PRESENTERS

1. **MOBILITY OF ENGINEERS – A GLOBAL OVERVIEW** by Gurmeet Bambrah PhD, C.Eng. R.Eng., FICE, MIEK Coordinator CAPE Council for Access to the profession of Engineering

2. **GLOBAL MOBILITY FOR ENGINEERING PROFESSIONALS** by John M. Boyd PhD, P.Eng. President, International Federation of Consulting Engineers (FIDIC)

1. **INTERNATIONAL MOBILITY OF ENGINEERS** by Gue See Sew PhD, Chair APEC Engineer Coordinating Committee with support from, Barry J Grear AO, Past President, Engineers Australia, President-Elect, World Federation of Engineering Organizations

2. **HOW IS THE TRANSFERABILITY OF EXPERIENCE AND THE TRANSFORMATION OF INSTITUTIONAL PRACTICES TO BE FACILITATED UNDER A GLOBAL FRAMEWORK?** by Exaud Mushi, Chairman GAMA and Managing Director, NORPLAN Tanzania Limited

3. **HOW THE ENGINEERING FRATERNITY CAN FACILITATE STANDARDISATION OF GLOBAL ENGINEERING EXPERIENCE** by Kadri Adebayo Adeola Chairman, Capacity Building Committee of FIDIC Managing Director, CPMS Limited

4. **COMMENTARY** by Nikhat Rasheed **on** submissions by Prof. Wlodzimierz Miszalski PhD, DSc. President, World Federation of Engineering Organizations – Committee on Education and Jim Birch PhD, Head of International Recognition, Engineering Council UK

5. **EXPERIENCE EVALUATION FOR LICENSING IN ONTARIO:** Mike Dang PhD

CAPE ENGINEERING KNOWLEDGE CONFERENCE 2007

MOBILITY OF ENGINEERS – A GLOBAL OVERVIEW

Preliminary Findings

Gurmeet Bambrah, PhD, FICE, MIEK
Coordinator, CAPE Council for Access to the profession of Engineering
supported by Amrit Soar, LLB

GEOGRAPHICAL SPREAD OF BACKGROUND RESEARCH

NORTH AMERICA	SOUTH AMERICA AND CARIBBEAN	EUROPE (Western)	EUROPE (Eastern)	AFRICA	ASIA	AUSTRALIA AND OCEANIA
Canada USA Mexico	Argentina Bolivia Chile Colombia Mexico Peru	UK, Ireland Germany France Italy Austria Belgium Denmark Finland Greece Denmark Netherlands Norway Portugal Spain Sweden	Hungary Estonia Poland Czech Republic	Kenya South Africa Egypt	Japan Malaysia Singapore China Hong Kong Thailand India	Australia

STANDARD COMPONENTS
PROFESSIONAL ENGINEERING PRACTICE

1. GOVERNANCE & INSTITUTIONS
2. SOCIETY & PUBLIC PROTECTION
3. EDUCATION & QUALITY ASSURANCE
4. EXPERIENCE & SKILLS ASSESSMENT
5. MOBILITY OF ENGINEERING KNOWLEDGE

GOVERNANCE & INSTITUTIONS NORTH AND SOUTH AMERICA

REGION	INSTITUTIONAL STRUCTURE	MECHANISM	SPECIFICITIES
NORTH AMERICA	INTERNATIONAL NATIONAL STATE / PROVINCIAL REGULATOR UMBRELLA BODY (NGO) LEARNED SOCIETIES	▪ENGINEERING ACTS ▪STATE REGULATION (USA) ▪SELF-GOVERNANCE BY PROVINCIAL GOVERNMENT APPOINTED REGULATOR (CANADA) ▪TEMPORARY LICENSES (FOR INTER-PROVINCIAL, INTER-STATE ▪MUTUAL RECOGNITION AGREEMENTS FOR INTERNATIONAL MOBILITY (GATS, NAFTA, WASHINGTON ACCORD)	▪MEXICO HAS YET TO INTRODUCE REGULATION ▪IN CANADA THE PROVINCIAL REGULATORS DO NOT RECOGNIZE MUTUAL RECOGNITION AGREEMENTS SIGNED BY THEIR FEDERAL UMBRELLA BODY CCPE (ENGINEERS CANADA)
SOUTH AMERICA AND CARIBBEAN	LEARNED SOCIETIES?		REGULATION UNDER CONSIDERATION

GOVERNANCE & INSTITUTIONS WESTERN AND EASTERN EUROPE

REGION	INSTITUTIONAL STRUCTURE	MECHANISM	SPECIFICITIES
WESTERN EUROPE	INTERNATIONAL NATIONAL REGULATOR UMBRELLA BODY (NGO) PROFESSINAL INSTITUTIONS LEARNED SOCIETIES	▪ENGINEERING ACTS ▪NATIONAL REGULATOR (ITALY) ▪NATIONAL UMBRELLA BODY (ENGINEERING COUNCIL, UK) ▪PROFESSIONAL INSTITUTIONS (ICE, FIDIC) ▪MUTUAL RECOGNITION AGREEMENTS (GATS, EU, WASHINGTON, DUBLIN, SYDNEY AND BOLOGNA ACCORDS)	▪NOT ALL COUNTRIES HAVE NATIONAL REGULATORS ▪NOT ALL COUNTRIES HAVE NATIONAL UMBRELLA BODIES
EASTERN EUROPE		▪LEARNED SOCIETIES ▪MUTUAL RECOGNITION AGREEMENTS (GATS, FEANI, BOLOGNA ACCORD)	REGULATION IS STILL UNDER DEVELOPMENT

GOVERNANCE & INSTITUTIONS
REST OF THE WORLD

REGION	INSTITUTIONAL STRUCTURE	MECHANISM	SPECIFICITIES
ASIA	NATIONAL UMBRELLA BODY (NGO) PROFESSIONAL INSTITUTION LEARNED SOCIETIES	▪ENGINEERING ACTS (IN SOME COUNTRIES) ▪ENGINEER REGISTRATION BOARDS (GOVERNMENT APPOINTED) ▪REGISTER OF ENGINEERS ▪MUTUAL RECOGNITION AGREEMENTS (GATS, APEC)	▪NOT ALL COUNTRIES HAVE REGISTRATION BOARDS OR ENGINEERING ACTS ▪ENGINEERING BOARDS ARE USUALLY GOVERNMENT APPOINTEES
AFRICA		▪ENGINEERING ACTS (IN SOME COUNTRIES) ▪ENGINEER REGISTRATION BOARDS (GOVERNMENT APPOINTED) ▪RESERVED TITLES (LEGALLY RESERVED IN SOME COUNTRIES ONLY) ▪REG ISTER OF ENGINEERS ▪MUTUAL RECOGNITION AGREEMENTS (GATS)	
AUSTRALIA AND OCEANIA		▪RESERVED TITLE ▪NATIONAL ENGINEERS REGISTRATION BOARD (NGO) ▪MUTUAL RECOGNITION AGREEMENTS(GATS, (GATS, WASHINGTON, DUBLIN, SYDNEY ACCORD, APEC)	▪UMBRELLA BODY (NGO) HAS GOVERNMENT REPRESENTATION ONLY (NOT GOVERNMENT APPOINTEE)

GOVERNANCE & INSTITUTIONS – GLOBAL TRENDS

- A SIGNIFICANT NUMBER OF COUNTRIES HAVE AN ENGINEERING ACT
- MOST COUNTRIES FAVOUR NATIONAL OR REGIONAL REGISTERS OF ENGINEERS AND REGISTRATION BOARDS
- MOST COUNTRIES FAVOUR MUTUAL RECOGNITION AGREEMENTS
- MOST COUNTRIES HAVE SIGNED GATS WHICH CALLS FOR LIBERALIZATION OF ENGINEERING SERVICES

STANDARD COMPONENTS
PROFESSIONAL ENGINEERING PRACTICE

1. GOVERNANCE & INSTITUTIONS
2. SOCIETY & PUBLIC PROTECTION
3. EDUCATION & QUALITY ASSURANCE
4. EXPERIENCE & SKILLS ASSESSMENT
5. MOBILITY OF ENGINEERING KNOWLEDGE

SOCIETY & PUBLIC PROTECTION NORTH AND SOUTH AMERICA

REGION	CONSIDERATIONS	MECHANISM	SPECIFICITIES
NORTH AMERICA	▪PUBLIC PROTECTION PROCESS •FAIR •OBJECTIVE •TRANSPARENT •ACCOUNTABLE ▪ENFORCEMENT ▪ETHICS	▪CREDENTIAL RECOGNITION ▪LICENSING BY REGULATOR ▪LEGAL RESERVATION OF TITLES ▪PROFESSIONAL PRACTICE EXAMS ▪VOLUNTARY CODE OF ETHICS	▪REGULATION IN USA IS AT STATE LEVEL ▪IN CANADA THERE IS SELF – GOVERNING GOVERNMENT APPOINTED PROVINCIAL REGULATOR ▪A FAIR ACCESS TO PROFESSIONS ACT HAS BEEN INTRODUCED IN ONTARIO, CANADA ▪MEXICO HAS YET TO INTRODUCE REGULATION
SOUTH AMERICA AND CARIBBEAN			REGULATION UNDER CONSIDERATION

SOCIETY & PUBLIC PROTECTION WESTERN AND EASTERN EUROPE

REGION	INSTITUTIONAL STRUCTURE	MECHANISM	SPECIFICITIES
WESTERN EUROPE	▪PUBLIC PROTECTION PROCESS ▪ETHICS ▪NO ENFORCEMENT	▪NATIONAL ENGINEERING ACTS ▪LICENSING (NATIONAL) ▪RESERVED TITLES (LEGALLY RESERVED IN SOME COUNTRIES ONLY) ▪NATIONAL EXAMINATIONS (IN SOME COUNTRIES ▪PROFESSIONAL INSTITUTION MEMBERSHIP EXAMS	▪NOT ALL COUNTRIES HAVE NATIONAL REGULATORS ▪RESERVED TITLES CAN BE ISSUED BY NGO UMBRELLA BODIES OR GAINED THROUGH MEMBERSHIP OF A PROFESSIONAL INSTITUTION
EASTERN EUROPE			REGULATION IS STILL UNDER DEVELOPMENT

SOCIETY & PUBLIC PROTECTION
REST OF THE WORLD

REGION	INSTITUTIONAL STRUCTURE	MECHANISM	SPECIFICITIES
ASIA AFRICA	▪PUBLIC PROTECTION PROCESS ▪ETHICS ▪NO ENFORCEMENT	▪RESERVED TITLES (LEGALLY RESERVED IN SOME COUNTRIES ONLY) ▪REG ISTER OF ENGINEERS IN SOME COUNTRIES ▪VOLUNTARY CODE OF ETHICS IN SOME COUNTRIES ▪ PROFESSIONAL INSTITUTION MEMBERSHIP EXAMS	NOT ALL COUNTRIES SUBSCRIBE TO THESE
AUSTRALIA AND OCEANIA	▪PUBLIC PROTECTION PROCESS ▪ETHICS ▪NO ENFORCEMENT	▪RESERVED TITLE ▪REGISTER OF ENGINEERS ▪MUTUAL RECOGNITION AGREEMENTS ▪VOLUNTARY CODE OF ETHICS	

SOCIETY & PUBLIC PROTECTION GLOBAL TRENDS

Favored by most countries:

- Public protection
- Reserved titles
- Ethics – voluntary codes
- Registration of engineers

Favored in a significant number of countries:

- Licensing and national engineering acts

Favored in North America only:

- Legally reserved titles
- Professional practice exams
- Enforcement

STANDARD COMPONENTS
PROFESSIONAL ENGINEERING PRACTICE

1. GOVERNANCE & INSTITUTIONS
2. SOCIETY & PUBLIC PROTECTION
3. EDUCATION & QUALITY ASSURANCE
4. EXPERIENCE & SKILLS ASSESSMENT
5. MOBILITY OF ENGINEERING KNOWLEDGE

EDUCATION & QUALITY ASSURANCE NORTH AND SOUTH AMERICA

REGION	POST-SECONDARY EDUCATION	MECHANISM	SPECIFICITIES
NORTH AMERICA	▪ UNIVERSITY DEGREE ▪ 12 YEARS FULL-TIME SCHOOLING ▪ 4 YEARS POST-SECONDARY YEARS ▪ CLASSIFICATIONS: ▪ ENGINEER (4 YEARS OR MORE) ▪ TECHNOLOGIST (3 YEARS) ▪ TECHNICIAN (2 TO 3 YEARS)	▪ SPECIALIZED PEER REVIEW ACCREDITATION ▪ACCREDITION BOARDS ABET (NGO) USA ▪CEAB, CEQB CANADA	▪IN CANADA THE ACCERDITATION IS ON AN INDIVIDUAL BY INDIVIDUAL BASIS ▪IN USA THIS IS ON A PROGRAM BASIS
SOUTH AMERICA AND CARIBBEAN		▪NATIONAL EDUCATION STANDARD	

EDUCATION & QUALITY ASSURANCE REST OF WORLD

REGION	POST-SECONDARY EDUCATION	MECHANISM	SPECIFICITIES
EUROPE (Western)	▪ UNIVERSITY DEGREE ▪ 12 YEARS FULL-TIME SHOOLING ▪ 4 YEARS POST-SECONDARY YEARS ▪ CLASSIFICATIONS: ▪ ENGINEER (4 YEARS OR MORE) ▪ TECHNOLOGIST (3 YEARS) ▪ TECHNICIAN (2 TO 3 YEARS)	▪STANDARDIZATION ▪MUTUAL RECOGNITION	3-6 YEARS
EUROPE (EASTERN)		▪NATIONAL EDUCATION STANDARDS	2-6 YEARS
AFRICA		▪STANDARDIZATION ▪MUTUAL RECOGNITION	3-6 YEARS
ASIA		▪STANDARDIZATION ▪MUTUAL RECOGNITION	3-6 YEARS
AUSTRALIA AND OCEANIA		▪STANDARDIZATION ▪MUTUAL RECOGNITION	2-4 YEARS

EDUCATION & QUALITY ASSURANCE GLOBAL TRENDS

- Most countries subscribe to quality assurance of qualifications
- Specialized Peer Review Accreditation for quality assurance is favored only in North America
- Around the world, globalization of the engineering profession has led to increased interest in mutual recognition
- Mutual recognition agreements are a mechanism for recognition of post-secondary education from another region
- The UNESCO Global Forum on International Quality Assurance, Accreditation and the Recognition of Qualifications aims to provide a platform for dialogue between international frameworks

STANDARD COMPONENTS -PROFESSIONAL ENGINEERING PRACTICE

1. GOVERNANCE & INSTITUTIONS
2. SOCIETY & PUBLIC PROTECTION
3. EDUCATION & QUALITY ASSURANCE
4. EXPERIENCE & SKILLS ASSESSMENT
5. MOBILITY OF ENGINEERING KNOWLEDGE

EXPERIENCE & SKILLS ASSESSMENT NORTH AND SOUTH AMERICA

REGION	EXPERIENTIAL REQUIREMENTS TO PRACTICE ENGINEERING	MECHANISM	SPECIFICITIES
NORTH AMERICA	4 YEARS	▪EXPERIENCE REPORT ▪STATE LICENSING EXAM (USA) ▪PROVINCIAL PEER REVIEW AND OPTION OF EXPERIENCE INTERVIEW OR TECHNICAL EXAMS(CANADA) ▪MEMBERSHIP OF FIDIC (LIMITED MOBILITY)	▪IN CANADA THE EXPERIENCE IS ASSESSED ON AN INDIVIDUAL BY INDIVIDUAL BASIS ▪IN ADDITION THE APPLICANT FOR A LICENSE SHOULD HAVE ONE YEAR OF IN-CANADA, IN-JURISDICTION SUPERVISED EXPERIENCE
SOUTH AMERICA AND CARIBBEAN		MEMBERSHIP OF FIDIC	REGULATION UNDER CONSIDERATION

EXPERIENCE & SKILLS ASSESSMENT REST OF THE WORLD

REGION	EXPERIENTIAL REQUIREMENTS TO PRACTICE ENGINEERING	MECHANISM	SPECIFICITIES
EUROPE (WESTERN)	0-4 YEARS	▪VERIFIED EXPERIENCE RECORD OR REPORT AND SUPPORTING DESIGN ▪TECHNICAL EXAMINATION ▪PROFESSIONAL INTERVIEW OR • NONE OF THE ABOVE •**MEMBERSHIP OF FIDIC, ICE**	
EUROPE (EASTERN)	0-4 YEARS	NATIONAL EXAMINATION IN SOME COUNTRIES **MEMBERSHIP OF FIDIC, ICE, LOCAL INSTITUTIONS**	
AFRICA	0-4 YEARS	▪VERIFIED EXPERIENCE RECORD OR REPORT AND SUPPORTING DESIGN ▪TECHNICAL EXAMINATION ▪PROFESSIONAL INTERVIEW OR ▪ **MEMBERSHIP OF FIDIC, ICE, LOCAL INSTITUTIONS**	MOST HAVE TENDED TO ADOPT THE COMMONWEALTH OR FRANCOPHONE SYSTEMS
ASIA	O-7 YEARS	▪VERIFIED EXPERIENCE RECORD OR REPORT AND SUPPORTING DESIGN ▪TECHNICAL EXAMINATION ▪PROFESSIONAL INTERVIEW ▪ **MEMBERSHIP OF FIDIC, ICE, LOCAL INSTITUTIONS**	
AUSTRALIA AND OCEANIA	SHOULD BE PRACTISING ENGINEERING	**MEMBERSHIP OF FIDIC, ICE, LOCAL INSTITUTIONS**	

EXPERIENCE & SKILLS ASSESSMENT GLOBAL TRENDS

- Length of experience 4 years in most countries
- A significant number of countries have **no** experience requirements
- Experience records and reports are a favored mechanism in establishing skill sets in many countries
- Membership of FIDIC is available in most countries
- Specialized peer reviews subject to the knowledge base of peers in Canada **only**
- Professional interview/exam/design
- Mentoring

STANDARD COMPONENTS
PROFESSIONAL ENGINEERING PRACTICE

1. GOVERNANCE & INSTITUTIONS
2. SOCIETY & PUBLIC PROTECTION
3. EDUCATION & QUALITY ASSURANCE
4. EXPERIENCE & SKILLS ASSESSMENT
5. MOBILITY OF ENGINEERING KNOWLEDGE

INWARD AND OUTWARD MOBILITY ENGINEERING KNOWLEDGE

- Two types of mobility of engineering knowledge:
  - Outward (knowledge workers leaving host country)
  - Inward (knowledge workers entering host country)

DEGREE OF OUTWARD MOBILITY

DEGREE OF OUTWARD MOBILITY	MOBILITY AGREEMENTS	NORTH AMERICA	SOUTH AMERICA AND CARIBBEAN	EUROPE (WESTERN)	EUROPE (EASTERN)	AFRICA	ASIA	AUSTRALIA AND OCEANIA
	GLOBAL	GATS	GATS	GATS	GATS	GATS	GATS	GATS
	INTER-CONTINENTAL	WASHINGTON ACCORD		WASHINGTON DUBLIN SYDNEY ACCORDS BOLOGNSA CONVENTION			WASHINGTON ACCORD APEC ENGIBNEER AGREEMENT	WASHINGTON DUBLIN SYDNEY ACCORDS APEC ENGIBNEER AGREEMENT
	INTER-REGIONAL	NAFTA		FEANI BOLOGNSA CONVENTION EU	FEANI BOLOGNSA CONVENTION		APEC	APEC
	NATIONAL	NATIONAL BODIES		NATIONAL BODIES	NATIONAL BODIES	NATIONAL BODIES	NATIONAL BODIES	NATIONAL BODIES
	INTER-STATE/ PROVINCIAL	REGULATOR	NO STATEWIDE REGULATION	NO STATEWIDE REGULATION	NO STATEWIDE REGULATION	NO STATEWIDE REGULATION	NO STATEWIDE REGULATION	NO STATEWIDE REGULATION
	INTER-INSTITUTIONAL	ENGINEERS CANADA, ABET		ECUK, ICE		ENGINEERS REGISTERS	ENGINEERS REGISTERS	ENGINEERS AUSTRALIA

DEGREE OF INWARD MOBILITY

DEGREE OF INWARD MOBILITY	MOBILITY INSTITUTIONS	NORTH AMERICA	SOUTH AMERICA AND CARIBBEAN	EUROPE (WESTERN)	EUROPE (EASTERN)	AFRICA	ASIA	AUSTRALIA AND OCEANIA
5	GLOBAL							
4	INTER-CONTINENTAL							SPECIFIC TO MORE THAN ONE REGION
3	INTER-REGIONAL			SPECIFIC TO ONE REGION			SPECIFIC TO ONE REGION	SPECIFIC TO ONE REGION
2	NATIONAL		SPECIFIC TO ONE COUNTRY	SPECIFIC TO ONE COUNTRY	SPECIFIC TO ONE COUNTRY	SPECIFIC TO ONE COUNTRY	SPECIFIC TO ONE COUNTRY	SPECIFIC TO ONE COUNTRY
1	INTER-STATE/ PROVINCE	SPECIFIC TO STATE/ PROVINCE						
0	INTER-INSTITUTIONAL							
CULTURE OF MOBILITY		INWARD	UN-DEVELOPED	OUTWARD	UN-DEVELOPED	ADAPTED FROM OTHER REGIONS	ADAPTED FROM OTHER REGIONS	APPLICABLE TO MOST REGIONS

ACCORDS VS. IMPLEMENTATION

COMPARISON OF INWARD VS. OUTWARD MOBILITY	MOBILITY INSTITUTIONS	NORTH AMERICA	SOUTH AMERICA AND CARIBBEAN	EUROPE (WESTERN)	EUROPE (EASTERN)	AFRICA	ASIA	AUSTRALIA AND OCEANIA
5	GLOBAL							
4	INTER-CONTINENTAL							SPECIFIC TO MORE THAN ONE REGION
3	INTER-REGIONAL			SPECIFIC TO ONE REGION			SPECIFIC TO ONE REGION	SPECIFIC TO ONE REGION
2	NATIONAL		SPECIFIC TO ONE COUNTRY		SPECIFIC TO ONE COUNTRY	SPECIFIC TO ONE COUNTRY		SPECIFIC TO ONE COUNTRY
1	INTER-STATE / PROVINCE	SPECIFIC TO STATE/ PROVINCE						
0	INTER-INSTITUTIONAL							
CULTURE OF MOBILITY		INWARD - IMBALANCED	UN-DEVELOPED	OUTWARD - IMBALANCED	UN-DEVELOPED	ADAPTED FROM OTHER REGIONS - IMBALANCED	ADAPTED FROM OTHER REGIONS - IMBALANCED	BALANCED

GLOBAL TRENDS OF MOBILITY

- In general, there is an increasing interest in outward mobility and limited interest in inward mobility

- Australia has the greatest balance between outward and inward mobility, and North America has the greatest imbalance

- Different cultures of mobility exist ranging from “inward, outward, undeveloped, adapted and applicable”

THREE QUESTIONS

1. How can the present instruments of mobility be modified to facilitate the mobility of engineering knowledge under global accords such as NAFTA and GATS?

2. How can the engineering fraternity facilitate on the standardization of global engineering skills and experience, given that there is some movement on the standardization of academic credentialing?

3. How can the transferability of skills and experience and the transformation of institutional practices be facilitated under a global framework?