeonpea (GNPP) produced more calories and proteins than sole maize or maize intercropped with pigeonpea (MZPP). Legume cropping system increased subsequent maize yield by 29-72% over continuous maize, and 69-200% with integrated soil fertility management. Intercropped species were more efficient at utilizing resources than sole stands as indicated by land equivalent ratios greater than 1.

Farmers' preference was for technologies that provide multiple benefits rather than yield only. Constraints to legume adoption were social-economic (seed availability, labor), biophysical (pests in pigeonpea, agronomic practices) and natural (unpredictable rainfall).

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Effects of Antioxidant and Proliferation of Osteoblasts with Rice Bran

Jungsun Moon, College of Pharmacy, Sahmyook University, Seoul 139-742, Korea, Korea

Geumseon Lee, College of Pharmacy, Sahmyook University, Seoul 139-742, Korea, Korea

Sungsook Choi, College of Pharmacy, Sahmyook University, Seoul 139-742, Korea, Korea

Taejin Kang, College of Pharmacy, Sahmyook University, Seoul 139-742, Korea, Korea

Dongsool Yim, College of Pharmacy, Sahmyook University, Seoul 139-742, Korea, Korea

Sungwhan Kim, Korea Research Institute of Chemical Technology, Daejon 305-600, Korea, Korea

Sookyeon Lee, College of Pharmacy, Sahmyook University, Seoul 139-742, Korea, Korea

In expectation that antioxidative activity is correlated to proliferations of oteoblasts, this study was done to investigate antioxidative activity and effect of proliferations of osteoblasts on Rice Bran. Osteoblasts play an important role in bone metabolism by bone formation. Rice bran having a stimulatory activity on osteoblast proliferation can improve bone diseases such as osteoporosis. Rice Bran were extracted with EtOH and fractionized with n-hexane, EtOAc and BuOH. With these extract and fractions of rice bran, several radical scavenging activity (DPPH, ABTS+, FRAP and SARS) were examined. Among these fractions EtOA fr. and BuOH fr. relatively showed stronger radical scavenging activities (DPPH : 86.7%, ABTS : 77.3%, SARS : 58.3%) than others, and we examined their effects of proliferation on osteoblasts (MC3T3-E1). As results, EtOAc fr. And BuOH fr. showed higher proliferation activities of bone cells than MeOH ex. and Hexane fr.. Through these results we could suggest what has the correla tion between the antioxidant and the anti-osteoporotic activities.

Key words - Rice bran, Antioxidant, Osteoblast, DPPH, ABTS, FRAP, SARS

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In Vitro Mutation Induction for the Improvement of Mycosphaerella Fijiensis Resistance in two Musa Cultivars Grown in Kenya

Mary N Mwangi, 1Kenyatta University, Department of Biochemistry and Biotechnology, Kenya

Stanley W Waudo, Mount Kenya University, Kenya

Esther M Kahangi, JomoKenyatta University of Agriculture and Technology, Kenya

Black leaf streak (BLS) one of the most devastating banana diseases is reportedly on the increase in all banana growing regions in Kenya. The preferred commercial dessert varieties are susceptible. Chemical control is effective but expensive and environmentally unsafe. The most sustainable intervention is to breed for BLS resistance. Cultivated bananas are sterile, vegetatively propagated, and hence recalcitrant to conventional breeding. The most sustainable intervention is to breed for resistance using novel biotechnology techniques such as in vitro mutation breeding. This paper reports on the in vitro mutation induction of two popular AAA dessert cultivars 'Kampala' and 'Nyoro' in an attempt to improve BLS tolerance. Intact and longitudinally dissected shoot tips of the two cultivars were exposed to 11 doses of 60Co gamma at a dose rate of 8 min-1. The M1V4 generation was evaluated for agronomic traits and screened for response to M. fijiensis in the greenhouse. Irradiation induced a range of morphological and agronomic variations. Based on their response to M.fijiensis, two gamma irradiated (NYRTC35A, KAMPTC35B) and two non-irradiated (NYRTC5, KAMPTC4) lines of 'Kampala' and 'Nyoro' respectively were further screened for M.fijiensis using a second double in vitro selection procedure. Forty-five percent of the resistant 'Nyoro' plants were late flowering, small in stature, with thick pseudostems ,short internodes and deformed leaves. Among the mutagen treated 'Kampala' plants, 5% were significantly taller and produced larger fruits than the control plants. Over two production cycles, the control plants were generally more susceptible to BLS but had superior agronomic traits.

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Optimization of Laser Parameters for Bulge Reduction in PMMA

Rehema Ndeda, Jomo Kenyatta University of Agriculture and Technology, Kenya

Paul N Kioni, Kimathi University College of Technology, Kenya

James Keraita, Jomo Kenyatta University of Agriculture and Technology, Kenya

Laser micromachining has been widely applied in the fabrication, production and manufacturing of Micro Electro Mechanical Systems (MEMS). During laser cutting of polymers, bulges are formed mainly due to resolidification of molten material in the working zone and temperature difference between the heat affected and the heat unaffected zone. This is a problem that has plagued the machining of polymers.

A mathematical model has been developed using finite element method to study the behavior of poly(methyl methacrylate) (PMMA) during carbondioxide laser cutting. Laser velocity and laser power are considered as important laser machining parameters. The mathematical model was simulated using FEMLAB software.

It was found that an increase in laser power caused an increase in the heat affected zone and an increase in penetration depth. On the other hand, increase in laser velocity for constant power caused a decrease in penetration

depth and reduction in heat affected zone. The results showed the need for optimization of the laser parameters for good surface finish.

Optimization of the laser parameters was done using the MATLAB fuzzy logic toolbox. It was found that at optimum values of scanning velocity and laser power, the rate of resolidification of the material could be controlled and therefore minimize bulge formation. Both the finite element and the fuzzy logic model developed in the study can, therefore, be used as an efficient design tool to analyze and consequently optimize the laser cutting of PMMA and polymers in general.

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Identification and Preference of Fruits and Vegetables by Pupils of the Kwame Nkrumah University Primary School, Kumasi- Ghana

Ibok Oduro, K wame Nkrumah University of Science and Technology, Ghana

Patricia K Brown, K wame Nkrumah University of Science and Technology, Ghana

Wilhelmina k Laryea, K wame Nkrumah University of Science and Technology, Ghana

L Asumeng, K wame Nkrumah University of Science and Technology, Ghana

Objective: Adequate consumption of fruits and vegetables is essential for the maintenance of good health. This study aimed at evaluating whether Primary 5 children, aged 9 &10 years could correctly identify commonly available fruits and vegetables and at determining their preferences using a 5-point hedonic scale.

Methods: Pictures of readily available fruits and vegetables were displayed for identification and preference assessment in pupils' classrooms. Data was collected from class five pupils (n = 65) using a questionnaire.

Results: In general, identification of and preference for fruits was higher than vegetables. Banana was correctly identified by all the children (100%); soursop (15.4%) was the least well identified. Apple, coconut, pawpaw, pineapple and oranges were well identified (75-94%). For vegetables, the least well identified was Corchorus olitirious (2%). Leafy vegetables were the least correctly identified while carrot, green pepper, okros and cucumber were properly identified by most pupils (69-92%).The least preferred fruit was soursop and the least preferred vegetables were cauliflower, solanum torvum, lettuce and Corchorus olitorius.

Conclusions: Certain vegetables, especially leafy ones, were poorly recognized but fruits were more easily recognized and liked. Survey results indicated that primary school children aged 9&10 are more familiar with fruits than vegetables. This may be due to seeing the fruits more often than the vegetables rather than more frequent consumption of them. Fruit and vegetable promoting programs can therefore be established to educate children on their importance in their diets.

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Study on Interface Characteristic of SiOC Film to Improve the Mobility

Teresa Oh, cheongju university, Korea

SiOC film made by the plasma enhanced chemical vapor deposition at rf power 450 W with the precursor, bistrimethylsilylmethane (BTMSM), was analyzed to find out the relationship with the dielectric constant and polarization. Interfacial binding between the SiOC film and the surface of semiconductor was investigated by FT-IR and XPS spectra. The dielectric constant decreased by lowering polarization, which contribute to produces the cross link structure without porous. Low polarity and the reduction of the thickness owing to the exclusion of the space hindrance induced to decrease the dielectric constant in SiOC film. The fine cross link structure by lowering polarization improved d the bonding strength and adhesion because the sample with this structure changes to higher bonding energy in Si 2p electron orbital spectra. Therefore, the fine cross link structure was more stable and low surface energy, that caused higher mobility in TFTs on SiOC film with non polarity as a gate insulator.

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Interfacial Properties of SiOC/Al Thin Film for Silicon Solar Cell

Teresa Oh, cheongju university, Korea

The practical solar cells are the silicon based crystal silicon solar cell. The phosphorus oxychloride for n+ type doping were diffused on a p+ Si, SiC and poly Si using the carrier gas of N2 by LPCVD. The series resistances on various p type silicon substrates were researched. n+-p+ junction were fabricated by thermal diffusion of phosphorus oxychloride into a p+ Si wafer. For the rear metallization, Al was deposited using by the screen printing and SiOC film instead of SiO2 film was used as a passivation materials for the metal layer. SiOC film was made by the capacitive coupled plasma chemical vapor deposition. When the Fourier transform infrared spectra of SiOC film shows organic properties including the strong peak of Si-CH3 bond, the trend of leakage current is proportioned the reflective index. The junction depth of phosphorus oxychloride were varied with increasing the diffusion time, The short circuit current density, series resistances and energy conversion efficiencies were researched. Alcohol additives influence the silicon etching anisotropy rate, and its low dielectric constant and polarity reduced the tension of silicon surface. The SiOC film was used for the passivation of Al metal contact at the back electrode. The efficiency 9.5 % of the solar cell with SiOC film was increased in compared with the efficiency 5.38 % of the solar cell without SiOC film.

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Effect of Aqueous Extract of Cyphostemma Glaucophilla on Lipid Profile and Serum Electrolytes

Eleojo Ojogbane, Kogi State University,Anyigba, Kogi State, Nigeria, Nigeria

Okwesili Fred, Chiletugo Nwodo, University of Nigeria,Nsukka,Enugu State, Nigeria., Nigeria

James Omale, Kogi State University,Anyigba, Kogi State, Nigeria, Nigeria

Aim:This investigation is to evaluate the effect of aqueous extract of cyphostemma glaucophilla, a traditional medicinal herb on the lipid profile and plasma electrolytes of albino rats.

Methodology: Inbred wister albino rats of

either sex aged 7-9months and weighing 100-150g were divided into five groups of six animals each and were served daily doses of saline{0.85%Nacl; 5ml/kg control, 0.5, 1.0, 1.5 and 2.0mg/kg body weight of extract using stomach tubes for 14 days. Twenty four hours after the last administration the animals were sacrificed by ether anaesthesia. Blood samples were drawn into heparinised tubes. The plasma was used for the assay.

Results: Findings indicated a significant ($p<0.05$) dose dependent reductions in the concentration of total cholesterol, triacylglycerols, LDL,VLDL and a significant ($p<0.05$) scalar increase in the concentrations of HDL when compared with the control animals similarly, the same treatment caused a significant decrease in the concentrations of sodium and chloride ions, however there was no significant ($p<0.05$)effect on the concentration of potassium and bicarbonate ions when compared with the control.

Conclusion: Consequence of result showed that extract had cholesterol lowering effect and stabilizes plasma electrolytes.

Keyword: ip -Lipid profile, electrolyte, atherosclerosis and Cyphostemma glaucophilla.

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Mechanical Disruption of Candida Cells Using Three Methods

Francisca I Okungbowa, University of Benin, Nigeria

Rukhsana Chowdhury, Indian Institute of Chemical Biology, India

Michael O Okungbowa, Nigeria

Objective: Yeast cell wall contains complex substances consisting of glucans . Efficient lysis requires a method that sufficiently breaks down these complex substances and maintains high enzyme activity. Molecular methods of detecting fungal pathogens involve the lysis of fungal cells. Endoproteinases play a role in the pathogenesis of Candida and have been used previously to characterize Candida strains. Although chemical lysis involving treatment of cells with enzymes is sometimes employed, mechanical methods (grinding with glass beads, by sonication and liquid homogenizer such as the French press), are still commonly used. This study was done to compare the efficiency of three mechanical methods for crude protein production and activity of an endoproteinase (an enzyme).

Method: Cells of ten Candida strains were subjected to disruption using three methods-glass beads, sonicator and French pressure cell press separately, and results compared for efficiency of each method.

Result: The French pressure cell press gave the highest protein yield and glass beads, the lowest (mean of means = 5.6, 40.0, 0.6 µg/ml, respectively, for the three methods). Enzymatic activity was also highest for the French pressure cell

press and lowest for glass beads (mean of means = 0.94 mg/min/mg protein .

Conclusion: The study has shown that cellular disruption by sonication is as efficient as the French pressure cell press in the mechanical lysis of Candida cells for crude protein extraction and enzymatic activity determination. The use of glass beads produces very little protein and leads to loss of protein activity.\

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Spatial Modelling of Groundwater Conditions in Nairobi City using Geographic Information System

Caroline K Onyancha, MASINDE MULIRO UNIVERSITY, Kenya

Monika Sester, Leibniz University of Hannover, Germany

David N Siriba, Leibniz University of Hannover, Germany

Sagi Dalyot, Germany

Nairobi City suffers from acute water shortage due to insufficient surface water supplies, inefficient use by consumers and rapid population growth. This scarcity has lead to drilling of boreholes to augment the surface water supply. To date, there are more than 2,000 boreholes in the City most of which are operational during periods of long droughts when surface water supply is rationed. This research was carried out to determine the effects of groundwater exploitation during the last 8 decades on water levels in aquifers beneath Nairobi City. Hydrogeologic information from 1,600 boreholes as well as vertical electrical sounding data from 48 sites scattered in the study area was used. This data included: subsurface profiles; aquifer thicknesses and depths; water struck levels; water rest levels; tested yields and drawdown levels. A Digital Terrain Model of the area was integrated to determine the contribution of topography to the water struck and rest levels. This multi-temporal data was geospatially modeled and analyzed via Geographical Information System. It was then simulated, formulated and geo-visualized to model the groundwater level change, determining present and future effects of groundwater extraction on aquifers water level. The study concluded that shallow aquifers have been depleted and rest levels in boreholes have been falling.

Key words: Groundwater, Boreholes, Water levels, Geographic Information System, 3D Modeling, Geo-Visualization.

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Open Rrelationships in the Castles of Clay: High Diversity and Low Host Specificity of Termitomyces Fungi Associated with Fungus-Growing Termites in Africa

Zipporah B Osiemo, Kenya

Andreas Marten, Germany

Manfred Kaib, Germany

Linus Gitonga, Kenya

Hamadi Boga, Kenya

Roland Brandl, Germany

In the African and Asian tropics, termites of the subfamily Macrotermitinae play a major role in the decomposition of dead plant material. Their ecological success lies in the obligate mutualism of the termites with fungi of the genus Termitomyces. Before the advent of molecular studies, the interaction with these fungi was poorly understood. Here, we combined available ITS sequence data from West, Central and South Africa with data of 39 new samples from East Africa to achieve the most comprehensive view of the diversity and host specificity of Termitomyces symbionts across Africa to date. A high amount of sequence divergence in the ITS sequences was found; 11 different Termitomyces lineages in East Africa and > 30 lineages across Africa were identified, and the expected diversity is estimated to be about 41 lineages. The fungal lineages belong to four major clades, each almost exclusively associated with one termite host genus. Analysis of molecular variance revealed that 40% of the ITS sequence variation occurred between host genera, indicating close co-evolution at this level. However, within host genera, fungal lineages and haplotypes were frequently shared among host species and sampling localities, except for fungal symbionts of Odontotermes. Horizontal

transmission of fungal symbionts may facilitate the transfer of haplotypes and species among hosts. However, at present we have little understanding of the maintenance of specificity at the genus level. Possible explanations range from substrate specificity of fungi to an active selection of fungi by termites.

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The Effects of MgCl2 Concentrations in the Aqueous Phase of Water/Brij 30/n-Decane and n-Dodecane Nano-emulsion Systems Produced by PIT Method

Firoozeh Pourjavaheri-Jad, RMIT University, Australia

Rajarathinam Parthasarathy, Australia

Nhol Kao, Australia

Yung Ngothai, Australia

The effects of Magnesium Chloride (MgCl2) concentrations in aqueous phase, on the phase inversion temperature (PIT) of water/Brij 30/n-Decane and n-Dodecane nano-emulsion systems, have been studied separately, and then compared. The variation of conductivity with temperature was measured for emulsions with 19.2 wt% oil, 4.0 wt% surfactant and salt concentrations in the ranges of 0 to 1.0 M. The results showed that with increasing concentrations of MgCl2 in aqueous phase, the PIT of nano-emulsions decreases. The effect of the elevation of concentration on the decrease of PIT was more for MgCl2 in aqueous phase than NaCl and KCl with equal concentrations, from previous studies.

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Serological Study of Newcastle Disease (ND) in Japanese Quails fed with Varying Protein Levels

Mary E Sanda, Kogi State University, Anyigba, Kogi State, Nigeria

Rose G Enebi, Kogi State University, Anyigba, Kogi State, Nigeria

The study was undertaken to detect Newcastle Disease (ND) antibodies in Japanese quails fed with varying protein levels. A total number of 42 three weeks old unvaccinated Japanese quails (Coturnix coturnix japonica) were divided into two treatment groups with three replicates in each, and were allocated 7 birds. These were reared intensively in the poultry house of the livestock unit of the animal production department of Kogi State University, Anyigba which previously housed chickens that showed signs of and died of ND. Diet 1 contained high protein level of 24 % soybeans while diet 2 had low protein of 12 % soybeans with high guinea corn. Salt, lysine, methionine and bone meal were added at equal proportions in both diets. After 10 weeks of age, 15 birds from each diet group were bled and sera separated and analyzed using Haemagglutination Inhibition (HI) test at the Veterinary Medicine Laboratory, of the University of Nigeria, Nsukka. All samples were HI negative. The proximate analysis was done at the Ahmadu Bello University, Zaria, Nigeria and Diet 1 had 86.73 organic matter while diet 2 had 89.39. T-test was used to analyze the data from feed intake and weight change and the result showed that initial weight and feed efficiency were not significant at $P>0.05$ but final weight, total weight gain, average weight and feed intake were highly significant at $P<0.01$. This study showed that Japanese quails are not susceptible to the ND virus strains present in this locality and soybeans inclusion at 24% gave a better body weight gain than at 12%. Further studies may include challenging the birds with virulent Newcastle disease virus.

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Effects of Refrigeration and Freezing on the Over Run in Probiotic Dairy Emulsion

Jeong Kyun Seo, Korea Institute of Machinery and Materials, Korea

Young Bog Ham, Korea Institute of Machinery and Materials, Korea

Chang-Dae Park, Korea Institute of Machinery and Materials, Korea

Byung Ju Lim, Korea Institute of Machinery and Materials, Korea

Soon-Chan Hwang, Korea Institute of Machinery and Materials, Korea

Sung-Soo Kim, CSSteel, Korea

The effect of refrigeration, freezing on the over run in ice cream containing yogurt as a probiotic were studied experimentally. The over run is the increasing rate in the volume of ice cream from ice cream material mixture occurred by the injection of air during freezing due to ice formation and by Shear Force. The suitable over run for probiotic ice cream is known 40~50% and the organization is determined by the size of ice particles, the size of bubble and its distribution during freezing. The experimental parameters were freezing temperature for foaming ice cream, RPM of a dasher in the cylider and time of occurring the over run. The aim of the present paper was to evaluation of the technical parameters effect on the over run in the probiotic ice cream.

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Production of Monoclonal Antibody to Tescalcin (TESC) and Development of Fluorescent Microsphere Immunoassay for TESC

Chung Il Lee, KRIBB, Korea
Yun Hee Kang, Korea
Na Young Ji, KRIBB, Korea
Hee Gu Lee, KRIBB, Korea
Jae Wha Kim, Korea
Suk Ran Yoon, KRIBB, Korea
Eun Young Song, KRIBB, Korea

Tescalcin(TESC), an EF-hand calcium binding protein that regulates the Na(+)/H(+) exchanger 1 (NHE1), is highly expressed in various mouse tissues such as heart and brain. TESC is essential for the coupling of ERK cascade activation with the expression of ETS family genes in megakaryocytic differentiation. In this study, we have developed a "Fluorescent Microsphere Immunoassay" (FMI) which is capable of specifically detecting TESC in serum specimens. We have produced polyclonal antibody (pAb) and monoclonal antibody (mAb) to TESC. We have selected four hybridoma clones which generated mAbs that recognize TESC based on ELISA and Western blot analysis. The FMI was composed with fluorescent microsphere conjugated pAb to TESC and biotinylated mAb, as capture protein and probe protein, respectively. The results were obtained using the Luminex200 system. The dose-response relationship between TESC and fluorescent intensity showed linearity in the range 0~1000 pg/ml and the sensitivity was 7 pg/ml. The FMI was more sensitive, and more reproducible than the ELISA. We have determined the TESC concentrations of serum specimens with the FMI assay system. The results were similar to those measured with ELISA. The newly developed monoclonal antibody and FMI method can be used as an expression and functional studies of TESC. This research was funded by The Basic Science Research Program through the National Research Foundation of Korea (NRF, 20100011583) and the KRIBB Research Initiative fund from the Ministry of Education, Science and Technology (MEST) of Korea.

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Construction of Algae Development Plants in Marine Areas Around Thermal Power Stations

Chika Suzuki, Kochi University (Japan)/ INWES JAPAN/Women Professional Engineers Society of Japan, Japan

Background and problems

In the project, "algae culture and energy production system" targeting coal-fired power stations, which are large-scale CO2 emission source, has been presently explored, namely, 1) collecting CO2 included in gas emissions and dissolving it into inland sea water by using microbubble method and non-bubble dissolution method, etc.; 2) culturing algae by using that sea water and letting CO2 be absorbed by algae photosynthesis, followed by collection of the algae at the stage of certain growth; and 3) producing bioethanol, methane, carbon materials, etc from the collected algae, and using them as substitute for fossil fuel. These have been mainly verified from engineering point of view, but there has not been sufficient verification in assumption of warm-water discharge use from fisheries and maritime environmental points of view which are important for the system operation.

Solution

There is the North Hemisphere's largest coal-fired power station in the Ise Bay in Japan, which is Hekinan Coal-Fired Power Station, but there needs to be verification from fisheries and maritime environmental points of view targeting the Ise Bay in order to realize the above system." In addition to the existing model study, I construct an algae cultivation plan in the marine area around thermal power stations through clarification of CO2 dissolution mechanism and its impact, selection of appropriate algae, and investigation of CO2 dissolution in the sea and algae photosynthesis acceleration, etc. in order to operate the above system. I comment on a progress result in ICWES15.

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The Relativity between Various Regulation and Red Tide Index

Chika Suzuki, Kochi University(Specially Appointed Assistant Professor), Japan

Background: In recent years, many problems have been occurring, including decrease of ice in the polar regions, abnormal climate, and impact on ecosystem due to the global warming. In the study for Grants-in-Aid for Scientific Research, the relativity between water temperature variation by warm-water discharge and red tide index has been becoming discovered from the variation of contribution ratio by applying the data based on the maritime environmental investigation for about 10 to 20 years to multiple regression analysis.

Solution: The target(Red Tide Index) is expanded to "algae with association characteristics" in the new study work, and the relativity between restriction factors (water temperature variation by warm-water discharge and CO2 density) and algae growth is verified by field examination and culture experiment from fisheries and maritime environmental points of view.

By the way, algae aggregation is very useful for high-density breeding of alga seeds. A spore aggregation method using enteromorpha prolifera has been developed by Dr. Hiraoka(Kochi University). Microalgae and algae aggregations have similar mechanisms, and the knowledge acquired from the relativity between warm-water discharge and microalgae is applied for model experiment, too. I comment on a progress result in ICWES15.

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The Electrochemical Oxidation of Phenol and Chlorophenol with Ti/Pt and BDD Electrodes

Mi-Sook Won, Korea Basic Science Institute, Korea

We studied the electrooxidation of 2-chlorophenol (2-CP) and phenol using the Ti coated with Pt and synthetic diamond electrodes in neutral aqueous medium for the efficient organic wastewater treatment. The electrochemical degradations of phenol and 2-chlorophenol aqueous solutions were conducted using a home-made flow through electrochemical cell (FTEC), separately. Above 93 % of degradation yield was obtained both in phenol and 2-chlorophenol oxidation at the applied current of 200 mA for 3 hr for the BDD electrode. However, 60 % of phenol was degraded to small aliphatic acid. Using the Ti/Pt electrode, 48 % of degradation yield was obtained from 2-chlorophenol for 3 hr reaction at the optimized condition. Based on the TOC analyses data, the degradation yield of phenol and 2-chlorophenol at BDD electrode was 1.4

times higher than that obtained from the Pt/Ti electrode.

References

1. Zhou, M.; Dai, Q. ; Lei, L. ; Ma, C. ; Wang, D. Environ. Sci. Technol., 2005, 39, 363.

2. M. A. Rodrigo, P. -A. Michaud, I. Duo, M. Panizza, G. Cerisola and Ch. Comninellis, J. Electrochem. Soc., 2001, 148(5), D60

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Shelf Life Predicting Model for Edible Coated Minimally Processed Mango

Sri Wuryani, Dept. of Agrotechnology, Universitas Pembangunan Nasional "Veteran" Yogyakarta, Indonesia

Hadi K Purwadaria, Dept. of Agricultural Engineering, Bogor Agricultural University, Indonesia

The aim of this study was to develop a model to predict shelf life of Edible Coated Minimally Processed (ECMP) mango from its respiration rate and critical quality degradation. A respiration model based on facilitated diffusion phenomena was proposed for predicting the respiration rates as function of internal oxygen. The critical quality of ECMP mango was the hardness and the degradation rate was estimated to be a function of steady state internal oxygen (O O2 int and storage temperature (T). The model successfully predicted shelf life of ECMP mango at the level 0.91 compared to the experimental data. The model can be implemented at the storage temperature range of 5 - 27 oC.

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Attracting Developing and Retaining Women Engineers and Scientists in Africa

Aude Abena, AFISC (Cameroon Women engineers and scientists Association), Cameroon

"Promoting the objectives of equality, development and peace, for all women and around the world, in the interest of all humanity."This is the commitment by Governments to the Beijing Women's Conference.

It therefore comes to stimulate investment for women and girls at the local, national, regional, continental and international level to have strong families, strong communities strong nations, a strong world. For stable families, you must be able men, strong boys, girls and women.

Women constitute more than 50 ° / ° of the word population.They must manage with dexterity, souls which it is the most part responsible for time. Hence the importance of search for the impact of scientific and technological innovations like ICT, on women in development in General, countries and integrate the gender concept to these developments in particular.

Women of science and technology are particularly indexed to not only use these innovations but also control, gain controls, with intended break inequalities in the sharing relationships and communicate freely, without being harassed or threatened.

In scientific and technological fields, reducing the gap between industrialized countries and African countries, between the number of men of science and technology and the women and between the involvement of women in urbanized areas and those of rural zones can have a positive impact on sustainable and equitable development.

It is necessary to increase the number of girl in science and technology, upgrading the role of women in science and technology, design a strategy for a dynamic network of synergies.

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Strategies to Attract, Develop and Retain Women

Cameron Sargeant, Woodside Energy Ltd, Australia

Lesley Adams, Woodside Energy Ltd, Australia

Woodside is Australia's leading independent oil and gas company and a major supplier of energy to Asia. We operate two of Australia's biggest resource projects, the $27 billion North West Shelf Venture in Western Australia and the adjacent Pluto liquefied natural gas project, currently under construction.

A diverse workforce supports Woodside achieve its business strategy. Diversity underpins our high performing culture through embracing the unique experiences and valuing the contributions of our employees.

Diversity is driven by the Chief Executive Officer and Executive Leadership team.

Woodside has maintained a female participation rate of approximately 27%, which sits well above the WA Resources sector average of approximately 18%.

A contributing factor is Woodside's flexible work practices and work-life balance initiatives which ensure staff are able to balance home and work-life whilst still being provided with challenging work and genuine career opportunities.

Woodside recognises it has a role to play in increasing the number of women choosing to study Science and Engineering at University.

38.5% of Woodside's 2009 Graduates were female. With a 40% aspiration target, the challenge in achieving our aspiration is supply. In 2009 16.6% of students studying an undergraduate Engineering degree across Australian Universities were female - approximately 45% being from overseas.

Woodside has committed to a number of initiatives to support increasing the supply of women choosing Engineering or Science, these include;

- Developing a female tertiary scholarship program
- Promoting career opportunities for women in schools and universities
- Partnering with Industry representative organisations to promote diversity

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Effective Strategies for Recruiting and Retaining Women Engineers and Scientists in the Profession

Margaret Ajibode, Women Engineering Society

In today's society where the engineering sector is suffering acute skill shortage and It is been predicted that this will get worse. In the UK for example, the skills gap is the result of a combined issue of an ageing workforce, the average age of an engineer working in the industry is 53 and a lack of young graduates and apprentices entering the sector. It is even worse where fewer than one in five women are been retained, and there is a decline in females entering the profession.

The current economic downturn has amplified this problem, as the recession has led to downsizing and early retirements, causing major concerns that over half of the global engineering workforce will retire in the next five years, taking their expertise and skills with them.

The industry is missing out by not optimizing the use of a pool of untapped

talent - "WOMEN" it is ironic though because during World War Two (WW2), women had to be recruited to work in factories and take on roles that men did before they were called away to fight in the war.

This report would be based partly on a report I did for the Winston Churchill Memorial Trust as a fellow in 2009 and show effective best practices adopted by businesses that have recruited, retained and promoted women within the profession but also other case studies of best practice to enable the attraction, adoption and retention of women in the industry.

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Water Use and Availability among Rural Women in South Western Nigeria

Oluwaseun A Alade, The Polytechnic Ibadan, Saki Campus,Oyo State,Nigeria, Nigeria

Philip O Eniola, The Polytechnic Ibadan,Saki Campus,Oyo State,Nigeria, Nigeria

Women are the collectors, users and managers of water in the household as they produce nearly all the water for household use in both rural and urban areas for processing, drinking, washing and irrigating home gardens .Women and their children walk longer distances and average of 4-5 hours a day for collection of water depending on regions and countries, especially in Africa. This study is aimed at determining the personal characteristics of rural women, source of water available, hours used in collecting water, uses of water by rural women and constraints to water availability. Random sampling was used to select two states from the six states in South Western Nigeria. It was revealed from the study that majority of the women are married within the age group of 25-50 yrs and are involved in various agricultural activities and trading. Well water and rainy water are the major source of water available to rural women. They spent 3-4 hours a day for collection of water which is used for cooking, processing, washing and other household chores. The major constraints faced in the availability of water are water pollution and contamination, lack of water storage and long distance to water source. It is recommended that pipe borne water should be made available to rural women by the government and erosion should be controlled which will ensure water sustainability.

Key words: Water, pollution, sustainability, women, availability.

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Women Engineers and Scientists and Gender Policy in Armenia

Svetlana Aslanyan, Institute of Linguistics of the National Academy of Sciences of Armenia, Armenia

The paper examines the state with women-engineers from historical perspective, investigates the changes resulted from the economic and social transformations and shows influence of the politics and social conditions on professional development of women.

The history of women's involvement in the engineering started in 1930s with rapid industrialization and stimulated mass involvement of women in this sphere, which occurred in three stages. The process permanently provided a high percentage of women, who worked in all fields of engineering as engineers, researchers and teachers.

Furthermore I will focus on causes of negative impact of the market economy on the situation and reduction of women in engineering in Armenia in contrast to the world tendency, despite the new opportunities which the liberalization of economy brought.

Finally the research will answer why it was and still it is so difficult for women to get to top position.

The paper concludes with recommendations how to attract young women in engineering and researches.

Gender, women, science, engineering, transition.

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Gender Based Digital Divide in Engineering Education in India

Krishnendu Banerjee, India

Gender disparity affects human resource development of any country. Gender based digital divide in engineering education restricts higher education and job opportunities for women engineers. In India, majority of women are engaged in teaching jobs and only few engineers are placed in upper level managerial positions. The general enrolment rate (GER) was 8.99% for rural area and 24.52% for urban area in 2001. Gender gap is less at primary level and higher in higher levels. It is highest at school leaving and Degree levels. The socio cultural problems include entrenched patriarchal attitudes, results in early marriages, early motherhood engaging girls in child bearing and rearing roles rather than in education, participation of rural girls in higher education continues to be low and negligible in engineering and technology sphere. To minimize the Gender based digital divide in engineering education in India there is an urgent need to address the socio cultural problems through awareness generation programmes. This can happen at two levels; school level and community level. This would result in increased enrollment

and presence of women in engineering and also lessen the gender based digital divide in engineering education in India. Both women and their counterparts should come forward to increase the enrollment of women in engineering education. Advocacy at the ground level is a must strategy to move the decision makers.

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Gender Issues and the Challenges of Attracting and Retaining Women Engineers and Scientists - Bangladesh Perspective

Zakia Begum, University of Information Technology and Sciences (UITS), Bangladesh

Science and technology through dramatic advances has improved quality of life tremendously. But on the other hand world is now facing many challenges in environment, energy, health, food, and other sectors mainly due to climate change. Scientists in general are able to contribute strongly in solving most of these challenges. Bangladesh is one of the worst affected countries of the world due to climate changes. So to cope with these challenges and at the same time for sustainable development of the country scientists would have to play a vital role. In fact for all nations of the world including Bangladesh future economy will be science based and scientists will help in the welfare and economic development of the country. So, there will be an increasing demand of scientific personnel to meet future challenges and for the advance development of science. Bangladesh, being a developing country, should give emphasis to ensure full utilization of all the talented and scientific manpower to meet the millennium challenges and at the same time for the overall development of the country. But despite constituting half of the population, women's are being underutilized here. Thus the country is being deprived of half of the talent. In this paper the scenario of women education in Science and Engineering in the context of Bangladesh has been portrayed, the main barriers against women's participation in Science and Engineering has been identified and what remedial actions should be taken both from government and social organizations has been highlighted.

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Girls into Sciences: Contextualizing School Science for Enhanced Performance

Stella Y Erinosho, Olabisi Onabanjo University, Nigeria

Science students generally ask: "What's the relevance?" as they struggle in their minds how to understand concepts that are taught. Girls in particular get tuned off by the abstract and impersonal mode of transmitting knowledge in the subject. Many more females in science would have persisted in the field if there has been flavor of social utility in the curriculum and pedagogical approach to science. Gradually, the pools from which the future women scientists are to be drawn have been shrinking as females rather switch to social sciences. The literature has established that pedagogy is an aspect of schooling that has direct impact on girls' cognitive and affective learning in science. The assumption is that learning, when reinforced by positive contextual experiences, enhances success in school science while success will positively affect girls' motivation and the probability of continuing involvement in scientific study. Researchers have attempted to use the constructivist approach to reinforce science learning through a process that connects what is taught with social-related experiences. The importance of contextualizing school science instructional procedure has been investigated, and found to be productive, as girls especially prefer more open, flexible, interactive and 'person-centered' learning environment. This paper describes the framework for contextualizing science within the indigenous processes in Nigeria, which has come out to be a useful approach for conveying some forms of affective and cognitive information in science to girls. The goal was to measure the gains among high school females when used as starting point for learning science concepts.

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The Construction and Management of Gender Issues within Engineers Without Borders Australia

Naomi Francis, BMT WBM, Australia

Although extensive scholarship exists in the areas of 'gender and development' and 'gender and science/technology/engineering', none sufficiently addresses the convergence of gender, development and science/technology/engineering in technically focused development organisations such as Engineers Without Borders Australia (EWBA). To explore the intersection of these three fields, this paper examines how gender issues are constructed and managed by EWBA.

As part of an honours research project in 2009, a focus group and individual interviews were held with EWBA staff and volunteers, which formed the basis for a case study of EWBA's approach to gender issues.

EWBA is a unique engineering workplace in that the numbers of male and female employees are almost equal. EWBA is similar to the wider engineering industry however, in that the research participants preferred to downplay the importance of gender issues. Akin to the development sector, when gender issues were acknowledged, there was a tendency to focus on those pertaining to the communities with whom EWBA worked rather than within the organisation itself. In contrast to mainstream development practise, but similar to most engineering practise, the management of gender issues within developing communities was generally considered 'interfering' and therefore beyond EWBA's responsibility.

EWBA's position within both the engineering and development sectors have influenced its approach to gender issues. It is important to examine the unique intersection of gender, development and science/technology/engineering in such organisations, as this might provide clues as to why they are attractive workplaces for men and women equally.

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Gender and Career Outcomes of U.S. Engineers

Lisa M Frehill, Energetics Technology Center, United States

Despite recent economic downturn, U.S. demand for engineers remains robust: the Bureau of Labor Statistics projects a need for 178,300 more engineers in the next decade with the fastest growth in biomedical, civil, environmental, industrial, and petroleum engineering. Only chemical engineering, which traditionally attracts a high proportion of women, is projected to decline. Further, new engineering bachelor's degree graduates continue to earn very high starting salaries and the engineering unemployment rate of 6.9% is lower than that for all workers (9.3%).

Women account for just 12% of U.S.

employed engineers and for 18% of new engineering college graduates. With so few entering the field, retention of women is critical. However, women are less likely than men in similar bachelor's degree cohorts to be retained in engineering.

This paper analyzes existing, nationally-representative data to answer several questions about the gender difference in retention in engineering. Are women less likely to stay in engineering because of work/family issues? Gendered reactions to the increasing uncertainty of engineering workplaces? Gender-based discrimination? Or are women more successful than men in moving to engineering managerial work? The first dataset is the U.S. National Science Foundation's Science and Engineering Statistical Analysis System for 2006, a compilation of three constituent surveys that provide the most comprehensive data about the U.S. science and engineering workforce. Second, data from the U.S. Census Bureau's 2009 American Community Survey are used to determine the extent to which recent economic changes have had a differential impact on men and women engineers.

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Promoting Gender Equality in Engineering Education and Careers

Durdana Habib, National University of Computer & Emerging Sciences, Pakistan

The equal participation of women and men in science and engineering education and careers is a critical issue worldwide. This requires the integration of the gender perspective in government, commercial and community activities. Positive action policies aimed at ensuring women's equal access to and full participation in power structures and decision-making are needed. There is need to promote gender equality in engineering institutes by generating interest in STEM at high school level through science exhibitions, motivational lectures by successful female role-models. To-date women remain a minority at most engineering institutes; they usually develop a communication gap with their class fellows and rarely come out of their cocoons to participate in technical discussions in class.

Employers need to be motivated to hire capable women. Senior management must model the way by seeking out women for top jobs and grooming the women at lower levels for future advancement. Flexibility for employees may help provide the freedom to adjust their career trajectory to accommodate the other forces in their lives, including family issues. The shackles of traditional barriers on women are hard to break but the change for betterment is emerging. Women are enjoying greater economic empowerment and are excelling in engineering and technology. Women engineers in Pakistan need support from family members, academic institutes and from the government to facilitate them in pursuing their studies and careers and be the ones to contribute to the welfare of their homes, society and above all their country.

References:

1. http://www.eduvision.edu.pk/Rec_Engg.htm
2. http://case.edu.pk/
3. http://web.uettaxila.edu.pk/uet/UETsub/about.htm

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Wings - Women in Great Sciences

Edith C Hammer, Lund University, Sweden

Anna Broström, Sweden

Charlotte Sparrenbom, Sweden

Pia Romare, Sweden

Alice Nicolle, Sweden

WINGS is a broad, cross-faculty network aimed at women at all levels of the Faculty of Science at Lund University, Sweden, and related industries. The network focuses on research, scientific goals and networking. Involving more than 250 employees from PhD students to professors, it is an important information channel and also comprises informal mentorship.

Lunch seminars are a regular activity, where we discuss research, career opportunities, innovation and ongoing process of change for equality. We invite lecturers from different fields within academy, old members that left University for a job in "real life", and women working with jobs related to science as for example research journalists.

Another important keystone of WINGS is our annual two-day retreat "Research in progress". All participants give presentations on their ongoing projects; we practise popular science writing and support project planning. We invited keynote speakers from a national funding agency, research institutes and a consultancy company.

WINGS activities are being perceived as rewarding and encouraging among the participants, and we want to connect with similar networks in other parts of the world to exchange ideas and inspiration.

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The Role of Site Audits in Providing Flexible Working Environments for Women

Xanthe K Holford, Coffey Environments Pty Ltd, Australia

Site Audits of contaminated land, by nature, are amenable to a flexible working environment. Site Audits are conducted at "arms length" by independent experts who have been engaged to review investigation, remediation and validation work conducted by contaminated land consultants to ensure that the consultant's methodology and interpretation of data are consistent with current regulations and guidelines.

Site auditors often work with assistants who do much of the leg work checking the consultant's reports during the audit process. I was initially attracted to the role of site audit assistant when I was expecting my child in 2002. I have been working with site auditors on a causal basis ever since.

The arms length nature of the work means it can be conducted from home or the office and to a schedule not governed by such time pressures as managing contractors and field work in real time. With the support of my employer (Coffey Environments Australia Pty Ltd) I can work the hours I chose when I chose to work them (mostly!). Thus, I can be there for the school runs and other precious family activities.

Audit work has been for me interesting and challenging with new problems to solve every audit. Exposure to and involvement in a broad range of contaminated land issues has meant I have continued to develop in my career in environmental engineering.

A strong sense of job satisfaction combined with work life balance has been the result.

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The Link between Climate Variability, Gender and Household Food Security: Lessons from Malawi

Tasokwa VM Kakota, Bunda College of Agriculture, University of Malawi, Malawi

Dickson Nyariki, Kenya

David Mkwambisi, Malawi

Wambui K Makau, Kenya

The challenge to achieve household food security in the face of climate change and variability is a result of a combination of biological, physical and social factors. However, despite their central role, gender issues have received a cursory attention in adaptation studies. This paper argues that comprehensive knowledge of the interactions between gender issues, climate variability and household food security can lead to development of effective adaptation measures. The study used thirty year daily rainfall and monthly minimum and maximum temperature data to investigate evidence and extent of climate variability in Ntcheu and Chikhwawa districts in Malawi. Participatory approaches were employed to examine gender vulnerability to climate variability and its implication on the household food security. The results have shown a clear indication of climate variability in the study areas which is manifested through variations in seasonal total and mean rainfall, mean temperature, number of rainy days and start of the rains. Similar changes were observed by the communities. The key finding is that men and women are affected differently by the impacts of climate variability and ultimately household food security due to different exposure and sensitivity to climate risks. Variations in responding to climate variability are mainly due to different adaptive capacity with men having more access to resources than women. The recommendation, therefore, is to mainstream gender issues in developing adaptation measures in order to ensure household food security.

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Recent Trend of Japanese Female Professional Engineers

Ryo Kimura, The Woman Professional Engineers Society of Japan, Japan

Kazue Sakai, The Woman Professional Engineers Society of Japan, Japan

Sanae Yoshikawa, The Woman Professional Engineers Society of Japan, Japan

Yumi Fujii, The Woman Professional Engineers Society of Japan, Japan

Akemi Inubashi, The Woman Professional Engineers Society of Japan, Japan

Nami Kubo, The Woman Professional Engineers Society of Japan, Japan

The Woman Professional Engineers Society of Japan was found in 1993 and has performed activity for 17 years. This is a network organisation of the female professional engineers who belong to various kinds of technical fields across boundaries, and the contents of activity are carrying out opinion exchange for the state of technology by a female viewpoint.

The missions of the organisation are 1. to perform social contributions to technology fields, 2. to offer support for young female engineers and female students in technology fields who will build the future, 3. to strengthen international networks of female engineers, 4. to interchange with Asian nations. Based on these missions, the organisation actively conducts various activities such as attending technology related events, organising symposiums, holding friendly counselling sessions for female students in technology fields and so on.

As one of these activities the organisation conducts questionnaire survey to learn about its members' working conditions, issues related to work and family and their opinions on professional qualifications etc. every few years. This poster will show past and present conditions among Japanese female engineers and current key issues surrounding them based on the survey on 2010.

The organisation has recently gathered members' personal history and published as a booklet. One of the aims of this booklet is to show young female engineers and female students female role models. This poster will also show a part of the booklet.

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JWSE: Division of Women Engineers Support, the Japan Society for Science Policy and Research Management

Mizue Y Kissho, Toho University, Japan

About 10 years have passed since the start of the 21st century, and Japan is continuing sustainable innovative development in a response to the strong and swift international changes occurring in the 21st century, as well as continuing to preserve international identity and improve the QOL of mankind.

To this end, it is vital that as a developed nation, Japan promotes the creation of an environment suited to the 21st century, in which women engineers in SET: Science, Engineering & Technology are able to use their abilities and actively demonstrate their strengths.

The concept of "active women" was first adopted by the society under the theme of gender equality and talented and capable workers in the fields of science, engineering and technology in the 2009 24th the Japan Society for Science Policy and Research Management (JSSPRM), fall symposium and creating a subcommittee. On 9th October, 2010, the Division of Women Engineers Support, JSSPRM (JWSE) was formally lauched, and has just started its activities.

The JWSE present state and its goals are described.

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Engineering a Career in the 21st Century

Miranda J Lamont, Opus International Consultants, New Zealand

My paper will cover my personal experience, and how I was attracted to a career in engineering, how I completed my studies through the Opus Cadet scheme, and details on the positive environment my workplace provides, specifically for me as a female engineer. It also covers why I love my job.

Why Engineering?

- I grew up in a rural farming community and even in this environment engineering wasn't a career that was promoted to women. After studying business and tourism at University I ultimately stumbled across engineering when a female friend was studying it at University and thought this is for me. However if I hadn't have

spoken to her I would never have even know engineering was a possibility let alone considered it.

Opus Cadetship

- The Opus Cadetship offers an alternative to studying at University. While you work full time you study part time. This is allows people to study at their pace and fit it in with their life with other committments (such as children and family)which is invaluable for making engineering more appealing to women.

Why I love my Job

- I love my job as not only does Opus offer a gender friendly work place (which is important in a male dominated industry)but they also have a mentoring scheme with female mentors who are able to provide assistance not only in engineering but on work life balances as well. I see these as valuable tools in retaining women in engineering.

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Developing African Women Scientists and Engineers in the 21st Century

Caroline C Lang'at Thoruwa, African Women in Science and Engineering, Kenya

Mabel Imbuga, African Women in Science and Engineering, Kenya

The participation of women in science and engineering careers in Africa has been extremely low compared to men as a result of several factors; socioeconomic, sociocultural, and policy factors. In the 21st Century it is expected that the contribution of African women scientists and engineers will improve significantly.

A descriptive survey was carried out amongst women scientists and engineers from several African countries. The objective was to determine the (a) factors that influenced them to (i) study science in school and (ii) to succeed in their current careers; (b) the challenges they have experienced and successes attained. The study also determined the successes and challenges experienced in leadership positions. The findings show that hard work, determination and interest in science strongly influenced the decision to study science in school and to succeed in science and engineering careers. Major challenges experienced in careers include family obligations, lack of finances & resources for research and gender biases. The prominent leadership challenges experienced by these women were related to men snubbing women and general lack of cooperation from colleagues. Some of the challenges expected in the 21st Century include - coping with the fast pace of technology, accessing research funds, translating research into products and making an impact on society. In conclusion, programs that enhance opportunities for accessing funds for postgraduate education and research need to be enhanced. Mentoring and leaderships programs should increase the number of successful women scientists and engineers as well as those taking up leadership opportunities confidently.

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'Young Professionals' Networks - Bridging the Gender Gap

Cynthia T Lie, Engineers Australia, Australia

Peter E Dawson, VPELA, Australia

This paper examines the role that 'young professionals' networks can play in developing female management talent. It considers as a case study the Australia-Pacific leadership team of the Professional Growth Network (PGN), a global Parsons Brinckerhoff (PB) network of 'emerging professionals', those with 0-10 years professional experience. Since 2003, the PGN Australia-Pacific has been run by a team of between 10-24 leaders. This paper investigates what happens to these leaders once their roles expire.

The PGN provides emerging professionals with professional development opportunities to complement PB programs, and is a trusted advisor to management. The leadership team develops and executes strategy; manages scope, budgets, and people; facilitates change; and engages clients and stakeholders; in the context of both local and geographically remote, dispersed teams. Accountability is a strong focus, achieved through influence rather than direct lines of reporting.

Since 2003, PB's average female participation rate in its professional workforce is 24%; for the PGN Leadership Team it is 44%. Through analyses of historical data, interviews, culture surveys, and investigations into cultural levers, the paper investigates how the PGN has achieved this overrepresentation of female leaders. There are similar trends in other regions: Asia, Middle East, UK, and US.

In 2010, 24% of PB Australia's Managers are women, with female representation falling through the Executive and General Manager roles to 8% at the Director level. This paper answers the question 'where do all the women go?', drawing conclusions about ways to reduce this leakage of female management talent from industry.

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Centre for Empowering Women and Girl-children for Careers, Business and Health

Jenniffer K Mabuka, Department of Global Health, University of Washington, Seattle, USA., Kenya

Caroline K Onyancha, Civil and Structural Engineering Department, Masinde Muliro University of Science and Technology, Kenya

Concerted efforts in the past decade have been invested towards achieving the Millennium Development Goals (MDGs) by the year 2015. It is now largely established that meeting the set goals relies on the direct impact these efforts have on women. A recent report by United Nations Development Fund for Women (UNIFEM) indicates that in general, promising practices that can help steer women out of poverty have been identified. However, it was emphasized that there is a critical shortage in scaling up investment of practices that work to the community level. Consequently, there is need to invest in projects that target women at the community level to expedite the realization of the MDGs before the deadline.

In this paper, various efforts that are being considered to empower vulnerable women and young girls in Kisii, Kenya are discussed. It is envisaged that a comprehensive resource centre focusing on women education, career modeling, business microfinance, agriculture and health education will be started. The target groups will include: school going girls that need career mentoring,tuition and 'summer' apprenticeships; school drop-out girls and young mothers in dire need of income generating skills; and women engaged in preparation and consumption of local liquor, a risk factor for HIV transmission and acquisition. A parcel of land for constructing this facility has been identified but the construction

of the physical structures and target mobilization is yet to begin. Because this project is at the initial stages, it will benefit from wide consultations with other conference attendees.

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Equal Opportunities

Yogita Maini, Halcrow Group Limited, United Kingdom

The third millennium has already evidenced unprecedented changes in the domain of Science and Technology; engineering companies in the United Kingdom are increasingly recognising the importance of integrating women engineers into their organisations. Although the gender gap has narrowed, the full gender equality in engineering careers still seems elusive with women being remarkably absent from senior positions. It is imperative, that we look into the issues that these few women engineers dealt with in the past, practising the profession institutionally established for men.

Drawing from my personal experience being the first woman civil engineer to graduate from the University of Botswana, this paper is a broad-brush view of the complexities which women engineers have encountered in their work environment and, thus affecting their career advancement. Understanding these informal obstacles and policies implemented by employers to encourage women engineers, can help us create a healthy work environment, which in turn, will allow all engineers to produce the best possible engineering innovations. Most importantly, it is hoped this paper shall culminate in employers developing similar policies and work practices that will foster gender equity.

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A Bibiliometric Study of the Publication Activities of Women Scientists With Special Reference to ICWES Conference Proceedings

Suriya M Mayandi Thevar, Annamalai University, India

Objective: The present study is an attempt to evaluate the research output of women scientists at three levels: viz (i) macro; (ii)meso and (iii)micro levels. In other words, the scientific productivity is measured in terms of (i)national (ii) institutional and (iii)individual levels. The descriptive indicators such as the 'list of conference papers' and the period of time are used to measure the volume of research output as well as to compute the research trend. The relational indicators such as the author, institution and the geographic regions are used to identify the links and interactions between the actors of national and international systems of scientific productivity. Such interactions not only constitute the flow of knowledge but also provide a picture of scientific activity based on the content of publications. These indicators help monitor changes in scientific productivity and identify emerging research topics and the relevant contributions. The database for the current study is the ICWES conference proceedings (1964-2008).

Methods: The contribution of the women scientists across various domains of specialization has been analyzed by using various bibliometric techniques such as Jaccard Index, priority index etc and also adopt various statistical tools such as Wroclaw's taxanomic model, Lorens Curve and Gini Ratio.

Results and Conclusion:
Hierarchical Clustering technique and Multidimensional mapping techniques are used to map the themes of the ICWES conference proceedings which in turn will reflect scientific activities of the women in different areas of specialization.

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Towards the Design of Gender Social Programmes in Science, Engineering and Technology in Sub-Saharan Africa: A Study of the Women in Engineering and the Built Environment Programme at the University of Johannesburg

Hannelie Nel, University of Johannesburg, South Africa

Anita Bosch Venter, University of Johannesburg, South Africa

Science and technology have gained increased prominence on the international political agenda due to its impact on sustainable development and democracy. At the 2005 World Summit the United Nations Millennium Development Goals were confirmed and goal three is the promotion of gender equality and the empowerment of women across the globe by 2015. The attraction, education and retention of women in science, engineering and technology are paramount to the socio-economic development of all countries; and in recent years several social programmes have been launched in Sub-Saharan Africa to promote women's participation in higher education and industry. The programmes include inter alia the Women in Engineering and the Built Environment Programme at the University of Johannesburg, South Africa; the Gender Centre at the University of Dar es Salaam and the Gender Dimension Unit at Ardhi University, both in Tanzania; the Botswana Technology Centre; and the Gender Training and Research Programme at the University of Namibia. Despite the emergence of the listed programmes the low number of Sub-Saharan women studying science, engineering and technology and working in the sector remains problematic. The effectiveness and impact of these programmes are therefore questioned. The Women in Engineering and the Built Environment Programme at the University of Johannesburg developed a framework of programme focus and activity items over the past five years - and the purpose of this study is to verify the framework and provide guidelines for programme design of gender social programmes in science, engineering and technology in Sub-Saharan Africa.

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Poland IEEE Women in Engineering Affinity Group

Barbara Obryk, Institute of Nuclear Physics (IFJ) Polish Academy of Sciences, Krakow, Poland

The IEEE Women in Engineering Affinity Group of IEEE Poland Section has been established in Spring 2009. The aim of the AG was to provide an opportunity for its members to exchange ideas and experiences how to overcome a special series of gender related barriers to entry and success in scientific careers that persist, de-spite recent advances. We work on the following points:

- how to prepare high school girls to make an unprejudiced choice regarding their study and careers in sci-ence and engineering as well as give them good background for making that choice;
- how to improve the academic progression of women in order to minimize the movement of women out of these fields;
- how to overcome barriers for the advancement of women already working in science and engineering;
- how to combine a career with family life.

We were involved in organization of the WIE Special Sessions during IEEE MSS/MIC conferences: 2008 in Dresden, 2009 in Orlando and 2010 in Knoxville. The special sessions have addressed the theme of women's contributions to nuclear science and medical imaging by presenting encouraging examples from the IEEE NSS and MIC field.

We hope that our activity will help foster efforts to counter a worrisome trend that has been recently noticed in European countries: the more developed the country is and the richer the society is, the fewer women there are in science & engineering. We cannot afford to lose women's talents in S&E.

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Supporting Women Scientists and Engineers in the Southeastern Region of Korea

Hye Young Park, BIS-WIST, Korea

Jung Sun Kim, BIS-WIST and Dongseo University, Korea

BIS-WIST is a regional institute commissioned by the Ministry of Education, Science and Technology (MEST) of the Republic of Korea. It was established in 2006 with aims to provide support for women scientists and engineers in the Busan, Ulsan and Gyeongnam area, otherwise classified as the southeastern region. The center opened in accordance with Section 2, Article 14 of the "Act on Fostering and Supporting Women in Science and Technology" which was enacted in Korea in December, 2002. Even though their overall education attainment falls within the range of the national average, the under representation of women in the science and technology sectors is more serious in the southeastern region compared to those in the capital region. With the successful completion of Stage 1 projects (2006-2008), BIS-WIST has begun its Stage 2 projects beginning January, 2009. The inclusion of "small group" funding in addition to the local organization support that has been implemented since Stage 1 is a notable change in Stage 2. This is to ensure visibility and empowerment of women in science and technology (ST) unique to the Busan, Ulsan and Gyeongnam region. Whether informal or well-established, women's networks have played a valuable role in raising the profiles of women scientists and engineers by bringing to light the problems they face. The achievements of BIS-WIST in the years 2009 and 2010 will be outlined in this presentation, which include career services, professional development programs and networking opportunities as well as advocacy research.

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Gender and Social Issues of Pakistani Women in Engineering

Sadia Shakil, Center for Advanced Studies in Engineering, Islamabad, Pakistan., Pakistan

Despite the efforts being made at different levels, to encourage female participation in science and technology, the results remains surprisingly discouraging. In educational policies, emphasis has been given to impart technical, vocational and engineering education to females. Customized programs have been launched, and women engineering universities have been established. The enrollment rate at technical and vocational levels is better, compared to university enrollment rate, but pass out rate and later on retaining the women in science and technology is low at every level.

Gender and social, both issues contribute towards this disappointing situation. Females are considered to be weak, both physically and mentally. And due to this misconception, they are not considered to be suitable for logical and physical demands of engineering, which is yet a male dominated domain. Socially also, the females of well off families are encouraged to opt for engineering and sciences, but the poorer females are strictly prohibited to choose engineering as field of education.

My paper will gather data on existing figures available for females in engineering and science. It will also give suggestions which can aide in developing and retaining women engineers and scientists.

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Women of Color in SWE: An Historical Perspective

Bevlee A Watford, Virginia Tech, United States

This paper will explore the history of women of color and their relationships with the Society of Women Engineers. SWE was at the forefront in recognizing the unique position these women held within the engineering professional community. The women found greater acceptance within SWE than in the larger community where they were rejected because of their color. However more recently formed organizations such as the National Society of Black Engineers and the Society of Hispanic Professional Engineers, and the brand new Society of Asian Scientists and Engineers provide alternate avenues for women of color to develop professional relationships with those similar to themselves. By tracing the history of the participation of these women in these professional engineering organizations and exploring the choices being made by those new to the profession, it is believed that we can better understand the role that these professional societies have and how SWE can move forward in addressing the needs of an increasingly multi-cultural society.

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Gender Mainstreaming Science Policies in Taiwan

Chia-Li Wu, Tamkang University, Taiwan

Gender mainstreaming has been incorporated and reinforced as national policies since 2000 by the then-newly elected government. Finally in 2007, a gender equity working committee was formed in National Science Council in Taiwan. In the meantime, a new category of gender and science has been established for project application. In compliance with this new classification, a special funding is allocated for projects to apply in this category.

Under the examination and push of the gender equity committee of NSC, several new science policies regarding gender have been implemented in order to achieve fair competition and encouragement of women scientists, such as childcare programs in NSC-supported symposia, extension of project duration due to childcare leave, as well as academic performance evaluation extended for pregnancy.

Another gender mainstreaming policy much affected is the gender impact assessment required for all government-funded S&E medium-term (4 yrs) projects. All such big projects must take consideration from gender perspective and be assessed on gender impact.

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ADVANCE: Advancing Women Faculty at North Dakota State University

Canan Bilen-Green, North Dakota State University, United States

Since 2001, National Science Foundation awarded 49 institutions five year ADVANCE Institutional Transformation awards. The goal of these awards is to increase the participation of women in the scientific and engineering workforce through the increased representation and advancement of women in academic scientific and engineering careers. The ADVANCE FORWARD program at North Dakota State University, funded in 2008, strives to improve the climate across campus, enhance faculty recruitment efforts, increase faculty retention and advancement, and open leadership opportunities. The FORWARD program features three major components consisting of a number of programs: Campus Climate, Advancement & Leadership, and Research. To achieve the project goals, the campus climate and advancement & leadership components provide professional development opportunities for academic administrators, and mentoring programs for junior and senior faculty. Within all components there are specific, funded incentives to support change efforts. Although FORWARD has adopted best practices from previously funded ADVANCE programs, it also has a number of unique programs, including a FORWARD Advocates & Allies program to engage senior male faculty in institutional transformation, a Commission on the Status of Women Faculty to proactively improve institutional policies, and a three-year cohort mentoring program for junior faculty. In this poster we will share how participation of women in all academic ranks at NDSU increased since receiving an ADVANCE award. We will highlight our unique programs, discuss formal and informal strategies employed, and report on our progress with regards to goals we seek to achieve.

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ADVANCE: Institutions Developing Excellence in Academic Leadership

Diana Bilimoria, Case Western Reserve University, United States

Lynn T Singer, Case Western Reserve University, United States

Amanda Shaffer, Case Western Reserve University, United States

Institutions Developing Excellence in Academic Leadership (IDEAL) is a three-year NSF ADVANCE PAID project to seed gender equity transformation at five regional public institutions of higher education in northern Ohio (Bowling Green State University, Cleveland State University, Kent State University, University of Akron, and University of Toledo) and continue the institutional transformation at Case Western Reserve University (CWRU). The goal of this innovative partnership is to create an institutional learning community that is empowered to develop and leverage knowledge, skills, resources and networks to transform academic cultures and enhance equity and inclusion. IDEAL adapts and disseminates the successful academic leadership development and institutional transformation methods developed by CWRU during its five-year ADVANCE Institutional Transformation initiative.

In this poster we describe: the goals, initiatives, and results of IDEAL's first year. Specifically, we highlight for the six schools institutional transformation themes, specific activities, findings, and sustainability plans during IDEAL's Year 1.

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ADVANCE: Purdue University Center for Faculty Success

Suzanne M Zurn-Birkhimer, Purdue University, United States

Christie Sahley, Purdue University, United States

ADVANCE-Purdue is an institutional transformation project that targets recruitment, retention, and advancement of women STEM faculty at Purdue University, West Lafayette, IN, USA. The development and implementation of programming is carried out by the Purdue Center for Faculty Success (PCFS). Our activities are designed to impact the institute through the hiring process, and by offering networking, mentoring and coaching for all faculty. Our current programming includes: Search Chair Workshop for Faculty Hiring, the Mentoring Institute and President's Luncheons for newly hired faculty, Career Coaching Cohorts for tenured female faculty, the AaLaNa Group for STEM female faculty of color, and Diversity Catalysts who engage the faculty and staff across campus in conversations about diversity issues. One of ADVANCE-Purdue's strengths is the blending of programming and research. The ADVANCE-Purdue research team uses theories and methods drawn from sociology and education to assess the theoretical models on which programs are based, and to develop new models that might be more inclusive in how they represent women faculty members' experiences. ADVANCE-Purdue and PCFS continually provide the campus leadership with evidence of program effectiveness and will offer a basis for campus-wide changes to policy and practice. In this poster we will present the implementation of the PCFS programs, participant demographics, and formative assessment. We will also outline how each program is leading to policy change and institutional transformation.

707

Turning Points: Propensity Score Matching to Isolate Factors Influencing the Participation of Women and Minorities in STEM Fields

Jennifer J DeBoer, Vanderbilt University, United States

While women in the United States have progressed in leaps in bounds in closing (and overtaking) the gap with men in access and completion of tertiary education, this trend has not been constant across fields. In science, technology, engineering, and mathematics (STEM) fields, female bachelor's degree earners are still outnumbered. Further, the gap is larger in fields that are "traditional" STEM fields as opposed to newer, interdisciplinary subject areas. The support mechanisms most often cited as the most effective in encouraging enrollment, persistence, and success for women in STEM fields are networking opportunities (social capital), mentoring (role models), and curricular preparation (early access). This study first investigates the spectrum of factors related to women's choice of entry into a STEM field (choice of major during the second year of college). It then matches women based on a propensity score

and seeks to isolate the effects of social capital (the average percent of students in the high school in advanced math courses), role models (having one or both parents in a STEM field), and curricular preparation (the availability of advanced math/science classes). The dataset used is the Educational Longitudinal Study of 2002, which has longitudinal information (base year and two follow-ups) on a nationally representative sample of sophomores in 2002.

708

Career Formation and Career Development of Female Students in Engineering Courses

Maki Iwakuma, Women Professional Engineers Task Force, project team of IPEJ., Japan

Yoshiko Ishida, Women Professional Engineers Task Force, project team of IPEJ., Japan

Fedeko Kakuda, Women Professional Engineers Task Force, project team of IPEJ., Japan

Kayako Sasao, Women Professional Engineers Task Force, project team of IPEJ., Japan

Yukari Aoki, Women Professional Engineers Task Force, project team of IPEJ., Japan

Yuki Hirose, Women Professional Engineers Task Force, project team of IPEJ., Japan

Japan's workforce is expected to shrink in the future, raising concerns over reduced productive capacity.

Where can female engineers demonstrate their abilities?

Society is coming to accept that there are no gender differences with regard to research or technological capabilities, and greater participation in society by women is inevitable.

However, there are still imbalances in the ratio of males to females in the management ranks as well as imbalances in salaries.

We started supporting programs to females in accredit engineering courses in March 2007. During the last two years eight meetings were held, in which we have been keeping familiar environment on discussion. Some females were greatly conscious of making carrier through meetings and networking. We had already reported these activities in the 13th and 14th ICWES conferences.

According to the Governmental Survey on Equality of Employment (2009), some companies have positive action towards woman resources development. Therefore; young female engineers have to study and train by their own wills to develop their abilities. Now we will suggest to learn IPD(Initial Professional Development) program of IPEJ (The Institution of Professional Engineers, Japan), which is for young male and female engineers. IPD program has three categories a) discipline specified competency, b) management skills, and c) commitment; they are very important especially young female engineers. We will present about our activities and IPD programs.

709

ADVANCE: The UIC WISEST Post Doctoral Research Associates Program - An Innovative Pilot Initiative for Underrepresented Minority STEM Women

Manorama M Khare, University of Illinois at Chicago, United States

Moyin S Tam, University of Illinois at Chicago, United States

Linda Siebert, University of Illinois at Chicago, United States

We will present assessment results from an innovative pilot initiative - The WISEST Post Doctoral Research Associates Program - designed to mentor and prepare URM STEM women postdocs for a successful academic career. This program is a key component of WISEST, the National Science Foundation funded ADVANCE IT grant at the University of Illinois at Chicago. The program was conceptualized by the WISEST Facilitators with assistance from National Postdoctoral Association Diversity sub-committee. Five URM women participated in this program from Aug 07-Aug 09. Each postdoc has an advisory team than includes a research adviser, a departmental mentor, and a WISEST Facilitator. Special features of the program include a proactive recruitment strategy, a strong mentoring team, a joint research proposal prepared with an identified advisor at UIC and a series of career building seminars.The evaluation of this pilot initiative used data from multiple sources to assess the success of the program, including qualitative one-on-one interviews with the postdocs before and after the 2 year experience; an extensive on-line survey to obtain the perspective of the mentors and advisors, and evaluations at the end of each career building seminar. At the end of the two year program 2 postdocs are in Tenure track assistant professor positions, 1 is a research assistant professor, 1 decided to do another post doc despite receiving 2 tenure track offers. Overall 4 of the 5 postdocs remained in academia.

710

Belarusian Model of the Commitment of Equality in the Workplace

Hanna Khrutskaya, Belarusian State University, Belarus

Gender equality is an obligatory condition of the effective development of any state. One of the main aspects of gender equality is the equality in the workplace. The objective of the research is to identify unique features of the commitment of equality in the workplace in Belarus which can be useful for other countries. The main method of the research is theoretic-bibliographical analysis of the legal sources, doctrine and statistics. The research of Belarusian national law gave extraordinary results: the legislation is gender neutral, it does not include any discriminating provisions. Consequences of that policy are successful. Belarusian women have higher level of education than men. 54 % of officials in ministries, 44 % of deputies in local governments and 30 % of representatives in Parliament are women. There are 58 women's nongovernmental organizations in Belarus, which provide educational programs, social support, etc. Lawgiver consider women's demands and prescribe social guaranties in the Labor Code, other statutes: guaranties and exemptions for pregnant women, gainful 3 year leave for taking care of children after their birthday, pensionary edge for women is 55 years. But the difficulties on the way of the spread of women's leadership still exist too: male corporative culture, lack of female solidarity, lack of time for leadership activities, because of traditional family duties. Thus the legislative base for the equality in the workplace is created, now the energization of nongovernmental organizations and women by themselves is necessary.

711

Women in Engineering in India

Nabanita Mukherjee, India

Women's presence and participation in engineering education and profession in India indicates a grave picture despite changes in the education system of India. Some of the factors that have kept rural women largely excluded from engineering education and profession are related to some changes at the policy level and also at the ground level. There is an urgent need to re view the existing education system of India so as to increase the participation of women in engineering education and profession. Gender factors typical to women restrict higher education and job opportunities for women engineers. At the ground level, parents of girl children needs orientation on subject matter of engineering education and profession and how it would benefit a girl child. Parents should dream first then only they would allow their girl child to go to school, learn science and increase their interest in engineering education. Women Engineers from rural areas may be brought to influence the decision makers and encourage the children (girl) in schools. Policy level changes in terms of adding some value to the existing education system is a necessity. Completion of at least 12 years of schooling at pre graduation stage is a decisive requirement for entering engineering degree courses.This would result in enhanced participation of women in engineering education and profession in India. It is also clear that many of the flaws that one observes in engineering education and practice can be remedied by greater participation and involvement of the 'forgotten' half of society.

712

Unconcious Resistance to Change

Kate OReilly, Optimiss Consulting, Australia

Resistance to change is often experienced from men and women who would outwardly appear committed to promoting opportunities for women.

The term 'unconscious bias' is used to explain a situation in which stereotypes influence how people process information in relation to other people. This becomes a problem in the workplace as people tend to recruit and promote people like themselves, rather than applying a merit selection process.

Just as unconscious bias shapes how people give preference to others without thinking about it, unconscious resistance explains how people resist recruiting, promoting and retaining certain types of people without thinking about it

Managers do not resist gender diversity as such, but rather the possibility that they might have to manage a team made up of men and women, something they may not be equipped to do. Can they communicate effectively with both men and women? Are they comfortable with negotiating flexible work arrangements with staff who are parents?

In order to empower staff to move towards gender diversity in the workplace, the organisation must create norms and values relating to diversity understanding. The norms of an organisation include things like attitudes, beliefs and values that are particular to that company. When the norms begin to change, that is when we will see real workplace cultural change occurring.

713

Constructing Diversity

Jan Peters, Katalytik, United Kingdom

Melanie Allison, United Kingdom

The UK Contractors Group report (2009) provided compelling evidence of the benefits of capital investment in the construction industry; its role in stimulating employment growth; the serious skills shortage that the industry faces and the need for urgent support to stimulate construction businesses to take on more apprentices.

The 2009 UK Construction Industry Council report, by the University of West of England, revealed that despite Government legislation covering the prevention of discrimination on the basis of gender, race, disability, religion, sexual orientation, family and age, the sector is made up of only 13.5% women, 2% black, Asian and minority ethnic (BAME) groups and 14% with some form of impairment.

The highly fragmented nature of the sector and seemingly random unconnected and un-strategic initiatives stimulated the UK equalities body to take action and commission a cost benefit analysis. Using the findings from that study the talk will focus on the issues and the challenges faced by middle managers and present case studies of outstanding practice in embracing diversity. The sector has shown that it can change with programmes in the UK like 'Considerate Contractors' so the challenge is on. Based on roundtable discussions with middle managers and interviews with sector leaders the presentation will discuss the most effective solutions and offer ideas to help move the diversity agenda onto the next level. The talk should stimulate discussion and debate among participants about good practice in different nations and the challenge of delivering on time, to budget and with quality.

714

Where did they all go? Career Crossroads for Female Engineers

Melanie J Pollock, GM Holden, Australia

Every engineer has different pathways into their career and faces different challenges during it. All children are born with the ability to follow a career as an engineer. This paper explores the turning points through a woman's life where she either consciously, or unconsciously rejects engineering as a career path, and discusses the policies at GM Holden that support women in following an engineering career.

Three generations of female engineers at GM Holden were interviewed to understand their experiences, and how they were shaped as engineers. Six specific life events were identified as significant crossroads for female engineers.

1. Interest in Maths and Science in Primary School
2. Subject selection for Senior school
3. Selection of University course
4. Commitment to completion of Engineering degree
5. Entrance into the workforce
6. Return to work after Childbirth.

GM Holden's Diversity policies were then analyzed to identify how effectively Holden addresses the career crossroads,

Finally, industry wide recommendations are made to assist employers in providing a fulfilling, lifelong career for their female engineers.

715

MentorSET

Milada Williams, Women's Engineering Society, United Kingdom

Background: Mentoring is considered to be one of the most critical supportive actions for many women engineers and scientists who are employed in industry or academia where they are often a very isolated minority working in a male dominated environment that shaped working practices since the industrial revolution.

Objectives: The aim is to describe MentorSET www.mentorset.org.uk, the very successful mentoring project developed and delivered by the Women's Engineering Society www.wes.org.uk

Method: The mentoring project runs workshops that deliver mentoring training to prospective mentors and mentees. Both parties thus learn about each other's roles, expectations and rules before deciding on what they can ask for or give to each other. Mentees submit their requirements to the MentorSET manager who will select the most appropriate mentor. Mentors are volunteers. Mentees drive the relationship according to their needs and basic rules of engagement agreed at the start. Mentoring can be done by direct personal contact or conducted at a distance via email, internet, peer group, etc. The project is supported by financial grants originating from UK government.

Results: Paired up mentoring provides major boost to confidence of the female mentees, particular to those who are lone individuals without in-house support. It also provides support for women who do not wish to have an in-house mentor by getting paired up with someone in the similar position elsewhere.

Conclusions: The mentoring scheme has been running for 8 years and has created 500+ pairs, success of which has been documented in feedbacks received.

716

Implementing Gender Equality in UK

Milada Williams, Women's Engineering Society, United Kingdom

Background: UK government's report http://www.bms.ed.ac.uk/services/webspace/bsdb/pdf/bsdbgreenfield2002.pdf published 2002 highlighted the need for positive action to attract, retain and progress women's careers in SET.

Objectives: To outline various initiatives and positive actions that help women studying and working in SET environment in the UK.

Methods: Drawing on personal experience and knowledge of work being done in the UK, as an employee of the Wales' Resource Centre for Women in SET http://www.theukrc.org/about-us/in-your-area/wales and as a volunteer for the Women's Engineering Society (WES) www.wes.org.uk. Various tools will be described that help establish and maintain a more equal workplace, such as official commitment to the gender equality, flexible working practices, workplace culture analysis, support for groups and individual women such as networks,mentoring schemes such as MentorSET www.mentorset.org.uk.

Results: Each individual tool/initiative highlighted will be supported by evidence in the form of a case study highlight or individual testimonial documented elsewhere. Examples include WES's Doris Gray Conference for students in SET, connecting networks, peer group mentoring, CEO Charter (a company's commitment to gender equality) workplace culture analysis, gender equality training, Athena SWAN Charter and Award, SET Fair Standard Award, etc.

Conclusions: Currently, there is greater awareness in industry, business and academia the need for greater diversity and gender equality, this is partly due to the changes, over the years, of the UK equality legislation which expects the industry and society to acknowledge and utilise the skills of the often dormant female talent and partly to the work being done by a variety of organisations.

717

Women's Networks in STEM

Milada Williams, Women's Engineering Society, United Kingdom

Background: Women's networks are being established in academia and industry in the UK to provide support, access to formal and informal information, to create a sense of community for those engineers and scientists working in isolation.

Objectives: To describe the ways different networks operate, compare and contrast and highlight those most successful.

Method: Contacting organisations requesting information, conducting a survey of the group, researching the aims, running of the organisation, its programmes and its members' satisfaction.

Results: Mostly qualitative evaluation, using case study material whilst providing some statistical information regarding the size and longevity of groups, etc.

Conclusions: The outcomes vary since most networks are quite small and serve a particular section of a company or university. Senior women networks are quite different from a student group.

718

Women Engineers: Looking around Looking Forward

Mai Yeung, AECOM Australia Pty Ltd, Australia

It is not uncommon to hear that there isn't enough women engineers represented in the industry, especially in the leadership roles. This paper looks at the importance of addressing this issue to support skills shortage and encourage a diversified and inclusive culture in the workplace so that women engineers will feel comfortable working in a male dominant profession. The paper will address the challenges that women faces from taking time off to start a family and flexible working conditions that would allow women engineers to work at home when required. A high percentage of women in the 25-45 age group works part time now, are they really working part time or they are actually putting in full time hours to get the job done. The nature of project work is actually suitable for women engineers who work part time. Women engineers in different industries and cultures will have different experience, the paper summarizes the women's viewpoint, their expectations from the employers and families. In conclusion there has been a progressive improvement on the number of women engineers entering into the workforce, they work in the industry for as long as possible, delay starting a family, most women engineers opted for part time work and with the improvement of communications and IT, most women engineers should be able to choose to work full time or part time with significant contribution to the industry.

719

Livelihood Interventions in North East India

Ajanta K Bezbaruah, Handique Girls' College., India

The North-Eastern Region is located at the easternmost side of India with seven states comprising it which present a wide mosaic of cultures. Yet there is an inherent unity in the area which bespoke not only of the region but the entire country.

At a time when India has been predicted to become a superpower, the region especially Assam still lags behind in many key indicators. Of late, a number of interventions by several players have led to a change in scenario leading to emergence of women leaders, entrepreneurs and businesswomen.

The objective of the present study is 1. To see how these interventions work; how women are encouraged to become a player in the money market. 2. To observe how these efforts bear fruit at the grass roots level touching even the marginalized women.

The methodology used has been mostly inference from the general to the specific. The idea is to first identify the sources of intervention in the specified region and then describe the modus operandi of one source and trace it to the ultimate beneficiary.

In this paper, of the three major players, the Rashtriya Gramin Vikas Nidhi has been chosen to see how it works and the mode of operation of a non government organization called SATRA has been highlighted.

The results and conclusion show that women have become confident to take part in decision making and are potential leaders in the making. They contribute to the family income and enjoy a better status in society.

720

Australias First Sustainable Precinct

Karen M Billington, Northrop Consulting Engineers, Australia

"Our developments are our legacy for our children and our children's children. We aim to make sustainable living part of the everyday life of Australians and leave the land in a better state than we inherited it". The Loop Development is forecasted to be the first sustainable Precinct in Australia. It will showcase strong leadership in sustainable precinct both on a national and an international scale.

Northrop is currently providing Sustainability Master Planning, Green Star Accredited Professional and Engineering Detailed Design services for the $130M Loop Development project expected to be completed in 2014. Our client is the Principal sponsor of the Green Star "Communities" tool, a green building framework which will establish benchmarks for sustainable communities throughout Australia. The project will be targeting a 6 star Green Star certification under the Green Star "Communities Pilot" tool. Northrop Sustainability is working closely with the Green Building Council of Australia (GBCA) to develop a mixed use "Custom" Green Star rating tool. All new buildings within the development will be targeting a 6 star Green Star certification under the new Green Star "Custom" tool.

The project encompasses passive thermal building designs, biofuel trigeneration systems, integrated rainwater and wastewater treatment systems, electric vehicle provisions, large scale grid connected photovoltaics, geothermal HVAC systems, naturally ventilation systems, commercial composting systems, community wide energy management systems, pedestrian friendly communal spaces and integrated residential waste services. Northrop Sustainability is leading the consultation process for the approval of the ACT's first precinct integrated rainwater and wastewater treatment plants.

721

Leadership in Engineering Education from K12 to University: Key to Improving Diversity in the Engineering Profession

Steven C Goh, University of Southern Queensland / Engineers Australia Queensland, Australia

The engineering profession within Australia has failed to attract young women for the last decade despite all the effort that have gone into promoting engineering as a preferred career choice for girls. It is a missed opportunity for the profession to flourish as a hetergemous team. Many traditional initiatives and programs have failed to make much impact or at best incremental improvement into attracting and retaining more women. Why is this? Is it because we are treating the symptoms rather than the cause? Should we look to prevention strategies rather than the current intervention strategies? The reasons why girls and young women in most parts of the world show little interest in engineering haven't changed, despite all the efforts to address them. This paper examines the proposition that leadership in engineering education may be the elixir for enriching the motivation of many young women to pursue an engineering career. Leadership in the interaction between teacher-student relationships, leadership in educational pedagogies, leadership in curriculum development, leadership in professional development for teachers and academics, and so on. Leadership, stripped of its various definitions, is basically the perceived ability to influence outcomes (sometimes via other people). In this case, the outcome is a sustained and exciting career in engineering. Hence, developing leadership at these coal-face acitivities in engineering education in encouraging diversity will influence young women to pursue such an outcome. In conclusion, we need to develop leadership in engineering education to improve diversity in the engineering profession.

722

Korean Women CEOs: Classification in Career Development

Eunhee Kim, Witeck (Women in Science, Engineering, and Technology in Korea), Korea

This article examines thirty representative female CEOs in South Korea. Their leadership development can be characterized by the path of their career. This article classifies their career development, and suggests three distinct groups: 1) Career development based on professional skill, 2) Business creation based on innovative ideas and technology, 3) Family business succession. In addition, several examplative cases of such female CEOs are presented.

The characteristics of these three groups are analyzed with respect to their educational and professional background, their firms' scale and foundation process, and industry attribute. The results show that the majority of female CEOs, among the thirty, fall into the third group, family business succession. In addition, CEOs in group 1 and 2 tend to have strong educational and/or professional backgrounds in technology and engineering. In the future, quantitative research needs to be performed in order

to track the firms' development ratio differences before and after being taken control of by a female CEO, along with the degree of technology innovativeness in female CEO's from group 1 and 2.

723

Engineering Professional Performance to meet Community Expectations

Alexandra L Meldrum, AGSM - Australian Graduate School of Management, Australia

Other papers at this conference look at the issues of competency and ethics in engineering relating to issues of public interest such as leadership and sustainability. This poster addresses the third, critical aspect, namely an expected standard of engineering performance. A project undertaken by the Warren Centre for Advanced Engineering resulted in the publication, at the end of 2009, of the Report "Professional Performance, Innovation and Risk in Australian Engineering Practice", including the PPIR ProtocolT, which defines the expected performance for engineering professionals. The protocol addresses a number of aspects relevant to achieving sustainable outcomes. Firstly, it requires the engineer to understand the stakeholders

to each engineering task (including the community) and the impact of any action on those stakeholders; secondly, it specifically addresses the need to address all relevant safety, environmental, public health and other public interest issues and thirdly it requires the development of a detailed risk identification and management plan. The paper also presents the current project for implementation of PPIR, under the title "Engineering Professional Practice" (EPP). The key objectives of this phase are to disseminate the PPIR Report, provide education and training and have the engineering industry and profession adopt the Protocol. Discussions have already commenced with Australian universities with regard to inclusion of PPIR into their syllabuses.

724

Leading out of Maternity Leave

Helen JS Pedersen, Sinclair Knight Merz, Australia

The usual discussion around maternity leave is about how critical it is to support women to remain in the work force when raising a family. The focus is generally on the difficulties of culture change to provide a workplace that merely caters for flexible working conditions.

But maternity leave can also be viewed as a time to grow as a person and as a leader. This paper aims to celebrate the positive side of parenting, how it can enrich experience and grow leadership skills. The paper speaks both to employers in demonstrating the diversity, skills and fresh viewpoint that a new parent can provide and to women in engineering who wonder how having a family will affect their career.

The perceived expectation of employers and of women themselves is that maternity leave is time out from a career, separate from it. However the skills learnt in parenting are directly applicable to management and leadership in the workplace. Business requires adaptation to change - new parents undergo one of the biggest possible changes in life - who better to lead a business and manage change?

Helen's experience is that with the right approach, women and indeed all parents can continue to contribute effectively in the workplace on a flexible and part time basis at a level commensurate with their experience. Parenting and part time work should be no barrier to effective contribution and promotion in the workplace, and in fact the experience of parenting can provide another dimension in leadership.

725

Leaders of Tomorrow

Jan Peters, Katalytik, United Kingdom

Anthony Finkelstein, United Kingdom

Often women's leadership style differ from men's and may be better suited to the leadership challenges of the 21 Century. Centring around communication and positive working relationships, these styles paradoxically still tend to be undervalued meaning women still face a challenge. Driven by concerns that fewer women than men are transitioning into engineering careers and anecdotal reports of women's lower performance in recruitment assessment day activities, 'Set for Leadership' was designed to ensure engineering undergraduates are given access to the latest leadership thinking.

McKinsey's 2007 study Women Matter demonstrated the link between the presence of women in corporate management teams and companies' organisational and financial performance. Women Matter 2 made an analysis of women's leadership and reinforced the need for more women in leadership positions.

Engineering's women must enter the workplace and aspire to leadership for the profession to reap the benefit from diversity. This paper focuses on the outputs of work undertaken in the UK's South East universities, led by University College London, as part of a national project. The work contributes towards the employability skills agenda and ensures the leadership skills and styles of graduates can be nurtured to embrace the demands of 21 century employers.

Existing leadership training given to students will be reported on and compared to the requirements of industry. Industry open days will connect women engineering students with role models in different sectors and materials (videos and interactive workshop) will be shared to disseminate knowledge beyond the UK to support undergraduate course directors.

726

Tactics to Become Leaders for Women Scientist and Engineers (II)

Naoko Tagashira, Toshiba, Engineer, Japan

Yoshie Ideura, Komatsu, Engineer (JWEF-BL), Japan

Yuhko Iwabuchi, Tokyo Agr. Eng. Univ., Lecturer (JWEF-BL), Japan

Rieko Shimogawara, Tokyo Med.Den. Univ., NIID, Tokyo Sci. Univ., Lecturer (JWEF-BL), Japan

Tomoko Moriya, Fujitsu SSM, Engineer (JWEF-BL), Japan

More women workers are being hired in Japan. The number of female executives, however, is still very low. As 46.1% of workers for the industry related to Science, Technology, Engineering and Mathematics ("STEM") are women, and 26.1% of workers are engineers, but only 7.2% are female engineers. Comparing with 6.4% in 2000, it has been increased, but 7.2% is very small.

We researched and analyzed the facts of

female STEM workers and executives. Using the Kaisha Shikiho data, we calculated ratio of female executives and female leaders, picked up top 30 STEM companies, and analyzed them with governmental reports and the results of research among JWEF.

More than half of top 30 STEM companies are system engineering industry or foods industry.

Those STEM companies handling women related items are in strong position and there expects more chances for women in such companies.

By showing those analysis and basic information, we, JWEF would recommend to female STEM workers that (1) to challenge to new responsibilities in new industries; (2) to challenge to apply to higher responsibilities; (3) to strengthen role modeling and cultivating net-work; and (4) to be flexible for working. In addition, JWEF would recommend to the industry to check their status of hiring women periodically and try to use more female executives. Further, JWEF would recommend to the government that they would construct certain legal system and structure which would make companies available to hire more women.

727

How to Improve the Quality of Life of a Company's Low-income Employees through Housing Enhancement

Delma V Almada, Tecnologico de Monterrey, Mexico

Francisco S Yeomans, Tecnologico de Monterrey, Mexico

Olivia Carrillo, Tecnologico de Monterrey, Mexico

Greta Porras, Tecnologico de Monterrey, Mexico

The Housing Research chair, as part of the Design and Construction Research Centre (DCRC) at Tecnologico de Monterrey, performed a study with the purpose of improving the quality of life of low-income employees. The study identified different factors relating to quality of life, particularly housing conditions, transportation means, and the time and cost of commuting. Additionally, the study analyzed the employee's skill level within their respective occupation and their interest in obtaining further training.

Putting the study into practice, the research group performed a survey among university employees, obtaining a 75% completion rate (697 out of 924). Survey results were used as a tool to identify priority cases, given many employees were found to be living in precarious conditions, such as a lack of proper roofing, toilet, indoor plumbing, and floor. The study contains photographic evidence.

Based on these diagnostics, the DCRC is fostering the creation of support programs to improve current housing conditions by implementing roof constructions. The Centre is also designing the first housing development with sustainable parameters. This program will not only benefit employees, but also provide the centre with a research opportunity to implement the technologies it has developed. The Housing Research Chair is willing to transmit this model to any other company or university interested in developing socially responsible policies.

728

Strategic Networking for Women Engineers and Scientists

Carla Boehl, Australia

Objective:

Currently Women Engineers and Scientists engage with strategic networks in a largely informal way. While some women are highly networked and actively seek to forge relationships, others are less inclined to do so.

As you look at your networks, ask the following questions:

How strong are my networks?

What is their impact in my career?

Methods:

To build a strategic network of key people that originates and validates advice, ideas and support for strategically managing your career.

The decision to establish and maintain a strategic network for developing your carreer can be viewed as a risk and time consuming. Mapping the strategic network is a complex process and requires good consideration and strategy. It is not the size that matters but its intensity and richness. It has to base on quality, not quantity and superficial contact.

Results:

Increased performance

Provided corridors for information flows

Formed relationships and building trust

Generated ideas

Collectively looked for answers to specific problems

Identified specific expertise within the network

Conclusions:

Forming relationships and building trust, rather than reliance on systems and processes, is proving to develop a successful career.

729

Conservation of Critical Ecosystems in the High Lands of Burundi: Case of Peat Bogs

Beatrice Cyiza, Burundi Nature Action, Burundi

Elias Bizuru, National University of Rwanda, Rwanda

Aims:

All the high lands marshes of Burundi above 1700 m of altitude are peat bogs. They are the main sources of water to be drained into Nile and Congo basins. They contain several endemic species of plants and endemic species of amphibians and reptiles. They constitute also good laboratories of past life and climate. Unfortunately, those ecosystems are very threatened due to agricultural overexploitation and peat extraction. The main aim of this project is to protect the peat bogs ecosystems, the flora and fauna.

Background:

In all the continent of Africa, peat bogs are mainly localized in the Eastern African mountains. They constitute rare ecosystems. Moreover, they contain many endemic,rare species within the vegetal kingdom and animal kingdom.

Until now, some studies regarding botany and palynology have been made in the Burundian peat bogs (Deuse, 1959, Bonnefille et al., 1987, 1991, Bikwemu, 1991). Some of the peat bogs have been completely destroyed while others are being degraded. The big majority of species included in those ecosystems risk to disappear if nothing is done to conserve them.

Moreover, the cultivation of those areas constitutes a source of greenhouse gas effect emission in the atmosphere. In fact, the land cultivation in Burundi uses the burning method of dry herbal plants with the consequence of burning all the peat stored.

Exploitation of the peat bogs has also the consequence of disturbing the hydrological system and at the end the sources debit will considerably decrease because of the water loss.

730

Mycorrhiza for a Sustainable Phosphorus use

Edith C Hammer, Lund University, Sweden

In the mycorrhizal symbiosis, plants and fungi exchange essential mineral nutrients from the soil against sugar from photosynthesis. The consideration of mycorrhiza in agriculture is a key factor for a sustainable use of earth's limited phosphorus (P) resources.

We found that P is an important currency in the symbiotical exchange. It can be stored in the fungus' organs and therefore get potentially available for the plant.

The fungi can be even more important under stressful conditions, as I found under elevated salinity and drought that the fungi pre-select mineral nutrients for the plant, measured with proton induced x-ray emission (PIXE) elemental tissue mapping. We found in laboratory experiments and in the Sahara border in Tunisia that the fungi help to build up a good soil structure and improve the carbon storage of the soil.

The consideration of mycorrhizal fungi can be of high importance especially in low-input agriculture, where we found that the addition of organic material improves the fungi's growth and carbon storage in the soil. Additional inoculum could not unequivocally show to aid seedling establishment under the harsh conditions, but the involved nursing treatment resulted in a good survival rate of young trees in a national park at the Sahara border.

A rethinking of the consideration of mycorrhiza in agriculture will be needed in the future, triggered by rising fertilizer costs.

731

Review of Effects of Global Warming in Africa's Irrigation Systems

Jokastah Wanzuu Kalungu, South Eastern University College - University of Nairobi, Kenya

Moses Mwangi, South Eastern University College - University of Nairobi, Kenya

Kennedy Mwetu, South Eastern University College - University of Nairobi, Kenya

David Mburu, Jomo Kenyatta University of Agriculture and Technology, Kenya

This paper reviews how expected temperature rise will affect irrigation systems in Africa. The global change of climate, which is conditioned by the possible air temperature, will have its impact on water availability and other natural resources. Africa which has an extremely continental climate will be considerably affected especially in agricultural field. The continents population is expected to double in the next 45 years to 1.69 billion. The growing population will result into a considerable additional demand for food, pressure to the already degrading environment as well as natural resources. The continent challenge for the 21st century is to confront and manage the changes while modernizing farming and food production infrastructure to ensure continued growth and development. The paper analyzes the vulnerability of irrigation sector in Africa due to future climate changes and the necessary adaption measures.

Key words: Water scarcity, Africa, Irrigation systems, Adaption measures

732

Examining Potential of Perennial Crops in Combating Climate Change: Case Study on Passion Fruit Farming in Meru Central and Bungoma Districts, Kenya

Mary Ng'endo Kanui, Kenyatta University, Kenya

The agricultural sector contributes about 30% of the GHGs (IPCC, 2007). GTZ- PSDA emphasizes sustainable agriculture, and passion fruit is one of its Value Chains. Passion fruit is among the most important fruit crops in Kenya ranking third in export fruits (Kahinga et al., 2006). Its cultivation provides a gross annual income of 284,000 KES/ha (USD 3,500). The return per family labor day is about 600 KES (USD 7.5), higher than the rate of hired agricultural labor at about 150 KES/day (USD 1.875) (Ndegwa et al., 2009).Most passion fruits are produced by small-scale farmers on ¼ to 2 acres of land (Wasilwa, et al., 2004). Agriperennials (such as passion fruits), due to their longevity, can sequester more carbon than forest trees, enabling small scale farmers to mitigate against climate change. To quantify current carbon amounts sequestered, two baseline studies were carried out in 10 farms in Bungoma North (Western Province) and 10 farms in Meru Central (Eastern Province), where soil carbon and tree biomass in the passion fruit fields were measured. Most of the carbon (C) was stocked in the soil. The average was 182 tCO2e/ha with a median of 191 tCO2e ranging from 155 (25% quartile) to 207 tCO2e (75% quartile). Very little C was found in biomass because of the few trees present in the plots . Though the average showed 24 t/CO2e/ha, 11 of the 20 plots did not have tree biomass. The total soil and biomass tCO2e/ha was on average 206t with the median at 194t.

733

It Would Be A Lake if it Could - Changing Water Flows on a Cooper Creek Floodplain

Danuta J Kucharska, University of Melbourne, Australia

Around the world, there is increasing development and climatic pressure on dryland rivers that rely on flooding from episodic rainfall events. Water inflows, outflows and losses must be appropriately maintained in these rivers for sustainable ecological and human outcomes.

As an example, the floodplain at the confluence of the Cooper Creek and Wilson River in South-West Queensland, is a geomorphologically complex region that water must penetrate to reach the RAMSAR-protected Coongie Lakes, and, in a good flood year, Lake Eyre. Remote, and with few monitoring stations, the hydrology is poorly understood. Current and planned exploitation of water resources, including by grazing, irrigation, and mining under Governmental Water Plans, requires sound inputs for monitoring and management.

This presentation integrates hydrological, satellite and digital elevation data to study inflows, outflows, and interactions in this complex floodplain for a range of flow magnitudes. The resulting model can be

used to predict responses to different climatic and extraction scenarios; in particular whether reduced inflow will lead to selective channel abandonment and aridification of the floodplain.

734

Energy Savings Certificates : The French Experience

Séverine Leclercq, Femmes Ingénieurs (French Association of Women in Engineering), France

Objective:

Our world is facing decline in traditional energy resources. That's why energy savings must be considered as an effective way to maintain business activity despite soaring costs. Moreover, states are more and more involved in reducing their greenhouse effect gas emissions.

Methods:

In 2005, Energy Saving Certificates were introduced in French legislation in order to get energy providers involved in the general aim of reducing energy consumption. Energy providers are under obligation to induce a certain target of energy savings, by encouraging their own clients in energy efficiency projects. While they invest in making their clients save energy, they will gain Energy Saving Certificates (unit is kWh "cumac"). They can also buy their certificates from other actors that invest in energy efficiency. If they don't meet their target, they will pay a penalty of 0,02 for each kWh not saved.

Results:

The first period results (from 2006 to 2009) will be presented. We will also explain difficulties encountered, why certain actors were excluded from the first period program and how these problems should be resolved on the second phase of the program , from 2011 to 2013.

Conclusion:

We will compare this system with other mechanisms experimented in other countries.

735

Reflections by Engineers Australia Legal Counsel

Caroline Marsh, Engineers Australia, Australia

As a professional woman with broad experience as a lawyer in large corporations, law firms and government, my appointment as Legal Counsel for Engineers Australia is an exciting challenge. The commitment of EA to maximising its support for the engineering profession and its recognition of the need for specific policies directed at women in engineering, is affirming. In 2011 Engineers Australia has a new Charter, By-laws and Code of Ethics. In this context, it is a perfect time to create fresh and inventive ways to publicly profile existing female engineers and to encourage much higher female intake of engineering students. Central to this in my view is the special role of ethics in shaping professional behaviour and thinking. My role in this process is very much behind the scenes in helping craft policies and documents that help guide engineers in the 21st century. We have an opportunity now to lay better foundations for women in engineering and I feel honoured to have skills and experience that are useful in this process.

736

Dehydrated Dark-Green, Leafy Vegetables an Intervention Solution for Haemoglobin, Serum Beta-Carotene and Retinol Among Preschool Children

Mildred P Nawiri, Kenyatta University, Kenya

Hudson N Nyambaka, Kenyatta University, Kenya

Jane I Murungi, Kenyatta University, Kenya

Health problems in developing countries among them eradication of vitamin A deficiency and anemia deserve continuous attention. Interventions with locally available dark green leafy vegetables (DGLV) are a more sustainable solution since they naturally contain iron and beta-carotene (BC) being important for biological functions. Although vegetables are season dependent, dehydration will avail them during seasons of low availability. This study determined BC in sun-dried amaranthus and cowpea vegetables. Serum BC and retinol among 152 preschool children (study subjects from a semi arid region, Machakos District Kenya) during and after a 13-week intervention period was also determined. Vegetable and serum extracts were isocratically eluted on an HPLC column with methanol:DCM:water (79:17:3, v:v:v) and methanol:DCM:water (83:15:2, v:v:v) respectively. Fresh cowpeas leaves had 779-827 BC (956;micg/g DM), while amaranthus had 553-639 These levels reduced with sun drying but after cooking, retentions for BC (60.1-77.6%; cowpeas, 59.0-76.5%; amaranthus leaves) were still sufficient to provide the recommended dietary allowances for retinol. Both serum BC and retinol (marginally low) concentrations increased significantly post-interventional ($p<0.000$, $df = 110$, for "fresh" group and $p<0.000$, $df = 38$ for "dehydrated" group). Consequently haemoglobin levels improved significantly post-interventional. Correlation was negative between baseline levels and the changes in haemoglobin, BC and retinol. The study concludes that, intervention can be achieved with locally available sun dried vegetables to improve haemoglobin levels, the bio-availability of serum-BC and retinol. These findings contribute to the link between increased consumption of carotenoid-rich DGLV and bio-availability of BC which is currently in controversy.

737

Quality of Groundwater in the Kwahu West District of Ghana

Marian Asantewah Nkansah, Kwame NKrumah University of Science and Technology, Ghana

Juliet Ofosua, Kwame NKrumah University of Science and Technology, Ghana

Sandra Boakye, Kwame NKrumah University of Science and Technology, Ghana

The quality of ground water in the Kwahu West District of Ghana was determined by the use of physicochemical parameters together with trace metal contamination as indices of quality. Standard methods for physicochemical determinations were employed. Atomic Absorption Spectrophotometer was also used for the measurement of Ni, Pb, Zn, Cu and Fe, Nitrate and Phosphate by photometric method and Chloride and Alkalinity by titrimetric method.

Results were compared with global

averages for freshwater and international water quality standards for drinking water, World Heath Organisation (WHO). Evaluation of physicochemical parameters revealed that the water samples were within the maximum permissible limits for consumption. All elements except iron, lead and nickel, were well within the safety limits recommended by WHO. The low level of industrialisation in the study area has kept the water relatively free from heavy metal contamination.

739

Climate Change

Francisca N Okeke, University of Nigeria, Nsukka, Nigeria, Nigeria

Bernadeth C Isikwue, University of Agriculture, Makurdi, Nigeria

Climate change is associated with global warming. The question is; do all scientists and non-scientist agree that global warming is real?, this question needs an answer. The answer is expected to be given from research work, not by drawing hypothesis. this work aims at addressing this issue by carrying out an investigation on past surface temperature, current surface temperature and future surface temperature of the earth. The global annual anomalies from 1860 to 2010 will be analysed so as to ascertain the increase or decrease. This will also enable us to investigate the warming or cooling of the earth. Temperature modeling will be employed and the green house effect considered. The results from this work will ascertain if global warming is real or not.

740

Modelling of Groundwater Conditions in Nairobi using Geographic Information System

Caroline K Onyancha, Masinde Muliro University of Science and Technology, Kenya

Monika Sester, Leibniz University of Hannover, Germany

David N Siriba, Leibniz University of Hannover, Germany

Dalyot Sagi, Leibniz University of Hannover, Germany

Nairobi City suffers from acute water shortage due to insufficient surface water supplies, inefficient use by some consumers and rapid population growth. This scarcity has lead to drilling of boreholes to augment the surface water supply. There are more than 2000 boreholes in Nairobi City most of which are operational during periods of prolonged droughts when surface water supply is rationed. This research was carried out to determine the effects of groundwater exploitation on the water levels in aquifers beneath Nairobi. Hydrogeological information from 1600 boreholes as well as geophysical resistivity survey data from forty eight sounding centres was used. The following data was integrated in Geographical Information System: subsurface profile for 457 wells scattered across the study area; water struck levels; water rest levels; tested yields; drawdown levels and aquifer thickness and depths from geophysical resistivity survey. Available Digital Elevation Model and topographic contours were included in the analyses. A groundwater level simulation model has been formulated to determine the present and future effects of groundwater extraction. Analysis of contours of water heads during different epochs indicates that water rest levels have been receding from an average depth of 60 m in the 1930s to the current average of 130 m. These receding heads have increased the cost of pumping and would potentially lead to ground subsidence.

741

Evaluating Externally Funded Water Projects in Nigeria

Emmanualla C Onyenechere, Nigeria

P A Okereke, Nigeria

Hitherto, most projects and policy proposals on water supply were usually without any detailed financial and economic feasibility studies. This has been so because of the popularly held misconception that water is a social commodity, which should be provided free of charge by government. With the now common resort to external loans to fund water project, the issue of project evaluation has become a precondition by foreign creditors such as the World Bank and the African Development Bank. This paper examines the necessity for evaluating externally funded water supply projects in Nigeria using the National Water Rehabilitation Project (NWRP) in some States as a case study. It examines some popular methods used in evaluating projects, noting that these methods are not suitable for water projects because State Water Agencies in Nigeria have no investment options than in water supply for now. The paper suggests the adoption of the “priority index” approach.

742

Climate Change and Spatial Planning Concerns in Nigeria: Remedial Measures for More Effective Response

Emmanuella C Onyenechere, Evan Enwerem University, Owerri, Imo State, Nigeria, Nigeria

Global warming and climate change pose a serious threat to life and human well-being. Unfortunately, many developing countries like Nigeria lack the resources and capacity to cope effectively with the negative impact of climate change. For the security of human settlements it is absolutely essential to integrate climate change concerns in the process of spatial planning. This paper seeks to contribute to the dialogue on the links between changes in climate and the planning of space and human settlements. It examines the following specific issues: the incidence of climate change in Nigeria; the vulnerability of the country to the negative impact of climate change; the implications of climate change for spatial planning. From the discussion we hope to provide the following insights: that climate change in Nigeria is real, and the country is very vulnerable to its negative effects because it is constrained by limited resources and technology needed to address the problem, more so because the national economy is based largely on natural resources which depend on, and are sensitive to changes in climatic conditions. The paper calls for careful planning before available spaces are allocated to various uses. It considers how improved investment and resource management can reduce the risks which climate change poses for the country’s inhabitants, enterprises and infrastructure in the urban and rural areas. It concludes with some suggestions on ways to adapt more effectively to the worsening threats of climate change.

743

Environmentally Sustainable Buildings - The Indian Perspective

Nilanjana Rao, DLF Universal Ltd.,, India

The real estate boom in India over the recent years has brought along with itself a plethora of urban environmental problems like huge demand on infrastructure, use of resource intensive building materials, generation of liquid and solid wastes etc. Environmental concerns have led to the concept of green or sustainable buildings, which introduces environmental friendly design and other measures to reduce the impact

of buildings. The estimated market potential of green buildings in India in 2010 was US $ 400 and there has been a paradigm shift in construction of sustainable buildings.

The paper presents some of the environmental friendly practices being implemented in the buildings like installation of Sewage Treatment Plants for treating wastewater, provision of rainwater harvesting, solid waste management, use of energy conservation measures etc. Surveys were carried out on operational high-rise buildings to know the extent to which the environmental friendly features including innovative sustainable practices are being followed. The paper also highlights through interviews with stakeholders of the building industry, the problems like lack of awareness, financial, technological and time constraints etc which prove as barriers in implementing these sustainable practices. Analysis of the survey and the findings of the interviews reveal that though some of the sustainable measures especially towards water conservation have made considerable progress, energy conservation is still a major concern in buildings in India. The paper also offers recommendations which the government and the industry should undertake, so that the actual potential of sustainable buildings is attained.

744

Women in Local Government Engineering... A Hands on Approach

Shereny Selim, enior Traffic Engineer at Hurstville City Council, Australia

John Roydhouse, Executive Officer IPWEA NSW, Australia

As a female engineer, this paper reflects on how things have changed for women from my grandmother's time and even my mother's time.

One of the most pressing issues facing local government in Australia is the fact that Local Government is not viewed as a lucrative organisation for professional engineers, including women.

A quick survey among my fellow engineers working in my organisation at Hurstville City Council on how long they have been working for local government revealed that the engineers in my organisation have been working for local government for an astounding average number of 21 years.

That number of years proves that Local Government is obviously "doing something right" to keep those engineers interested in staying that long in Local Government.

This brought me to the conclusion that the problem is not in retaining Engineers in Local Government for it seems that once they are in …they stay. The Problem is in attracting them to Local Government.

How to attract Engineers including women to Local Government

The answer is easy; we need to raise awareness to the great benefits that Local Government offers. We need to grab them while they are young!!

Two organisations have taken a great initiative in addressing the skills shortage and attracting skilled workers and Engineers to Local Government.

Hurstville City Council and the Institute of Public Works Engineering Australia. This paper will look at the practical iniatives underataken by both organisations

745

Sustainable Agricultural Development of Ukraine in Terms of Modern Integration Process

Olena Shubravska, State Organization, Ukraine

At the present time in the agricultural sector of Ukraine the activization of vertical integration and land concentration can be observed. The aggressive domination of agriholdings and their suppression of small households constitute a danger for national food security and sustainable development of the agricultural sector. That is why system government regulation and control are necessary. Thus, the objective is to introduce primary directions of such regulation. Economic and statistic analysis as well as calculations using index method let us note a considerable raise of economic sustainability index, slightly positive change of social security index and noticeable reduction of ecological sustainability index which, on the whole, determines certain positive changes of the integral index of sustainable agricultural development. So the Ukrainian government should: give state support to farmers and cooperatives, at the same time taking into consideration the interests of big agricultural enterprises, which operate on the rented agricultural lands in an efficient and ecologically safe way; strictly regulate the development of the land market, primarily in order to prevent the activization of non-agricultural structures there; promote the improvement of the financial and credit system of the innovation activity regulation in agriculture and decrease the level of innovation market monopolization first of all for providing access to the innovations for small and medium agricultural producers; work out and implement a program of agricultural bioeconomy development on the basis of the conceptions of energy and resource conservation, bioresource efficiency, national food security.

746

Third Party Access to NSW Water Infrastructure: Drivers and Challenges for Private Projects

Kate E Simpson, Veolia Water Australia, Australia

In 2006, the NSW Government passed the Water Industry Competition Act (WICA) with a view to harnessing the innovation and investment potential of the private sector. Five years on, what is the outlook for private investment in the water industry?

In April 2009, Veolia Water Australia was granted the first Network Operator's Licence under WICA, allowing it to build and operate a 20 ML/d recycled water plant as part of the Rosehill Recycled Water Scheme. From mid-2011, Veolia Water, who also owns the plant, will provide high purity recycled water to AquaNet Sydney, the first private sector water retailer licensed in NSW.

In spite of this success, proponents of fully private schemes of significant scale will continue to face challenges. For recycled water, these challenges include being able to offer competitive pricing in comparison to other water sources and developing customer confidence in both recycled water and private sector providers. The role of Sydney Water in the Rosehill scheme was critical to its inception and at this time it is difficult to imagine a private scheme succeeding in the recycled water market without similar public sector support.

This presentation will discuss the third party access regime in NSW, consider its advantages and examine the challenges facing private sector schemes in water recycling. The Rosehill Recycled Water Scheme will be discussed as a case study, particularly considering the role of public and private sectors in developing the scheme.

747

An Assessment of the Role of Networks in Promoting Female Participation in Science and Technology in Nigeria

Kehinde A Taiwo, Dept. of Food Sci. & Tech., Obafemi Awolowo University, Ile-Ife,, Nigeria

Akin J Famurewa, National Centre for Technology Management (NACETEM), OAU, Ile-Ife, Nigeria

Helen O Aderemi, National Centre for Technology Management (NACETEM), OAU, Ile-Ife, Nigeria

Tosin G Oladipo, National Centre for Technology Management (NACETEM), OAU, Ile-Ife, Nigeria

Willie O Siyanbola, National Centre for Technology Management (NACETEM), OAU, Ile-Ife, Nigeria

Contemporary evidence has shown the relevance of Science and Technology (S&T) for achieving rapid economic growth and development. Women participation in S&T has been relatively minimal over the years and their potential contribution to S&T has remained untapped in spite of their constituting nearly half of Nigeria's total population of about 150 million (ca). Nigeria's quest to achieve vision 20:2020 cannot be realized without harnessing fully her S&T potential. Given the low enrolment/ participation of females in S&T in the world in general, many groups have emerged undertaking various initiatives to ameliorate this concern.

Networks and professional associations are veritable tools of social engineering requisite for addressing diverse issues. However, the relevance of networks to achieving greater participation of females in S&T has not been evaluated. This study evaluated the role of networks and the impact of their activities in promoting female participation in S&T in Nigeria.

Results showed that Nigeria has several professional women associations. Their strategies for promoting female access to S&T education include: organizing conferences and seminars with special discounts for students; granting scholarships to girls in S&T education; organizing vocational remedial courses for girls offering S&T subjects and organizing career talks to feature different women in S&T education. A database of female S&T networks and organizations in Nigeria was developed and recommendations were made on how to formulate appropriate national structure on networking for gender equity and female participation in S&T.

748

The use of Virtual Teams on Major Projects

Louise Wallace, Parsons Brinckerhoff, Australia

Emily Trusler, Parsons Brinckerhoff, Australia

The paper examines the current use of tools and technology to assist in the delivery of large scale projects using virtual teams. The use of virtual teams within projects increases access to skilled resources without the additional costs and time of travel. This paper examines some real-life examples of the interactions of a virtual project team, consisting of a head project office in Australia and a remote package team in New Zealand on a Major Pipeline Project. Packaged work required the expertise of a specialist virtual team in New Zealand. Different drivers within the head project office and the virtual team were observed, which adversely impacted the efficiency and productivity of the virtual team. Key challenges faced by the virtual team included the lag in communication of the overall project schedule, systems and procedures. The dynamic, fast-paced environment of the head project office required more regular communications to the remote team to ensure they were always aware of the latest changes and information. A team review coordinator was brought in to be the central contact for all remote reviews. The coordinator was responsible for managing the priorities on incoming workload, and ensuring the appropriate outputs were delivered as required by the wider team. Tools such as action lists and online document management systems largely contributed to the success of the team. The use of technology such as weekly conference calls, kept all team members engaged and helped to improve culture, accountability and on-time delivery.

749

Training of Engineers and the Current Challenges for Southern Universities

Khedidja Allia, USTHB, Algeria

The crucial role of engineers to addressing the pressing challenges facing our societies are now widely recognized and related to issues such as energy, climate change, access to safe drinking water, mitigation of disasters, environmental protection, resources and risks management.

Another perceived need is behaviour and vision change, due to the emergence of new technologies as nanotechnology and rapid development of biotechnology, bioengineering and information, communication technology. .. What has not failed to make evolving other areas, which are complementary and necessary to the specific training of engineers, such as natural and social sciences that helped to forge interdisciplinary alliances while focusing on innovation, entrepreneurship and promoting awareness about the key ethical issues, mitigation disasters, risk management and environmental protection.

It is obvious that no issues can be addressed without at prior taking into account training and therefore the need to introduce some concepts in the curriculum of engineering education alongside the fundamentals as; conceiving, designing and calculating. So the primary interest lies in proper training taking into account such issues, that is what had led the engineering community, to work redefining the content of programs with the introduction of humanities sciences in different engineering specialities.

For southern universities, this type of education is in its beginning, or even non-existent. To what extent these types of teaching; engineering ethics, environmental protection, sustainable development, reduction and risk management could be introduced at various levels of the curriculum for engineering student. The objective of this communication is contribution in that direction.

750

An Assessment of the Design, Instrumentation and Use of Mathematics Labouratory in Secondary School

Lucy Eraikhuemen, University of Benin, Nigeria

Mathematics is an indispensible part of life beacuse it is applied in almost all aspect of human endavours. The effective learning of Mathematics is anchored on effective teaching of Mathematics through instructional methods that exposes the 'Mathematics process' and how to apply it. The Mathematics laboratory approch is an instructional stratagy that gives oppotunity to the learner to create and explore Mathematics, learn and evaluate his/her own learning in his/her own way. This study was designed to assess the design, instrumentation and use of Mathematics labouratory in secondary schools. Twenty one secondary schools constituted the sample for the study. Three research questions where raised to direct the study. The instrument for data collection was a questionnaire titled: Mathematics Teachers Questionnaire. It had two sections A and B. Section A had Five items on demographic variables and section B had fifteen items on the areas of focus of the study. Data collected where analyzed using descriptive statistics. The analysis of data revealed among others that Mathematics labouratory does not exist in the schools. The recommendations emphasized the need for government to establish Mathematics labouratory in secondary schools and secondary school Mathematics teachers to often give their students project works for assignment.

753

The Research of Scheme to Raise Scientific Preference of Korean Primary and Junior High School Students

JiHye Kim, Ewha Womans Univ., Korea

HyeYoung Kim, Korea National Sport University, Korea

JunYoung Kim, Ewha Womans Univ., Korea

The aim of this research is to ease the Korean students' avoidance of natural science and engineering by the specialized science class. Therefore we surveyed the students who participate in 'Learning science by using sports' and analyzed the results.

According to our survey to junior high school students, the boys who have a preference in science were overall 61%. Comparatively, the girls' preference of science was only 46%. The question about the factors which caused the low interest or difficulty in the class, 52% of the boys answered that there were no factors causing that, though, only 36% of the girls answered equally. In addition, 25% of the girls answered that they are not interested in the topics. All in all, for both of science and sports topics in the class, girls had lower preference than boys'. Furthermore, more than 20% of the students appealed to difficulty of scientific terms. Nevertheless, both of boys and girls still had positive response to utilized sports and audio-visual materials in science class.

In conclusion, the solutions can be debated into four parts. First, we have to consider "Gender Difference". In addition, using familiar subject to students for instance, sports might be useful. The third way is to utilize audio-visual materials to students. Lastly, it is necessary to explain the scientific term easily. In order to perform those educational methods, political support is relevant. Moreover, teachers need to have sufficient scientific knowledge and studying science in real life.

754

Community Service Learning Using the Pedal Prix Challenge

Michelle Bailey, The University of South Australia, Australia

Elizabeth Smith, The University of South Australia, Australia

Andrea Duff, The University of South Australia, Australia

The Pedal Prix is an annual challenge held in South Australia, where human powered vehicles are raced around an enclosed circuit for between 6 to 24 hours. Primary and High School teams compete on the same track with University and Senior teams, for prizes in their age category based on vehicle design and speed. The Pedal Prix Challenge is a way of indirectly introducing Mechanical Engineering concepts and principles to individuals, using a non threatening team project that is fun and hands on. The University of South Australia has participated in the Pedal Prix Challenge since 2009. In 2011 the undergraduate students will share their experience in Pedal Prix with students from a local all girls High School through a community service peer mentoring scheme. Community service learning is a relatively new approach which recognises the importance of social good as a product of discipline knowledge and university learning. This paper examines the current literature around graduate attributes and community service learning in Australia and overseas. It provides an exploration of the theoretical framework of community service learning and examines the considerations around linking traditionally soft skills with technical skills. This is done by using Pedal Prix as a case study. A program integrating the aims and objectives of community service learning will be presented as a capstone model which could be transferred across programs and disciplines.

755

INWES Japan's Trial to Nurture Young Girl Engineers and Scientists

Akiko Tsugawa, Japan

Sachiko Tanaka, Japan

It has become the serious problem of "Declining Interest in Science & Technology among Young People" in Japan.

There are several reasons.

1. There are quite few students who think that science is an interesting career even if they have got good marks at the school, because of
2. Promotion of Yutori Education (Relaxed Education Scheme) of reducing the annual lesson hours inevitably pushed the trend to learn the textbooks by heart only, hence, decreasing finding out principles and rules through the deep thought with observation, experiment, given data, information.

It takes quite a long time to bring up and train female researchers in science and technology fields by teaching young girls how interesting science is, and letting them to maintain their interest in order to induce them to enter scientific careers.

INWES-Japan created the DVD "Let's Challenge to Major in S&T! -You can do anything", and organize the seminar at the senior high schools in every place in Japan, to explain the jobs in science and technology, how to take their favorite job in science and technology field, and to have some idea of choosing university to study and take job, etc.

However, we have some bright expectations in the future as Japanese Government arranged the countermeasure to increase female researchers by introducing "Supporting Female Researchers Promotion Scheme." from 2006.

In our presentation we will introduce about the above mentioned method, questionnaire and the results.

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The Science and Technology Guidance for Girl Students in Japan

Akiko Tsugawa, Japan

Maki Iwakuma, WPETF,project team of IPEJ., Japan

Sachiko Tanaka, Japan

Ikuko Imoto, NPO The Geoecological Conservation Network, Japan

Ryo Kimura, The Woman Professional Engineers Society of Japan, Japan

Kayoko Sugahara, Japan

Nami Kubo, The Woman Professional Engineers Society of Japan, Japan

Aguri Nakano, Okinawa Polytechnic College, Japan

It has become a serious problem something named "away from science" in Japan. There are several reasons.

- Despite their excellent results at school, very few students think that science is interesting.
- Junior and high school students do not have knowledge about science society.
- The lately "Yutori" Education (relaxed education), which characterizes by reducing the number of hours in the classroom, contents of the textbooks for prescribed courses of study do not drive the student to find out by themselves laws and principles, with material data, through a number of experimental observations, and understanding in the classroom. Instead they are focused on memorizing only the text.

Moreover, in the case of girl students, they are obstructed to follow a higher education in science and technology area, because of the Japanese unique conception about women in science.

In order to foster women researchers in the field of science and technology, it is necessary to cultivate and maintain the interest of our children in the science from an early age. This requires a very long time before they actually get into a research career.

We, INWES-J, organize seminars in senior high schools in every place in Japan, with topics like "Working on science", "How to get a desired job in science" or "University and employment selection".

We will introduce our presentation about the method, result and questionnaire.

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Recent developments in the vacuum process measurement techniques for the IT industries.

Yong-Hyeon SHIN

Korea Research Institute of Standards and Science, 209 Gajeong-Ro, Yousung, Daejeon 305-340, Republic of Korea

E-mail: yhshin @kriss.re.kr

In IT industries, such as semiconductor or flat display panel manufacturing, the products are produced through the several hundreds of vacuum processing.

Nowadays the technology trends require more sophisticate and more precise process control. The in-situ vacuum process measurement technique is very important to apply the advanced process control in vacuum process and to improve the processing technology; reducing the critical dimension, increasing the product size, improving the yield, reducing the cost, and reducing the energy consumption and waste.

Korea Research Institute of Standards and Science (KRISS) have developing the in-situ vacuum process measurement techniques as well as the plasma and particle monitoring method in the vacuum systems.

Not only some technical achievements but also the technical cooperation program among the research institutes, universities and industries, will be presented.

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