

# GEDC 2014 Dubai

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**Conference Report**  
**Prepared by the GEDC Secretariat**



2014 WORLD ENGINEERING  
EDUCATION FORUM

## Table of Contents

About GEDC Annual Conference	3
<b>3 December</b>	
Enhancing and Embedding internationalization in Engineering Education	4
GEDC Airbus Diversity Award Dinner	5
<b>4 December</b>	
Promoting Diversity in Engineering	7
Preparing Graduates for a Global Engineering Workforce	7
Corporate Engagement and Collaborative R&D	8
<b>5 December</b>	
Grand Challenges and Global Academic and Industry Collaboration	10
Building Engineering Education Excellence in Resource-Scarce Environments	10
New Deans Mentoring Session	12
<b>Appendix</b>	
GEDC Members Assembly	13
GEDC Executive Committee Meeting	14

## About GEDC 2014 Dubai

Every other year, the GEDC Annual Conference is part of the World Engineering Education Forum (WEEF). This was the case in 2010 in Singapore, in 2012 in Buenos Aires, and will be again the case in 2016 in Seoul. In December 2014, the GEDC Annual Conference was held in parallel with the annual conferences of IFEEES, IGIP, SPEED, as well as other workshops and meetings. Together, these joint meetings make up the WEEF.

GEDC Member Alaa Ashmawy, dean of engineering at the American University of Dubai, hosted this year's WEEF in Dubai, United Arab Emirates (UAE). This year's GEDC Conference Program Chair was Peter Jimack, with support from Program Committee members, Peter Kilpatrick, Laura Steinberg, Xavier Fouger, Monique Simon, Sunil Kumar, Uriel Cukierman, Alaa Ashmawy, George Nasr, Rachel Schroeder, and John Beynon.

This year, the GEDC Conference Program Committee decided to devote two sessions to an increasingly important topic for engineering deans: engineering education's relationship with industry. You can read more on these sessions on pages X and Y – "Preparing Graduates for a Global Engineering Workforce" and "Corporate Engagement and Collaborative R&D."

This report contains summaries of only the GEDC-specific sessions held at the WEEF 2014 Dubai. For a summary of keynote speeches or other WEEF sessions, please check the WEEF 2014 Dubai Conference Report.

## **Enhancing and Embedding internationalization in Engineering Education (beyond the junior year abroad)**

Globalization has manifested in engineering education in the forms of increased language requirements, multi-institutional international design teams, case studies, topical courses, engineering-specific study abroad programs, international internships, and international research collaborations have been used in varying combinations, all with varying degrees of success. This session presented internationalization strategies and experiences from different countries and institutions in a panel format.

Norman C. Tien (University of Hong Kong) began the session by identifying several challenges and opportunities in globalization in engineering education. “Globalization of industry and marketplace demands engineering graduates who are globally competitive.” He also gave examples of the great opportunities in curriculum, which can increase students’ global awareness. He followed with several challenges with an increasingly globalized environment: restraints in engineering curriculum structure (many requirements that make international exchange difficult), infrastructure and financial costs (cost of international programs and housing students and programs), and cultural challenges (language, culture clashes).

Angela Laguna (Technological University of Panama (UTP)) provided a Latin American perspective on the implications of internationalization in engineering education. The nation of Panama has been and is a natural point of interchange, being located in the isthmus between North and South America. More than 120 international companies have their headquarters in Panama, providing ample opportunity for Panamanian graduates to work in the global marketplace right at home. UTP has internationalization strategies to diversify the types of students who study abroad. UTP also encourages faculty to gain international experiences. To facilitate these, UTP participates in many exchange networks and initiatives.

Sirin Tekinay (Kadir Has University) shared on Transdisciplinary and international collaboration and networking. She shared three enablers of this kind of education model: open access, exploiting the digital revolution, and open design. The goal of open access is bringing people together to serve a common purpose. “We need everyone plugged into the repertoire of information that’s available.” The digital revolution has transformed communication, making it person and mobile, and easily accessible (data is in the cloud). This has huge implications for international collaborations and networking. The concept of open design is “the making of both free and open-source software (FOSS) as well as open-source hardware. The process is generally facilitated by the Internet and often performed without monetary compensation.” [1] Open design in transdisciplinary and international programs means that nobody has the monopoly on success; entrepreneurs, bottom-up movements, students, creators - almost anyone can create a movement. Tekinay shared extensively on a project that exemplified all three of these “enablers” - The Fab Lab (Fabrication Laboratory) network, a global community of learners, educators, technologists, researchers, makers and innovators -- a knowledge sharing network that spans 30 countries and 24 time zones (<http://www.fabfoundation.org/fab-labs/what-is-a-fab-lab/>).

Participants engaged in discussion about how to increase students' awareness of international opportunities and experiences, how to formalize Fab Lab interactions (common standards for collaboration?), and how to reduce peer group/"clique" culture.

## **GEDC Airbus Diversity Award Dinner**

On the evening of 3 December, GEDC members gathered at The Address in downtown Dubai to celebrate the finalists of the 2014 GEDC Airbus Diversity Award. Charles Champion (Airbus) and John Beynon (GEDC) introduced the finalists and their work in diversity and inclusion in engineering education, naming Marita Cheng (2Mar Robotics) as the recipient of the 2014 Award. Cheng gave brief remarks, saying that she felt quite humbled to be amongst the finalists, after hearing the work of the other finalists Bryan Hill (University of Arkansas) and Bevlee Watford (Virginia Tech). She thanked her university, and the faculty there who first supported her endeavors with Robogals.

Charles Champion, Airbus Executive Vice President Engineering led the evaluation committee, said, "At Airbus, we are constantly looking for new ways to innovate. That means building more diverse teams, for higher performance and an inclusive culture that builds on everyone's strengths. Our 2014 Award recipient not only impressed us with her initiative, but also inspired us with her understanding that the best way to increase diversity is by creating a clear roadmap for others to follow."

The three 2014 finalists were selected from over 20 candidates from 12 countries. This prestigious award is given to individuals who have been proactive in bringing more diversity into engineering schools and universities. It rewards initiatives around the world which encourage young people of all profiles and backgrounds to study and succeed in engineering.



Photos from [www.diversityinengineering.com](http://www.diversityinengineering.com)  
From left to right: Marita Cheng, Bryan Hill, Bevlee Watford

The finalists presented their ideas before a distinguished evaluation committee at the World Engineering Education Forum (WEEF) in Dubai earlier this week. John Beynon, (Executive Dean, Faculty of Engineering, Computer & Mathematical Sciences at the University of Adelaide and Chair of the GEDC), Rana El Chemaitelly (Founder, The Little Engineer) Prof. R Natarajan (Former Chairman, All India Council for Technical Education, and former Director, Indian Institute of Technology, Madras) and Dr. Khairiyah Mohd-Yusof (Director, Centre of Engineering Education, Universiti Teknologi, Malaysia) joined Charles Champion on the Committee. Their selection criteria focused on the measurable success of the initiative, the transferability of the idea and the potential to inspire others.

“All three of our finalists are to be congratulated for the real difference that they have made,” said John Beynon, chairman of the GEDC. “Their achievements are testimony to their hard work and commitment. Now we hope that engineering leaders from around the world will be inspired to follow their example, and replicate their initiatives in order to build a more diverse global community of engineers.”

For more details on the 2014 GEDC Airbus Diversity Award and the three finalists, please visit [www.diversityinengineering.com](http://www.diversityinengineering.com).



Airbus Executive Vice President Charles Champion and GEDC Chair John Beynon present the 2014 GEDC Airbus Diversity Award to Marita Cheng, founder of Robogals.

## Promoting Diversity in Engineering

In this session, participants got to hear from the finalists of the 2014 GEDC Airbus Diversity Award - Bevelee Watford (Virginia Tech, USA), Bryan Hill (University of Arkansas, USA), and Marita Cheng (2Mar Robotics, Australia).

Rachel Schroeder (Airbus) opened the workshop with a series of questions for the panelists and participants to consider. Brian share about his program at the University of Arkansas, Engineering Career Awareness Program (ECAP), a program dedicated to providing opportunities for underrepresented populations in engineering. Not only providing financial support to students, ECAP is a comprehensive program that provides academic support, mentorship, and support beyond graduation. The program has managed to triple the population of ethnic minority students in the College of Engineering (from 200 to 600 out of 3000 students), with a graduation rate of 71%, significantly higher than the regular graduation rate of 46%.

Bevelee shared her over 20 year experience as a minority in engineering at Virginia Tech. She described the best practices in Diversity and Inclusion programs - peer mentoring programs, bridging programs, living-learning programs, and pre-college outreach. Together, these different elements create the rich diversity program at Virginia Tech Engineering.

Marita Cheng, recipient of the 2014 GEDC Airbus Diversity Award, was the last to share, introducing the audience to Robogals, a highly successful program that was born out of Marita's personal experience of her disappointment at the low percentage of female peers in her engineering school. Robogals started from a small program and has turned into an international student-run organisation which aims to substantially increase the number of young women pursuing engineering as a career. Its primary activity is robotics workshops aimed at girls in primary and secondary school. Robogals has chapters at over 20 universities across Australia, Canada, the United Kingdom, the United States, and Japan.

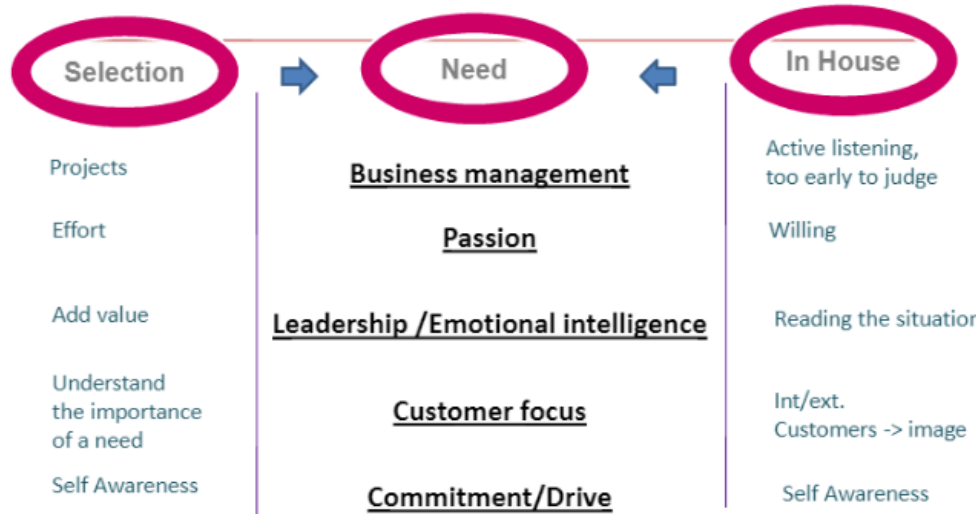
## Preparing Graduates for a Global Engineering Workforce

Xavier Fouger (D'assault Systemes) moderated this session, opening with statistics on employers opinions of the "skills shortage" in graduates, which is the leading reason for entry-level vacancies. "Germany needs 80 thousands engineers a year. It is training 40 thousand engineers every year." With this compelling background, he introduced the panelists, Ashok Agrawal (ASEE), Gary May (Georgia Tech), and Yvonne Leidi (Tenaris Global Services).

Leidi provided an industry perspective of the "skills shortage" and the skills that they look for in recent graduates. Ninety-five percent of Tenaris' workforce is engineering, making her somewhat of an authority on what industry is looking for in an engineer. There is a common skillset needed from engineering graduates, no matter which country they come from – business management, passion, leadership/EI (EQ), customer focus, and commitment/drive. Session Moderator Fouger challenged the participants and panel, asking "How do you teach these kinds of competencies?"

## A company perspective: Preparing Graduates for a Global Engineering Workforce

### Tenaris Global Trainee Program



9 December 2014  
Human Resources

May gave an academic perspective on the topic, sharing on how his university is preparing students for the global workforce. With their Learn-Make-Launch projects, “we are trying to instill in students ‘entrepreneurial confidence’.” These projects offer students the opportunity to turn ideas into products, to see their ideas go from start to finish.

Agrawal finished the session with an institutional and organizational perspective, representing ASEE and presenting their recent publication, Transforming Undergraduate Education in Engineering (TUEE). The first phase of the TUEE is “Synthesizing and Integrating Industry Perspectives,” where over 40 representatives from industry, federal government, and academia identified core competencies, skills and professional qualities they believed would help students succeed in today’s workforce. The question he left the audience with was, “Who should provide these KSAs? School? On the job training? Society? Where does it happen?”

### **Corporate Engagement and Collaborative R&D**

Peter Kilpatrick (Notre Dame University) impressed upon the audience that corporations want to see universities investing more. He shared Notre Dame’s experience of building large research facility, which helped to establish preeminence for the university, as well as leverage partnerships. It was a great tool for the local economy of South Bend, IL. GE subsequently committed 13.5 million USD for research, recognizing that they would benefit from access to great talent. “The best corporate-university partners are when university invests as much, if not more than corporations.”



## ... Culture differences between operations and R&D



From Statoil TMN presentation - 05/2013

Referencing the Abu Dhabi National Oil Company (ADNOC) experience, Wafik Beydoun illustrated three typical university-corporation partnership models: 1) Consortium model where academia leads, and several industry partners sponsor; 2) Bilateral cooperation where academia leads, and industry provides data and sponsorship

moneys; and 3) Co-leadership, where industry provides data, money and SMEs. He then shared seven ingredients for successful collaborations: 1) Industry Technical Challenges need to impact Operations, 2) Shared access to data, information & knowledge, 3) Opportunities to experiment/pilot potential innovations, 4) Define clear roles and deliverables with handshaking tasks, 5) Understand each other's business and culture – mitigate the "valley of death", 6) Early buy-in from Operations and involve R&D staff in Pilots, and 7) Team up passionate/able Scientists, Engineers, Experts & Students.

Alex Tormasov (Innopolis University) shared the differing interests of four key players in university-industry collaborations: university, industry, students, and faculty. After outlining different models of partnerships, he pointed out that there is no "silver bullet" or magic formula for successful cooperation. "Not all companies are able to successfully cooperate with universities."

Abdurrahman Khalidi (GE) shared his experience from industry, admitting that he had experienced the "shadow of death" in university-industry collaborations. He has found there to be three phases of collaboration: 1) Set up, 2) Execution, and 3) Dissemination. Failure in the first phase of set-up comes with miscommunication or a misalignment of expectations. "People in industry will say, 'This is a waste of money.' Academia will say, 'There is no scientific value in this.'" The "shadow of death" comes in the execution phase when people are turned off—the team must be able to adapt during this critical phase. Khalidi focused on this point: "Do what is impactful to business, not just what is important."

Participants raised questions about resources and the cost of co-leadership as a model of collaboration, but the panelists insisted that it was the most effective form of teamwork. Wafik Beydoun said, "'Blue sky' inspiration should come from R&D science, not industry." Deans were challenged to consider this question: "Often when considering tenure, do we look enough at the impact of research?"

## **Grand Challenges and Global Academic and Industry Collaboration (Joint IFEES/GEDC Session)**

The session on Global Grand Challenges brought together diverse thought leaders from around the world to broaden the discourse about engineering education within the context of 21st century Engineering Grand Challenges. Grand Challenges are global initiatives that have beacons of support from around the world, including the Chinese Academy of Engineering, National Academy of Engineering (NAE), and Royal Academy of Engineering, multinational corporations, and a wide range of universities.

The panel was moderated by Christina White who is a director of Grand Challenges Scholars & K12 Partners Programs and a member of the NAE Global Challenges Scholars Program (GCSP) committee. To set the groundwork of the concept of Engineering Grand Challenges, Yannis Yortsos, engineering dean at University of Southern California and one of the founders of the GCSP, shared how engineering has evolved from physics devices to complex societal challenges requiring interdisciplinary connections. Jaime Bonilla, engineering dean of Tecnológico de Monterrey, and Khairiyah Mohd Yusof, director of the Centre for Engineering Education at Universiti Teknologi in Malaysia, stressed the importance of service-learning to develop a wider range of skills and motivation to solve human challenges.

Jean-Francois Minster, Vice President of Research at Total, presented the need for new business models coupled with new technologies as being key to scaling solutions globally. He shared a real world example from Total, where they reconceptualized their business model to work with their new technology thus making it feasible to scale a lighting solution to 50 million people. Theo Andrew, executive dean at Durban University of Technology, included ideas about how cross-cultural training and systems thinking are needed in engineering education in an effort to address Grand Challenges. Catherine Didion, senior program officer for the Diversity in the Engineering Workforce at the National Academy of Engineering, discussed how Grand Challenges attract diverse students, including those that are traditionally under-represented, into engineering. She and Jean-Francois Minister agreed that Grand Challenges must include diverse perspectives in their solutions.

Overall, the discussion included themes that resonated across Grand Challenges including sustainability, health, technology and growth, entrepreneurship, education, enriching life, and resilience. With this panel, the WEEF community will continue to enrich the discourse on Grand Challenges from global perspectives on research, teaching, implementation, and engineering education.

## **Building Engineering Excellence in Resource-Scarce Environments**

Increasingly, there are substantially more engineering students enrolled in universities and colleges that operate in resource scarce environments, whether they be in developing nations, or in the developed world. Delivering excellence in engineering education seems to require significant resources - sophisticated laboratory and computational needs, qualified faculty, vital modern infrastructure. In this session, panelists shared philosophies and strategies for delivering excellence that prevail over resource constraints.

Rajnish Sharma (IIT) emphasized that motivation and zeal were crucial components to achieving excellence; he cited the examples of Einstein and Mother Teresa, who certainly operated in resource-scarce environments, but were great successes in their own rights.

Kayode Ayodele (Obafemi Awolowo University, Nigeria) asked participants to imagine a facility that had power outages 70% of the time, only three faculty members, painting a real picture of resource constraints. Yet, partnering with MIT with iLabs gave his students and faculty the ability to do experimentation on nuclear reactors. Through modern communications technology, his university in Nigeria had access to one of the most sophisticated facilities in the world.

Pankaj Jalote (IIT New Delhi) focused on two factors that excellence requires: capital and human resources. “Without capital, you can build *foundations* for excellence.” Jalote emphasized the importance of finding the best available faculty, and allowing them to reach their full potential. “If the faculty want to do research, make a research-oriented environment. You want to build a system to keep faculty.”

Theophilus Andrew (Durban University of Technology, South Africa). “There is a misperception that resources are a means to an end. Resources are always linked to worldview.” He argued that abundance can actually kill innovation. He encouraged the audience to always develop a strategy before raising capital. “We have to run colleges like businesses.” He then shared his experience with a regional collaboration for equipment, which the NSF will be funding.

## New Deans Mentoring Session

Each GEDC Annual Conference offers an opportunity for recently appointed deans to learn from the experiences of other deans. This year, Laura Steinberg (Syracuse University) led the discussion, with help from panelists Adagbonyin Obiazi (Ambrose Alli University), Leland Blank (American University of Sharjah (AUS)), and Mallikharjuna Babu (BMS College of Engineering in Bangalore).

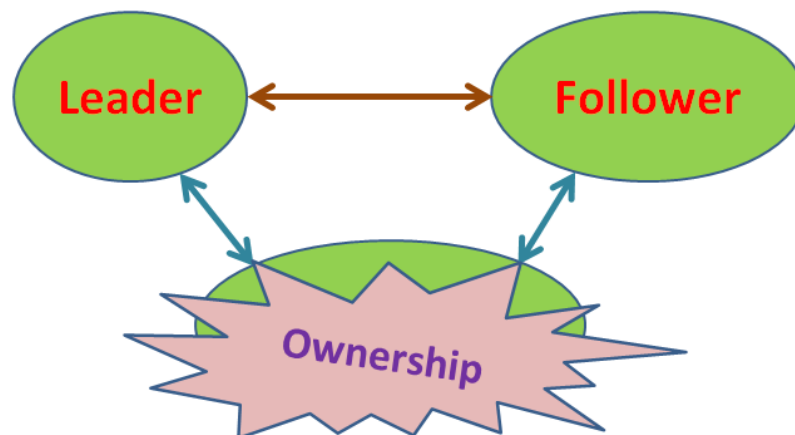
Obiazi shared on the several roles that a dean has as: 1) Lecturer and Leader in the Faculty/College, 2) Visionary, 3) Faculty/College advocate in the Face of Competing Demands for Resources, 4) Bridge and Resource Finder/Identifier to External Bodies, 5) Curriculum Planner, 6) Advocate for Global Competitiveness (responsibility to develop strong linkages at local, national, continental and global levels, but remain globally competitive), 7) Financial Manager (establishing financial reporting structure, being accountable to fund providers, maintaining financial discipline and minimizing wastages, managing project timelines), and 8) Leader in Strategic Planning and Faculty Management.

Steinberg made a presentation on how to make a strong start in deanship: 1) Promote yourself. “Realize that what you did well to get you to the Dean’s position may not be the things you need to concentrate on as Dean. You may need to stretch yourself.” This step includes re-assessment of your skills, and knowing where to grow. 2) Build your Team. Here, Steinberg emphasized the need to leverage your human resources. Associate Deans, Department Chairs and Staff are all valuable teammates who will help carry out the common goals of the college. 3) Develop a strategic plan. “A strategic plan signals where you are going and helps to establish priorities for your organization. It defines what success looks like for the College.”

Blank emphasized the principle of “Ownership,” sharing his experience of conducting a focus group and a follow-up strategy setting session in order to develop AUS’ Engineering PhD program and research focus areas.

### A Principle of Successful Leadership

The purpose of the strategy-setting session was to “develop ownership and motivation to lead research areas identified in an open discussion, facilitated session.” The session resulted in the formation of research areas and an initial basis for doctoral program design. Deans who aspire to start Engineering PhD programs may find Blank’s approach very useful.



## Appendix

### GEDC Members Assembly

#### Agenda

- |  |                              |
|--|------------------------------|
| 1. Welcome and roll call   | John Beynon, GEDC Chair      |
| 2. Overview of GEDC during 2013-14 since GEDC Chicago October 2013<br>Challenges and Opportunities                 | John Beynon                  |
| 3. GEDC Secretariat Report   | Hans J. Hoyer                |
| 4. Appreciation remarks to outgoing members<br>of the GEDC Executive Committee                                     | John Beynon                  |
| 5. Recognition of new members of Executive Committee   | John Beynon                  |
| 6. Brief Updates by GEDC chapters present in Dubai   |                              |
| a. United Arab Emirates  | Lee Blank                    |
| b. Nigeria   | Adagbonyin Obiasi            |
| c. Latin America   | Jaime Bonilla                |
| d. India   | Krishna Vedula               |
| e. Europe  | Mike Murphy & Françoise Côme |
| f. Canada  | Mehrdad Saif                 |
| g. Australia   | Doug Hargreaves              |
| 7. Brief Updates of emerging GEDC chapters   |                              |
| 8. GEDC/Airbus Diversity Award 2014 and 2015   | John Beynon                  |
| 9. Highlights of IFEEES  | Jose Carlos Quadrado         |
| 10. Brief comments re WEEF 2015 Florence   | Claudio Borri                |
| 11. Brief comments re GEDC 2015 Adelaide   | John Beynon                  |
| 12. Appreciation to Tuncay for her leadership and service in the past three years<br>Transition of GEDC Leadership | John Beynon                  |
| 13. Closing remarks  | John Beynon                  |

## GEDC Executive Committee Meeting

### Agenda

1. Welcome, introductions & apologies John Beynon (JB)
2. Review of notes from Executive Committee teleconference on November 10, 2014
  - a. Actions arising
3. Review of recent activities JB
4. Future events JB, Hans J. Hoyer (HJH)
  - a. GEDC workshop/seminar during WEEF 2015 Florence
  - b. GEDC 2015 Adelaide Conference. Program Committee members to be identified
  - c. GEDC 2016 Seoul Conference during WEEF 2016 Seoul
  - d. Regional Deans Conferences in Singapore; Bolivia (GEDC-Latin America Chapter); USA; OAS meeting Guatemala; Ethiopia; IUCEE conference and World Bank workshop, India
5. GEDC Secretariat Report – matters arising HJH
6. GEDC Dubai 2014 – important reflections (conference report will be reviewed later.)
7. Future issues – open discussion JB
8. Any other business
9. Meeting Adjourns