Dr Ron Watermeyer
Joint Lead Tutor:
ICE President's Apprentice Scheme
SAICE 2004 President
watermeyer@ssinc.co.za

The ICE President's Apprentice Scheme 2009/10 an engineer's toolkit for a developing world

THE ICE President's Apprentice Scheme started in 2005 when the then president, Gordon Masterton, showed real commitment to graduates during his year in office by starting the scheme. Each president since then has run their own versions of the Presidential Apprentice Scheme. Prof Paul Jowitt, the 2009/10 president, continued with this tradition when he embarked upon his ambitious apprentice scheme for his presidential year.

In terms of his scheme, twelve graduate members of ICE (Institution of Civil Engineers, UK) who were Chinese, Ghanaian, Nigerian, South African, Sri Lankan, British and Zimbabwean nationals, were selected as apprentices. These apprentices were tasked with the development of an engineer's toolkit/handbook for an "Engineering Project Delivery Plan for the UN Millennium Development Goals (MDGs)" which would become freely available to all engineers. This project was driven by the fact that:

- few graduates have experience of working within the context of international development, yet engineering is a global profession and vital to society
- sustainable infrastructure for development is crucial in promoting and driving a low carbon economy, providing the platform for an increasingly urbanised world and helping to lift communities out of poverty
- if engineering is to deliver the best possible outcomes to society, engineers must understand their role in the wider field of development, and shape their work and contribution accordingly.

1 2009/10 ICE president, Prof Paul Jowitt (back row, third from right), with his twelve apprentices at the top of the arch at the Moses Mabhida Stadium in Durban

Table 1 The twelve apprentices of the ICE President's Apprentice Scheme 2009/10

Abiodun Akinyemi (Ariosh Ltd, Lagos) Nigerian	Nicola Bailey (Formerly Hyder Consulting, London) South African	Benjamin Bampoh (Department of Urban Roads, Accra) Ghanaian	Lorna Brady (MWH, Scotland) British
Tonderai Chakanyuka (Grontmij, East England) Zimbabwean	Fang Fang (Atkins North West, UK) Chinese	Fazlun Fazlee (WSP, London) Sri Lankan	Joshua Macabuag (BDP, London) British
Joe Mulligan (Buro Happold Consulting Engineers, New York) British	Michelagh O'Neill (JBA Consulting, Scotland) British	Tom Wilcock (Arup, London) British	Hung Yik Lee (Chun Wo Construction & Engineering, Hong Kong) Chinese

From the outset it was envisaged that the toolkit would be in the form of an intensive, professional development programme addressing infrastructure for international development, supported by key engineering organisations and other professionals operating on a pro bono basis. The breadth and depth of this programme was simply beyond any single company training scheme.

Leading professionals (tutors) from a range of disciplines were engaged to prepare a focused, high-level interactive seminar session, lasting up to one and a half hours. Following the presentation, a list of potential issues to be dealt with were identified by the apprentices. The apprentices thereafter shortlisted the identified issues and allocated tasks amongst themselves to develop a Method Card for each issue. Each card posed the issue as a question on the front face and offered an action in response to the issue on the back face. The tutors then reviewed and commented on the drafts that were developed by the apprentices. The Method Cards were thereafter finalised by the apprentices responsible for the development of a card in consultation with the two lead tutors, Charles Ainger and Dr Ron Watermeyer, both Fellows of ICE. The final card was then either accepted or referred back for refinement by the president.

The apprentices came from different parts of the world to discuss real-world issues, learn from experts and work together in London, South Africa and Paris and then at home. The sessions with tutors in London, South Africa (Durban and Johannesburg) and Paris (UNESCO) set the context, provided the tools and revealed the power for change, respectively. In Durban the apprentices visited:

- the world-class Moses Mabhida Stadium where the semi-finals of the Soccer World Cup were held
- the eThekwini Water and Sanitation Department's replacement of asbestos secondary water mains project, which creates temporary employment opportunities through employment intensive construction methods, and develops small-scale contractors who will be able to maintain the completed pipe network
- the eThekwini Zibambele Road Maintenance Project where impoverished households generate income by maintaining roads.

All these projects clearly demonstrated the connection between the construction and maintenance of infrastructure, and community livelihoods. The apprentices learnt that MDGs are fundamentally about infrastructure.

The apprentices developed a total of 76 themed Method Cards, each one highlighting a specific issue and challenges, providing associated data and references, and identifying the pointers to engineering and other solutions. "An Engineer's Toolkit for a Developing World" is arranged in five themes grouped together under the following crucial stages of a project, namely:

- **Policy,** which sets the agenda for the planning, procurement, delivery, maintenance and disposal of infrastructure that is sustainable.
- **Planning,** which links infrastructure needs to organisational objectives, policies and strategies.
- **Implementation,** where decisions are made regarding the design, procurement and delivery of infrastructure.
- **In-use,** where infrastructure is operated and maintained before being disposed of.

This provides for ease of navigation through the toolkit, which acts as a quick reference for engineers worldwide.

Through this programme, the apprentices moved beyond the textbook principles of engineering. They discovered that engineering is linked to improving the quality of life, and to this end the process of delivery is just as important as the product itself. They assimilated in a very short period what has taken others a decade or more to put together. The process also offered an alternative to mentoring – collaborative working.

Table 2 Summary of the tutors, topics and locations

Location	Topics	Tutors
London	▪ Climate Change ▪ Urbanisation ▪ Poverty ▪ Infrastructure ▪ Development	▪ Jo da Silva (Arup) ▪ Chris Jofeh (Arup) ▪ David Balmforth (MWH) ▪ Tony Iles (Atkins) ▪ Professor Sohail Khan (WEDC, Loughborough) with Dr Sue Cavill (DFID/ WEDC) ▪ Dr Priti Parikh (Arup) with Matthew Lynch (Engineers Against Poverty) ▪ Professor Richard Carter (WaterAid) ▪ Richard Burrett (CPSL) ▪ Neil Stansbury (GIACC) ▪ Ian McAulay, Mark Wilson & Daressa Frodsham (United Utilities) ▪ Jon Pike and Tracey Gee (MWH)
Durban and Johannesburg	▪ Millennium development goals ▪ Infrastructure procurement and delivery ▪ Programme and project partnering ▪ Maintenance ▪ Capacity building	▪ Dr Ron Watermeyer (Soderlund and Schutte)* ▪ Sam Amod (Development Engineering Consultants)* ▪ Charles Ainger (MWH/University of Cambridge) ▪ Mike Lomas (Tubular Holdings) ▪ Allyson Lawless (Allyson Lawless and Associates)* ▪ Dr Kevin Wall (CSIR)* Informal tutor: Dr Mike Sutcliffe (City Manager, eThekwini Municipality) * Past SAICE presidents
Paris	Leading Change – The engineer's role(s)	▪ Dr Tony Marjoram (UNESCO) ▪ Charles Ainger (MWH/University of Cambridge)

On the evening of Tuesday 19 October 2010 at One Great George Street, ICE president Prof Paul Jowitt revealed the innovative "Engineer's Toolkit for a Developing World", the culmination of a year's work. The toolkit is a first-of-its kind in the civil engineering field – an open-source set of materials and ideas to help engineers plan and deliver infrastructure for international development, poverty alleviation and the UN Millennium Development Goals (MDGs).

Prof Jowitt, His Excellency Gabriel Machinga (Zimbabwe's Ambassador to the UK), Charles Ainger (joint lead tutor to the apprentices), Sam Amod (past president of the South African Institution of Civil Engineering, and scheme tutor) and two of the apprentices, Fang Fang and Joe Mulligan, gave an insightful introduction about how and why the toolkit came into being, and revealed the end result.

To view the toolkit, go to www.ice.org.uk/patoolkit or for morre information contact Daphne Guthrie (apprentices@ice.org.uk). □

2 The 'old masters' Charles Ainger, Tony Marjoram (UNESCO), Ron Watermeyer and Paul Jowitt at UNESCO's headquarters in Paris

Table 3 The five themes linked to four crucial stages of a project in "An Engineer's Toolkit for a Developing World"

	Policy	Planning	Implementation	In-use
Sustainable infrastructure	●	●		●
Climate change	●	●	●	
Financing and anti-corruption in sustainable infrastructure	●	●	●	●
Procurement and delivery of sustainable infrastructure	●	●	●	●
Building capability for sustainable infrastructure	●	●	●	