# INSTITUTION OF ENGINEERS MAURITIUS

**Report on a Pilot Project on**

**Building Engineering Capacity through the**

**Accreditation of Engineering Degree Programmes**

implemented with the support of the Royal Academy of Engineering
under the GCRF Africa catalyst Scheme

ROYAL ACADEMY OF ENGINEERING

And with the collaboration of Engineers Against Poverty UK

ENGINEERS AGAINST POVERTY

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The Engineering Profession's Gift to the Nation

**A Report of a Project on**

# "Capacity Building through the Accreditation of Engineering Degree Programmes"

Implemented with the support of the
**Royal Academy of Engineering (UK) under the GCRF Africa Catalyst Scheme**
IEM acknowledges with thanks the support and assistance of the Academy, and the collaboration of Engineers Against Poverty(UK) and its Director Mr Petter Matthews.

**The Story of the Initiatives of the Institution of Engineers towards establishing an institutional regime for the accreditation of engineering degree programmes in Mauritius told by the Working Group on Engineering Accreditation.**

Disclaimer: (Note from Working Group on Engineering Accreditation WGEA):
*No responsibility of the Royal Academy of Engineering (UK) is implied or should be inferred in the production of this Report besides having enabled IEM to implement all the activities it undertook to implement in its application to the Academy, aimed at building capacity towards establishing an accreditation system in Mauritius.*

*The Working Group on Engineering Accreditation of IEM gratefully acknowledges with thanks the use and inclusion in this Report of documents downloaded or copied from the website of the Royal Academy of Engineering (UK), as well as documents constituting exchanges between the Academy and IEM, and of course other documents whose sources have been quoted elsewhere in this Report.*

**IEM House**
**Corner Hitchcock/Ollier Avenues**
**Quatre Bornes, MAURITIUS.**
**July 2017**

# *FOREWORD*

## by Raj H Prayag PDSM, B.Sc. M.Sc. C.Eng. MICE, FIEM, RPEM

**President of the Institution of Engineers**

Seventy years ago, 12 engineers got together to create the Association of Professional Engineers with a view to protect the society by ensuring that only fully qualified engineers provided engineering services.
Fifty-three years ago, the same group of engineers lobbied for regulating the practice of engineering in Mauritius and were responsible for the enactment of the Council of Registered Professional Engineers in 1965 through a Private Member's Bill in the Mauritius Legislative Assembly. The CRPE Act 1965 has been in force ever since, requiring an Engineering Degree acceptable to the Council plus two years of supervised experience to be licensed to practice as professional engineers.

Today, the heirs of those founder members have taken up the torch to move the engineering profession and engineering practice forward in line with what is being done in advanced countries in the World, with a view to locally produce high calibre engineers at par with the best in the world. Embracing an Accredited Engineering Degrees standard has been on the menu of the Institution of Engineers of Mauritius since the late 1980's. Attempts made in that direction failed because of lack of support at national level for many and various reasons.
However, today with resources and support from the Royal Academy of Engineering of UK, through the Africa Catalyst Scheme, great strides have been made in Mauritius.

Institution of Engineers of Mauritius has been able to convince all stakeholders concerned, ranging from the authorities responsible for Education, to Universities, to Professional Engineering Institutions, academicians, students etc. of the need to embrace Accredited Engineering Degrees, benchmarked against the Washington Accord standard. From the beginning of this pilot project, IEM has worked with all the stakeholders, and all have fully collaborated and participated in all the workshops where the various implementation models of Washington Accord were reviewed with a view to identify a model that would best fit Mauritius. The working Group driving this Pilot Project has also together with all the stakeholders, prepared a draft Governance Structure for the future National Engineering Accreditation Board. In short, in the last six months much progress has been made to enable the Institution of Engineers Mauritius to be in the position to take the next step up and create an independent Engineering Accreditation Board and apply for provisional membership of the Washington Accord.

None of the above would have been achieved, had we not had a most dedicated Working Group for Engineering Accreditation, led by Mr. Jagadish Soobarah, himself a Past-President of IEM. Once again, the Institution of Engineers Mauritius is very grateful to the Royal Academy of Engineering for its support at the opportune moment in time. I also place on record our gratitude to the Engineers Against Poverty for their technical support during the implementation of this Pilot Project.
Finally, I thank all our national partners for their exemplary collaboration, the many academicians and practising engineers who had attended some 18 workshops and for their valuable contribution.

July 2017

# AKNOWLEDGEMENT

**Jagadish Soobarah,** B.E(Hons), C.Eng. FIEM, FRAeS, FAeSM, MIET, CDipAF, RPEM
Vice President Aeronautical Society of Mauritius
**Team Leader,**
**IEM Working Group on Engineering Accreditation.**

Having been requested to put in a few words as the Project Leader, let me say that the story started with an invitation from the Royal Academy of Engineering, in July 2016, to attend a conference of the Council of Academies of Engineering and Technological Sciences (CAETS), to be hosted by the Academy at Savoy Place in September. In London, I met another IEM Colleague and Past President Jayesh Desai, also a guest of the Academy. The Conference which was inaugurated by the President of the Republic of Mauritius, Dr (Mrs) Ameenah Gurib Fakim, was on the theme "**Engineering a Better World**". In the words of the Academy:

Quote "***Engineering a Better World will draw upon the experience and expertise of leaders in engineering industry and national academies, as well as governments and the international development community, to promote and strengthen the role engineering plays in sustainable development***." Unquote

On 13th September, the second day of the Conference, which coincided with Engineers' Day in Mauritius, the Academy launched the GCRF (Global Challenges Research Fund) Africa Catalyst Scheme, which would make funds available to the professional engineering bodies of the Sub-Saharan nations for capacity building through research and strengthening of the professional engineering institutions. The CAETS Conference was an opportunity for us Mauritian engineers to meet and network with many people who were driven by their passion to do something for the less unfortunate sections of society, however small their initiative would be, provided it served the better interest of that community, and contributed to reduction or elimination of poverty, gender, class and creed discrimination and other inequalities, and bring some improvement in their living conditions, and thereby giving them a sense of equality with the more fortunate members of the community.

We were impressed with the Academy's efforts to reach out to motivate, encourage, reward, and bring into the limelight, all those unknown people from around the world, who through simple, ingenuous and innovative means were contributing to improving the lot of the unfortunate members of society. Colleague Jayesh and I decided that we too should do something back home. The Academy's GCRF Africa Catalyst Scheme was beckoning at us; there was £40,000 that could be ours to help our nation. So, back home, when IEM President confirmed to us his resolve to establish an accreditation regime for engineering degree programmes, and do so through IEM, we knew what we had to do, and knew that accreditation of engineering education would have a profound positive consequence for the economy. We were glad that we found quite a few other colleagues, from the professional practice and the academia who were equally minded, to join us. This Report is the story of our achievement over the nine months following our return to Mauritius.

Now that the project is completed, may I recognise and appreciate the motivation, help, encouragement and freedom of action given by Raj H Prayag PDSM, President of IEM, to the Team Leader of the Working Group on Engineering Accreditation and to the Team, to do whatever it would take to put in a winning application and thereafter implementing it.

Our Project has been executed within the contractual target completion time and budget, with every activity being executed in a clockwork manner. For the success of this venture, I am grateful to my colleagues of the Working Group, especially (Dr) Andre Chan Chim Yuk, Jayesh Desai, Donald Dhondee, Deven Daliah, Raj Prayag himself, and to Ghunsyam Parsan who served as member of the Group for some time, for their dedication to the cause of the profession, and their unflinching support with the project formulation and execution. I must also recognise here the support Council of IEM, and particular, of the IEM Secretary, Aboo Permamode, who kept the IEM website updated almost daily with news of the Project, and Abdel Khoodaruth, the IEM Treasurer, for his meticulous handling and recording of the Project Expenditure; also, very much around were Project Secretary Mrs Lebon and Profive staffer Jhyoti Daliah for administrative and secretarial support.

I have not, and cannot, forget to thank the Royal Academy of Engineering which made it possible for IEM to realise this project with its significant grant; I must include the Academy Programme Manager for GCRF Africa Catalyst Ms Louise Olofsson and her colleagues for help and guidance offered to us all the way. I must also thank our UK Partner and its CEO Petter Matthews, who obtained for us the services of the distinguished Professor Barry G Clarke of Leeds University for the Conference and Professors Sean Wellington and Andrew C Downton, respectively Chair and member of IET Accreditation Committee to take us through the accreditation procedures.

Due acknowledgement has been given in Chapter 7 to the above named and others who in one way or other have contributed to the smooth running of the project.

A special thank is due to the President of the Aeronautical Society in Mauritius, Captain Richard Twomey FRAeS, FAeSM, firstly, for having made it possible for Prof Chris Atkin FRAeS, CEng, then President of Royal Aeronautical Society, to honour the IEM Project Launch on 23 January 2017 with his presence and address the audience, and secondly for spontaneously agreeing to collaborate with IEM on this project. The inaugural launch was honoured with an address by the President of the Republic Dr (Mrs) Ameenah Gurib-Fakim to whom both IEM and the Working Group are grateful.

**21 August 2017**

# Summary

This Report covers all the ins and outs of the Project on Building Engineering Capacity through Accreditation of Engineering Degree Programmes in a sufficiently detailed manner to tell the readers how the Working Group proceeded to put in its application for a grant from the Royal Academy of Engineering, what were its short term and long term objectives, which included spreading awareness about accreditation and creating an initial capacity that we believe was necessary before firmly establishing an accreditation system, thereby offering to Higher Educational Institutions a local address for accreditation.

The Report has also gone to a fair length to relate the many initiatives regarding the academic standard of an engineering degree in the UK post 1965, so our readers can appreciate that IEM did place Mauritius at par with UK in 1965, but could not do more when we became independent. The Report has nevertheless brought out that there were efforts made. The Working Group has set the records right by bringing out the previous initiatives by IEM, jointly with CRPE, mostly unknown to outsiders and vaguely recalled by insiders, which were aimed at enhancing the academic standard of engineering degrees and the status of the profession. The Report just highlights that in 2017 the profession is still regulated by a 1967 law.

The Report goes to some depth in its explanation of issues connected with the academic standard of engineering degree programmes for entry into professional engineering practice, including an explanation of accreditation, its implications for stakeholders and the many known and perceived benefits, without going into the complexities of accreditation standards and procedures. Again, the Report has explained the interest in Washington Accord and the International Engineering Alliance, without going into its Rules and Procedures, including the Graduate Attributes, which have become the core of the Programme Objectives adopted by all members of the Washington Accord community of organisations. The Report has not gone into the accreditation of programmes satisfying the Sydney Accord for Technologists and the Dublin Accord for Engineering Technicians.

The Working Group also decided to bring up, in this Report, the various bits and pieces of the early history of the Institution as recorded in previous editions of the Journal of IEM or still vivid in the memory of those who took over from the founders.

A fairly comprehensive set of documents relating to this project have been included in the form of Annexes, some of them stand on their own without a link to the Report, but explicit as to their intent and purpose.

Readers will find a Photo Gallery with pictures giving a fair view of the who's who involved in the delivery of the project.

***General Acknowledgements and Copyright***

IEM and the Working Group acknowledge utilising of accreditation related information published from Washington Accord community of organisations as well as other international stakeholders in engineering education, training, professional development or employment of engineers. Specific authorisation was obtained from the Engineering Council (UK), Engineering Council of South Africa, Institution of Engineers Singapore, Institution of Engineers New Zealand and the International Engineering Alliance. Sources and/or authors have been duly named. No specific authority from IEM will be necessary for any information from such sources. IEM authorises reproduction of use of information contained in this Report subject to the source being acknowledged.

Second Edition September 2017

Note: A limited number of prints were produced for the purpose of the launch of this Report on 13th September 2017. This edition has edited for improved readability and removal of typograpgical errors.

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## 1.0 A matter of academic standard for an engineering degree

### 1.1 Is there such a thing as a satisfactory standard suitable for entry into practice of professional engineering?

Mauritius had its first Tertiary Educational Institution, the University of Mauritius, in 1965; the latter established a Faculty of Engineering (then called the School of Industrial Technology) in 1968, and the first undergraduate engineering programmes were offered in 1978. Three years later the Faculty delivered the first batch of engineering graduates. An examination of the 2011 Roll of Council of Registered Professional Engineers (CRPE) shows Mr Ahmad Futloo as the first Registrant from the University of Mauritius at Serial No 337, registered on 7th February 1983. The CRPE Roll of 1995 show there were 3 other Mauritian engineering graduates who were registered on the same day (7th February 1983): Jadoonanun Mahadnac, Dorsamy Caderassen, and Uteeme Ahmad Fouad, and four others registered later that year. The serial No 337 indicates that at least 336 persons, who did their studies overseas, were registered before that. The CRPE Roll of Registered Engineers shows Mr Shad Mukhlall Adjodah being registered on 27 December 1966 with Serial No 1 on 27 December 1966 and 8 other persons were registered on same day. However, the 40th Anniversary Journal of the Institution of Engineers Mauritius of 1988 shows earlier registrations. Mr P.F. Robert Vigier de la Tour was registered on 8th December 1966; three other engineers were registered on the 15 December, and 6 others, including Roland Desmarais were registered on 15th December; thus, a total of 24 were registered in 1966 under Ordinance No 49 of 1965, when there was no legal requirement for prior experience.

It is a major disappointment to think that during the last fifty years the CRPE Roll has issued less than 1500 registrations. Surely there must be many “engineers” around practising illegally or doing non-engineering routines. Certainly, there were engineers before that milestone, but a narration of their stories is outside the scope of the present project. Interested readers would wish to read A. Kauppaymuthoo’s articles in the 1948-1888 (40th Anniversary) Edition and the 50th Anniversary Edition of the Journal of the Institution of Engineers which give an insight into engineering in Mauritius, since the days of the Dutch.

As to the question in the heading, the University of Mauritius (UoM) or the other Higher Educational Institutions (HEIs) would be better qualified to elaborate upon how they proceed to ensure that the academic standard they deliver in engineering, is of a reasonable standard compared to what highly reputed Universities deliver. UoM makes use of external examiners and has in place quality assurance mechanisms and arrangements through collaborative arrangements with one or more external Universities. In Mauritius, the HEIs will rely on feedback from the industry, and from alumni to review their programmes if they deem fit, but most importantly they will look to what consideration the Council of Registered Professional Engineers gives to the graduates who apply for registration, initially upon graduation and then two years later, when the applicants come for registration and are assessed for their competence. The CRPE assessment does pick up some weaknesses, especially if the applicants have not had a sound academic grounding in mathematics,

principles of engineering and depth of their engineering knowledge or if they fail to impress the Assessors as to their ability to undertake design or solve complex engineering problems or display ignorance about other things that the assessors would expect them to be knowledgeable about.

### 1.2 Everything seems to be fine, so what's IEM's problem?

Will it make sense, if we were to say the problem is that it is not IEM's own problem, but a growing concern of the engineering profession, to which IEM has become sensitive. To understand this statement, one has to go back to 1948, when 12 engineers got together and, presumably, after some discussions about the qualifications of people who were practising engineering, decided that they had to do something about it and, as a first step, decided to create an association of engineers which would group all those who could be identified as professional engineers. Thus, the Professional Engineers Association of Mauritius was born on 26 February 1948 to represent the engineering profession and to provide a forum for all engineers to come together for the advancement of the engineering profession, irrespective of the engineering disciplines in which they specialised or practised. They had set themselves the following objectives: to foster engineering science and its application in all engineering disciplines, ensure the highest standard of service in engineering, and improve the status and safeguard the interests of the engineering profession.

### 1.3 Ensuring the highest standard of service in engineering, and improving the status and safeguarding the interests of the engineering profession

The above is therefore what the founder members had set out to do. These men who watched the professional engineering environment evolve and widen through the arrival of persons qualified in engineering from all parts of the world, and in respect of whose qualifications these great men, could be excused to entertain some doubts, especially, if the new entrants to the field came from countries not known at that time to be capable of producing engineering graduates (of a standard comparable to those from Europe or the North American continent), decided to do something about that; to develop a mechanism to filter out the doubtful and substandard "engineering degree" holders and protect society from them.

Their efforts culminated into the adoption by the Legislative Assembly — we were still a colony of her Majesty the British Sovereign at that time and therefore had no Parliament— of the Registered Council of Professional Engineers Ordinance on 21 December 1965. That Ordinance prescribed the holding of a degree in engineering from a University of the United Kingdom and Northern Ireland or holding the Corporate Membership of one of the three well known professional engineering institutions of the UK as a requisite for engaging in the practice of engineering; we refer to ICE, IMechE, and IEE (now the IET). Practice of engineering was defined by using four very simple words which said it all: *reporting on, advising on, designing*, *and the approval of design* of an inventory of whatever the founders thought was engineering in those days. The legislation also made it an offence for non-registered engineers to practice engineering. Of course, there were provisions for other qualifications, but these provisions placed the onus for assessing the standard of these

qualifications on the Council of Registered Professional Engineers to be appointed after the enactment of the legislation. That Ordinance was amended by the Legislative Assembly on 23 May 1967 to include a provision for graduates in engineering to submit evidence of two years of satisfactory post-graduation experience for registration. That was on the advice of the Secretary of State (UK Government). That was a sensible proposal, though skewed, since Corporate Membership of the specified Engineering Institutions (ICE, IMechE, and IEE) required at least four years of experience in those days with at least 2 years in a responsible position. However, the two years provision made Mauritian engineers eligible to the title of Professional Engineer with only two years of experience.

The amendment to the legislation provided for persons who were not registered to work under the direct supervision of registered engineers and prohibited them from getting involved in Final design or decisions making. The law makes it an offence to practice without registration, except that it does not apply to operating, executing, or supervising any works, as owner, contractor, superintendent, foreman, inspector or master. It makes it an offence (fine for first offenders, plus fine plus prison for repeat offenders) to be practising engineering without being registered. The law also clarifies that it does not affect the work or profession of architects, bacteriologists, chemists, mineralogists, physicists or surveyors.

### 1.4 Applying the Law

The implementation was not without its own lot of problems for graduates from Universities about whose academic standard the Council, or should we say the members on that Council, had a doubt. Engineering graduates from India thus found to their dismay that their degrees were not of standard acceptable to the Council and could only be registered after they did a Master's: L E Astruc, S Narain, R. Retnasamy, (all three from India) were registered on the basis of their UK Master's Degree, or in the case of R Retnasamy on the basis of his Diploma from Imperial College, London, since his Diploma from the world famous Indian Institute of Science Bangalore was not recognised. In the 1985 Journal of IEM, Roland Desmarais tells us that those members of the Professional Engineers Association who were not professional qualified were issued with a Certificate of authorisation to practice.

The amendment that was done to safeguard those who were already registered on the basis of the degree only, without experience, and who could possibly have been employed in some positions. This was an important consideration for the public sector where legal compliance is a priority. An associated problem that arose, again for those seeking employment within the public sector, was that engineering job specifications required the applicants to be registered; the requirement for registration was two years practice, which could only be obtained through employment as engineer, and the applicant for registration was not being told that his degree was in question. The case of J. Soobarah (graduating and returning to Mauritius immediately after the amendment was enacted) with a degree from India, and without a Master's Degree from UK, resulted in a period of soul searching for the CRPE, which was compelled to institute some form of assessment of the academic standard before summarily dismissing someone's qualification. Once the element of the academic standard was sorted out it made sense for the public sector to make appointments in a temporary capacity pending their eventual registration of the incumbents. A further problem that arose subsequently was that some "temporary" appointees were remaining

"temporary" for an unreasonable length of time, since registration was not automatic after two years. Council had meanwhile put in place a procedure for competence assessment and did not care if the applicant held a temporary appointment or not, and rightly so, with the temporary appointee being dismissed without possibility of appeal against his employer if he/she failed to obtain registration within the period of temporary appointment. The solution to that situation was the creation of a new category of employees designated as "Trainee Engineer" who are made to understand that so long as their status is "unregistered", neither their continuing as trainee nor appointment to an engineering position could be guaranteed. These days where employment scope is getting limited, no employment guarantee is offered to "Trainee Engineers", but at least they know that upon completion of their traineeship and if they clear the registration assessment, they will be entitled to call themselves Registered Professional Engineer of Mauritius, use the designation RPEM, and search for jobs.

## 1.5 Recalling History

### *(i) The passage of a Private members' Bill in the legislative Assembly*

Having explained what we set out to explain in paragraph 1.2, it is just proper that the story be completed.

We understand from an input into the IEM Journal of 1985 by Roland Desmarais O.B.E CEng FIEE FIEM, several times Past President of the Institution and whose picture stands proudly in the Lecture Room of IEM House at Corner Hitchcock and Ollier Avenues at Quatre Bornes (Mauritius), and who was a long serving General Manager of the Central Electricity Board, that it was Hon J R Rey, Second Member for Moka who introduced the Professional Engineers Bill, as a Private Member's Bill, through the Legislative Assembly on 26 October 1965. During the Second Reading of the Bill he reportedly said "*Sir, the Professional Engineers' Bill is strictly limited to the professional engineers. This group of men considers it necessary to safeguard their professional interest and also the interest of the public. They consider that their association should be given legal status and they have therefore decided to constitute themselves into an association known as the Association of Professional Engineers of Mauritius. They also wish to have the qualifications required to form part of their association to be defined …*".

The Bill was referred to a Select Committee of the House, which favoured a separate body for registration of Engineers. The revised Bill was passed on 21 December 1965 and gazetted on 23 December 1965 as the Registered Professional Engineers Council Ordinance (No 49 of 1965), and became effective on 1 July 1966.

The amendment referred to in paragraph 1.3 was passed in the legislative Assembly on 23 May 1967, enacted as ordinance No 9 of 1967 on 24th May and published in the gazette on 27th May 1967.

### *(ii) Founding of IEM*

As regards the association itself, it was created on 26 February 1948, by a group of 12 who called it "The Engineers Association of Mauritius". They were: Messrs R. Bérenger, Roland

Desmarais, J.L. Nairac, Georges Pitot, Georges Taylor, Xavier Koenig, Serge Staub, Maurice Paturau, André Rey, Marcel de Nanclas, Alfred Leclezio, and Raymond Rey. An Editorial Committee input into the IEM Journal commemorating the holding of the Commonwealth Engineers Council Meeting in Mauritius (on 13-18 September 1991) tells us that the meeting was also attended by Professor Thornton White and Hon Raymond Hein, as the Legal Adviser to the Association. The Engineers Association of Mauritius changed its name to "The Professional Engineers Association of Mauritius during a Special General Meeting held on 28 January 1965. Thirteen years later, on 1 Dec 1978, the association was restructured and adopted a new name "The Institution of Engineers Mauritius", at a meeting held at Carri Poulé in Port Louis attended by 55 members (against a quorum of 40). The changes to the rules and name were approved by the Registrar of Associations on 19 January 1979. The Constitution was again amended by a Special General Meeting held on 15 April 1993; the amendments were approved by the O.I.C Registry of Associations on 5 October 1993. To complete this record, we should also point out that the 1948 IEM Council comprised Raymond Berenger (President), Alfred Leclezio (Vice President), J. J. Raymond Rey (Secretary), Roland Desmarais (Treasurer), and George Taylor, Xavier Koenig, Maurice Paturau, and Serge Staub as members. Writing in the 1985 Edition of the IEM Journal, Roland Desmarais says that the original draft Constitution was amended and Rules approved at the first AGM of the Association held in 1953 at the Mauritius Institute, Port Louis.

### 1.6 The UK Degree in Engineering in 1965

Mauritius adopted the UK Degree (of 1965) as its standard for entry in the practice of engineering. Readers need to know that while we stayed put with that standard, which is legally the standard today, UK itself has seen very significant developments, reviewing its standard for registration as Chartered Engineer not once but several times.
However, before going over those developments it is pertinent to take a quick look at what influences the academic standard of an engineering degree and how different stakeholders assess its standard. This issue is dealt with in paragraph 1.9

### 1.7 Factors influencing the Standard of Engineering Graduates.

In 1965, there was no Washington Accord. It is a standard that developed following a meeting, held in 1989 in Washington, of the professional engineering bodies of the UK (Engineering Council), Ireland (Institution of Engineers Ireland-now Engineers Ireland), the USA (the Accreditation Board of Engineering and Technology – ABET), the Canadian Council of Professional Engineers, now Engineers Canada), the Institution of Engineers Australia, now Engineers Australia) and the Institution of Engineers New Zealand). The Washington Accord standard which took shape a few years after has come to affect in a very significant manner our thinking on the academic standard of the engineering degree. One can surmise that prior to a consensus being reached as to a suitable standard, there must have been and perhaps still exist disparities in the academic standard across Universities. Can the cause of disparity be found in the following?

- Society's influence on the Mission and Vision of the Higher Educational Institutions;
- Industry's influence on the curriculum;
- The influence of those directly concerned with the design curriculum,
  - their assessment of the needs of the industry or of the demand for graduates with the specialisation delivered by the Institution;

- the manner in which Society's influence comes to bear on the choice of subjects or modules to be offered and taught;
- the duration of the programme of studies, including the total teacher-student contact hours.

- The educational standard of the entrants to the courses;
- The engineering exposure and competence of those staff tasked with responsibility for imparting the knowledge to the students;
- The financial resources over which the University has command, and the scope and quality of facilities available at the University to permit greater exposure of the students to current and advanced technology;
- The actual teaching methodology;
- The learning environment;
- The University's own assessment methods and its assessment of the quality of its graduates;
- The extent to which the Institution is concerned with, or guided by, assessment made by external bodies, (associations of professional engineers, or licensing agencies)
- The assessment, if any done, by the University of the usefulness of their graduates, particularly, to employers, and to society in general, and how it reacts to this assessment.

## 1.8 The Perception of Uneven and Low Standard.

Professional Engineering Bodies, including IEM, have always been sensitive to reports about the performance of engineers. Frequently such reports would come from people who had certain expectations from engineers and but were disappointed by not seeing the expected attributes in them. This is best illustrated by an examination of how the following stakeholders assess the engineer: the external bodies (CRPE), the Professional Engineering Associations, the Employers, and Society.

### *1.8.1. Assessment by the Regulatory body, e.g. the CRPE in Mauritius.*

The 1967 Act setting up the Council of Registered Professional Engineers made no provision giving authority to the Council to subject any applicant to a written form of assessment. The Council has not so far stretched the meaning of the word "approve" to mean "***conduct such assessment as Council may deem fit, including through written examination, towards determining if the applicant's qualification is substantially equivalent to that of a UK Degree in engineering***". It had nevertheless decided that it would make its own assessment (which it does in two stages). The Supreme Court has rejected appeals of applicants who had questioned the right of Council to assess them. It is quite probable that their Lordships would have also approved of Council's setting written examination. It is not within our present terms to embark on that aspect. The Medics have done it.
The general view is that Council could contemplate such a course of action if an appropriate empowering provision were to be inserted in the law. We recognise that CRPE has a satisfactory system in place, at least for its purposes, considering that it does not undertake accreditation of engineering degree programmes. It has published criteria, known to both the potential applicants and the assessors, against which an applicant's knowledge, understanding, skills and abilities are assessed. The applicants knows right from the start

what to expect during their encounter with the CRPE Interviewing Panels, provided they had taken the trouble to inform themselves about the process.

In such assessments, based on the professional review or interview of applicants, the outcome can depend upon:

- on the assessment criteria set, and follow on procedures, if any,
- the interpretation of those criteria by the examiners,
- the manner in which the assessment is carried out,
- the academic and psychological preparation of the candidates for the interview,
- the quality of the communications between interviewers and interviewees: are the questions sufficiently clear and articulated?
- the quality of the responses of the interviewees to the questions set,
- the assessment by the examiners of the degree and if the interviewees have come up to their expectations, and finally,
- the consideration that the examiners are prepared to give to those who do not meet the standard set.

### *1.8.2 Assessment by an Association of Professional Engineers.*

Professional Engineering Bodies these days are very open to admit members. One may be tempted to conclude that it is the annual membership subscription that they are after. We must not fool ourselves however. Associations of learned professionals in engineering, whether in the UK, Mauritius or elsewhere, while being "open" to admit new engineers in their fold, generally operate an internal classification which clearly demarcates between members holding qualifications above and below a standard, as well as the level of responsibilities they hold or have held in the course of their practice. Before the advent of the accredited degree, the UK Engineering bodies would require applicants for membership to sit their own admission examinations or hold degree from Universities that they have approved. The paper will examine this aspect in greater depth in later sections.

### *1.8.3 Assessment by Employers*

When it comes to employers, the latter expect engineers to do precisely what the engineers are reasonably expected to do, namely:

- carry out the engineering design of their buildings, products, etc.
- Display their innovative skills towards giving their employers an edge over competitors.
- optimise their employer's returns on their investment in technical facilities
- boost up their business by improving the quality of goods manufactured or technical services offered.
- Keep an eye on engineering services offered by their competitors so as be the first to offer such services.
- provide the customer after sales service and support that gives satisfaction to customers, and make them come back for more but not with complaints.
- advise their employers on technological advances in which they can invest, to widen their market or improve productivity and provide better service.
- conduct their business in such a manner as not to leave any door open for Murphy (of Murphy's Law) to play havoc with their business, and get them entangled in

disputes with customers, financial problems, bad publicity, or even prolonged disputes and litigations in and out of courts.

- and equally important, to eliminate all plant and machinery down time, cut down the maintenance costs and run their business efficiently.
- and, against the backdrop of legislation on occupational health and safety, fire protection, environmental protection and remediation, other industrial laws, not only to advise the employers on implications and solutions but to institute measures to safeguard the employer's business.

### *1.8.4 Assessment by Society*

Society has a very simple yard stick. It evaluates engineers by:

- the state of the infrastructure, including roads, government buildings, etc.;
- the quality of the transportation system it utilises, i.e. the regularity of the service and the comfort or discomfort to which travellers are subjected to, when going over pot-holes, waiting times, as well as its cost to travellers and to the tax payers;
- the quality and cost of public utilities at its disposal;
- the nations' preparedness against calamities, and society's strong view that engineers are the root cause of their misery;
- the costs of building homes, or offices, and their maintenance.
- To this non-exhaustive list, one should add products and goods which incorporate the latest technologies whose maintenance seem to be beyond the engineer's capacity.
- Their assessment of the extent to which engineers have improved their quality of life.

The Engineers would like to be in the news but more often than not they do get in the news only when some technological feature associated with their professional life becomes a subject of society's anger, such as the collapse of a building, or bridge or any structure, failure of a utility which the public considers essential, especially when the failure occurs when it is required the most, hopefully without catastrophic consequences; inability to deal with events like land-slides, bringing their own lot of problems like road closures or other inconveniences to the public, etc.

## 1.9 The Academic standard of the Engineering Degree in the UK (in 1965)

The Mauritius legislation regulating engineering practice is still the 1967 Act, originating as Ordinance No 49 of 1965. It is our intention to show how the "standard" shifted elsewhere while we were still priding ourselves on our practising the 1965 UK Standard. We must recognise that some improvement has been brought about through the procedures of CRPE.

In the UK, around that time, thirteen Institutions of Engineering got together and constituted themselves into the Council of Engineering Institutions. Prior to that, each institution had its own admission requirements and they were not all of a University Degree standard. Members who passed the Institutions' own examination would, after a few years of experience, be admitted to, what the Institutions termed Corporate Membership Grade; that grade was associated with eligibility to the designation of Chartered Engineer. So, when the Institutions decided of a common accord to cease holding their own

examinations, and agreed to common examinations being carried out by the Council of Engineering Institutions, it was certainly a step towards getting all institutions to practice the same agreed academic standard.

At that time, some Institutions had what was called the Associate Membership or Graduateship Examination; some would accept the Higher National Diploma in Engineering (in discipline relevant to the Institution's specialisation), or even, for some Institutions, the Higher National Certificate with or without topping up subjects.

It can be appreciated that the CRPE (Council of Registered Professional Engineers) in its interpretation of the Corporate Membership provision, which permitted it to recognised alternatively Corporate membership of any other Institution or Society, could very well face applicants who are members of institutions practising varying standards.

When the Council of Engineering Institution (CEI) took over the responsibility for setting the standard for the Chartered Engineer for 1966/67 onwards, the requirements were as follows for registration as Chartered Engineer:

(i) an academic education represented by not lesser than a pass in engineering at degree level
(ii) a well-defined type of training for the profession
(iii) a period of responsible experience in the profession.

CEI recognised that the member institutions differed in their training and other experience requirements for admission into their Corporate Membership, and decided to accept the same, provided they occupied not less than 3 Years.

In 1966, in a publication referred to as **Statement No1**, the CEI wrote:
Quote: “The increasing demands made upon Professional Engineers leave the Council in no doubt that the intellectual capacity of the professional engineer of the future must not be less than exemplified by the ability to obtain a University Degree. The Council has therefore decided to set the standard for the academic qualification of future Chartered Engineers at the level of degrees in engineering at present awarded by Universities in the United Kingdom." Unquote

It is significant that Council of Registered Professional Engineers Mauritius adopted an identical stand when interpreting the educational qualifications of applicants, namely, the qualifications that Council will recognise has to be of a standard that gives eligibility to Chartered Engineer status (of a UK Professional Body). That position was adopted at the Supreme Court by none other than Mr Raj H. Prayag who was then the Chairman of CRPE. CRPE has maintained that stand till now, except that in the UK, the Engineering Council now prescribes an accredited 4-year degree. Towards 2005, CRPE has shifted to the 4-year degree to maintain consistency in its stand.

### 1.10 Enter the CEI

CEI started its examinations in 1965/66, but Institutions which had already registered candidates for their own examinations were allowed to continue until 1971 when they would conduct their last examinations. After 1971, candidates who had not cleared the

Institutions' examinations and who lacked one or two modules were offered an opportunity to sit a Special Academic Test, which comprised two papers, for a limited period up to 1974. As a matter of interest, we state hereunder what the CEI had proposed as its own alternative to a University Degree in Engineering:

- An initial academic attainment of the level required for entry into a University degree programme, including a knowledge of Engineering Drawing and English language.
- Passing of the CEI Part 1 and Part 2 examinations.

***Part 1***

- Properties of materials
- Applied thermodynamics
- Fluid Mechanics
- Applied Mechanics
- Applied Electricity
- Mathematics

***Part 2***

At the Part-2 level, the examination consisted of 6 Papers to be taken, including one Compulsory paper " The Engineer in Society", which would encompass topics such as professional practice; structure, finance, and economics of industry; industrial administration and sociology.

As regards the 5 other papers, candidates had a choice from a wide range of "A" and "B" papers. The "B" papers being more specialised. Candidates had to pass in at least two "A" papers, and 3 chosen from either "A" or "B" papers.

Of further interest may we add that there was a setback for the highly esteemed Higher National Certificate and Higher National Diploma for their technological content. The latter was accepted for a limited concessionary period (up to 1971), then ceased to give exemption from Part 2 of the CEI Examinations, whereas HNC ceased to give exemption altogether. The Engineering Council advised good Ordinary National Certificate holders aspiring to become Chartered Engineers to change course to more acceptable alternatives.

***Indian University Degrees***

Holders of Indian University qualifications (other than those of the Indian Institutes of Technology) ceased to obtain exemption from Part 2 of the CEI Examinations, so candidates with Indian University Degrees (except from IITs) aspiring to Chartered Engineer status faced the 6 CEI Part 2 examinations.

**1.11 Other UK initiatives which impacted upon the academic standard**

1.11.1 The Feilden Report (1963) had linked the failing British industrial exports to lack of designing skills. The following recommendations are quoted from **UK House of Commons debate (HC Deb 19 March 1965 vol 708 cc1719-36)**, from the speech of The Joint Parliamentary Secretary to the Ministry of Labour (Mr. Richard Marsh), quoting from the Feilden Report on Engineering Design:

(i) “that experiments in methods of teaching design at undergraduate and post-graduate levels in universities and colleges as well as in industry should be encouraged.”
(ii) “That the practical training of professional engineers should be reorganised to include more emphasis on modern production methods, works organisation, costs and the influence of design; and to bring about a closer integration of the practical and academic elements of education.”

1.11.2 The Confederation of the British Industry (1976) commented that the importance of design was insufficiently appreciated in universities.

1.11.3 UK Government established a Design Council in 1972, following the recommendation contained in an Engineering Council document (**the Conway Report**), wherein Conway had proposed a Council of Engineering Design.

1.11.4 A Report by A.E Moulton (**the Moulton Report**) on "***Engineering Education Design***" published (in 1976) contained the following guidance regarding the teaching of design:
Quote: "… Engineering should be taught in the context of design so that design is a continuous thread running through the teaching of undergraduate engineering. Courses should expose the student to a proper mixture of analysis, synthesis, conceptual design and other wider issues.” Unquote

1.11.5 Royal Academy of Engineering initiated a scheme "***the Visiting Professorship Scheme***" under which it appointed Senior Designers from industry as Royal Academy Visiting Professors in the Principles of Design to assist Universities.

1.11.6 In 1976, the British Government responded to the concern of the ailing British Industry to the effect that the UK Universities were not producing engineering graduates who could deliver to the industries’ requirements. A “***Commission of Inquiry into the Engineering Profession***” was instituted under Sir Montague Finniston, with the following terms of reference:

"To review for the manufacturing industry and in the light of national economic needs:
(i) the requirements of the British Industry for professional and technician engineers, the extent to which their needs are being met and the use made of engineers in the industry.
(ii) the role of engineering institutions in relation to the education and qualification of engineers at professional and technician level.
(iii) the advantages and disadvantages of statutory registration and licensing of engineers in the UK;
(iv) the arrangements in other major industrial countries, particularly in the EEC for handling these problems, having regard to relevant comparative studies and to make recommendations."

Colin R Chapman and Jack Levy, writing in an Engineering Council publication "***An Engine for Change: A Chronicle of the Engineering Council***", observe that of the 80 recommendations contained in the **Finniston Report** (published in 1980), the majority were directed towards Government and employers. A few were concerned with improvement to school education and the "formation" of engineers. However, there was one recommendation on the setting up of an Engineering Authority, which would have taken up responsibility for statutory body

for licensing. The Chapman and Levy "Chronicle" is on ECUK website: <www.engc.org.uk> Link: documents/, document: ec_chronicle.pdf
The ***Finniston Inquiry Report*** as the Commission's report was called, caused the engineering profession to undergo further restructure: the CEI was replaced by the Engineering Council.

**The Revised Standard (in 1990)**

***1.11.7 Publication of Standards and Routes to Registration SARTOR 1 (1984):***

Engineering Council (UK) specified certain requisites for accrediting engineering degree programmes; these included a requirement for teaching of engineering design to be included in the curriculum, among others, viz. manufacturing, reliability, maintainability, and Quality Assurance.

***1.11.8 Publication of SARTOR 2 (1990):***

Candidates for registration (as Chartered Engineers) would be required to satisfy the following criteria:

(i) Hold an ***accredited*** BEng Hons. Degree, ***which should include Design studies***, should be part of study programme.
(ii) two years Structured Training or 4 years' experience in-lieu, plus
(iii) another two years responsible experience starting after the previous criteria had been satisfied.
(iv) Candidates should be at least 25 years of age.

The academic standard for Chartered Engineers was reviewed upwards. The new requirement was a First Class Honours, or Second Class Upper in Engineering. Graduates who were less fortunate and secured a bare pass or a Lower Second Division in an engineering course found the road to Chartered Engineer closed to them. Instead, they could access the Incorporated Engineer Class of membership. The Incorporated Engineers could still make it to Chartered Engineer rank, but it required a very special effort from them. Readers would wish to know that the Class of Incorporated Engineers is referred to as Associate Engineer in Ireland, and are designated as Technologists under Sydney Accord, another forum within the International Engineering Alliance, besides Washington Accord in which we have special interest.

***1.11.9 (a) Publication of SARTOR 3 (1997):***

ECUK enhanced the overall standard. The revised standards concerned the education, training and professional development of the Chartered Engineer (CEng), Incorporated Engineer (IEng), and Engineering Technician (EngTech). The revised criteria imposed on ***every person desiring registration with the ECUK to be a member of one of the bodies*** licensed by ECUK, i.e., one of the engineering institutions or societies recognised by the ECUK, plus, he/she requires to submit evidence of:

(i) A satisfactory educational base, preferably by means of an accredited course

(ii) An Initial Professional Development (IPD) preferably by means of an accredited programme involving the building of competence and professional breadth inclusive of the business aspects of engineering, and
(iii) A Professional Review - an assessment of competence and commitment

Of relevance and direct interest to CRPE Council were the specifications of the Educational Base, for Chartered Engineer which were:

Either: a 4-year M.Eng accredited Degree,
Or : a 3-Year accredited B.Eng (Hons) Degree, supplemented by one further year of study, referred to as the "***matching section***".

Other requirements concerned the graduates Initial Professional Development and the Professional Review that applicants for registration have to undergo before being accepted for registration as Chartered Engineer. There were also new requirements for Incorporated Engineer and Engineering Technician Registration.

As regards the ***Matching Section*** concept, and alternative pathways, Engineering Council UK prescribed as follows:
Quote: "The Matching Section required by BEng (Hons) graduates to complete their educational base for Chartered Engineer must include the learning equivalent to one further academic year of study. The main aim is broadening to achieve equivalence with MEng graduates, both in foundation learning and specialist enhancement. There are a number of possibilities such as full or part-time post-graduate courses, distance tuition and work-based learning. Other pathways to Chartered Engineer registration also exist. These include progression from Incorporated Engineer and Engineering Technician registration, routes based on the achievement of Occupational Standards and a Mature Candidate Route". Unquote

### *1.11.9 (b) Why the changes (on the UK Scene):*

Engineering Council explained that the changes arose from the changed national and international circumstances, including:

- operation in a global market for goods and services, underlining the need for internationally recognised qualifications
- changes in the schools' curricula in mathematics and other subjects relevant to the needs of engineering
- change from a selective to a mass system of higher education and a consequent need for universities to provide courses of different types and levels
- doubt about the equivalence of output standards from different universities
- the increasing use of 'occupational standards' by employers

### *1.11.10 Lord Dearing Report (1997):*

The UK Engineering environment kept evolving, and saw another change in 1997. Government of UK had instituted yet another Commission of Inquiry, this time on ***Funding of Higher Educational Institutions,*** under Lord Dearing. The 1997 **Dearing Report** included a Recommendation which established a turning point in matters of educational programmes

in the UK (including engineering degree programmes). It shifted interest in the approach to higher education towards the "outcomes" of an educational programme, i.e. ***stakeholders were now interested in what is learnt, and learning how to learn, instead of what is taught***.
Specifically, it recommended that "institutions of higher education begin immediately to develop, for each programme they offer, a 'programme specification' which identifies potential stopping-off points and gives the intended outcomes of the programme in terms of:

- the knowledge and understanding that a student will be expected to have upon completion;
- key skills: communication, numeracy, the use of information technology and learning how to learn;
- cognitive skills, such as an understanding of methodologies or ability in critical analysis;
- subject specific skills, such as laboratory skills".

## 1.12 The evolution of "Output Standards"

### *1.12 (1) The Engineering Professors' Council*:

In 1997, EPC (the Engineering Professors Council) initiated a project to establish "output" standards for engineering graduates: that is, the desirable standard of engineering graduates upon completion of their degree. The results were published as a Standard defined in terms of

(a) Ability statements, which were applicable across a range of disciplines, and
(b) Exemplar benchmarks, specific for each engineering discipline.

The EPC Standard comprised of 26 ability statements, based on the procedures carried out by an engineer in solving an engineering problem and delivering the solution. In its Interim Report of the EPC Output Standards Project (copy of which was published on its website), EPC highlights, inter-alia:

(i) Engineering problem solving is an iterative task involving creativity and the application of knowledge and understanding.
(ii) An engineer needs to be able to identify and describe the problem that is to be solved: this is a process involving knowledge of existing engineering systems and the experience of the past.
(iii) The solution will have a specification with parameters that require evaluation: this in turn is a process that relies on the engineering skills of conceptualisation, determinable modelling and analytical representation.

EPC considered that the engineer will need to draw on other skills to deliver the specified solution: it will involve the verification of assumptions made in the design. EPC also highlighted an aspect that is picked up by professionals of all disciplines: ***possessing the necessary skills to evaluate own performance towards determining one's own learning and developmental needs.***

### *1.12 (2) The Quality Assurance Agency for Higher Education (QAA):*

The QAA was established in 1997 as an independent body funded by subscriptions from UK universities and colleges of higher education, including contracts with the main UK higher education funding bodies. Following the publication of the Dearing Report (1997) the QAA published its Standard "***Subject Benchmark Statement for Engineering" (QAA, 2000)***, which was intended for all first degrees in Engineering at honours or higher level. Given the presence of the EPC Standard, QAA then set up a Working Group on Compatibility to look into the compatibility of the QAA and EPC "***Output standards***". This Working Group concluded that they were compatible: the QAA statements were grouped under the descriptors of "knowledge and understanding", "intellectual skills", etc., whereas the EPC statements identified "abilities to" in relation to a model of the engineering process.

***1.12(3)The Engineering Council:***

In 2003 the Engineering Council (ECUK) came up with its own "Output Standards" known as ***the UK Standard for Professional Engineering Competence (UK-SPEC***). Once again, the QAA was approached by the Engineering Council UK and the Engineering Professors Council to consider the possibility of aligning the three "Standards". QAA decided to retain the Engineering Council's UK-SPEC Standard. QAA had concluded that that ECUK had "adopted the general model of the QAA Benchmark while incorporating thinking and insights developed through EPC's work".

**1.13 What has changed?**

1.13 (1) One major change is in the outlook of accreditation and licensing bodies towards the engineering degree programmes. Emphasis has shifted from what the engineering graduates have studied, to what knowledge and skills the graduates have acquired and can demonstrate on graduation from such study programmes. Organisations concerned with the "recognition" of engineering degrees, for the purpose of "licensing" the holders to practice engineering, now wish to ensure that the graduate in engineering has acquired sufficient and necessary knowledge for engaging in his/her practice, and and that the graduate actually demonstrates an ability to do certain prescribed tasks. This is unambiguously reflected by the use of the terms "***Output Standards", "Learning Outcomes***" or "***Ability Statements" or "Programme Outcomes***" or "***Graduate Attributes***" in the "policy statements", "standards", "accreditation framework", and other related documents prescribed or promulgated by major engineering bodies, as the capabilities that graduates from accredited programmes need to have.

1.13(2) It is noted that "Output Standards" include requirements for the graduate to demonstrate that, in addition to having engineering knowledge and skills and ability to work to high ethical standards, and recognise their responsibilities towards society in matters of protection of the environment, and society's health and safety, they should also have ability to operate within multi-disciplinary teams, and to demonstrate their knowledge and ability to manage engineering projects and do project appraisal. Equally relevant is the engineer's ability to communicate effectively with peers and society at large, and his/her capacity and commitment to undertake lifelong learning.

1.13(3) As regards the industry, employers need engineers who can be useful from day-one and whose competence keeps improving with time; these are the persons who will become

the drivers of their business. The engineers should be able to undertake design and innovation. Employers require their engineers to research possible solutions to their business "problems", i.e. solutions to problems or new products or improvements or upgrades of existing production lines, analysing the options on a cost /benefit analysis basis, and producing a positive impact on manufacture and marketing.

1.13(4) On the International Scene, organisations concerned with or responsible for Higher Education, Quality Assurance and Accreditation, along with Engineering Institutions, Association of National Engineering Institutions and the Regulatory Bodies of different countries and regions have been showing an increasing interest in the academic standard of the engineering degree, the quality of engineering education, the accreditation of engineering programmes, and the assessment of professional competence as well as the demonstrated professional competence of the engineer.

In this venture, they have been motivated by initiatives and/or directives to reach agreements on mutual recognition of qualifications and mobility of professionals by the various Governments, Authorities, Commissions, or Councils of the economic formations of which they form part. This interest has been manifested at national, regional and international conferences, seminars, workshops, and meetings. Numerous Mutual Recognition Agreements (MRA) have been signed between the engineering agencies. There have also surfaced quite a few "Agreements", "Accords", or "Declarations" signed between various participating Authorities and Agencies responsible for engineering education and practice, wherein signatories express their confidence in the engineering degree accreditation procedures and the academic and professional competence standards of other signatory(ies), after having undertaken mutual assessment of the qualifications, etc.

**1.14 Of special interest to the Working group on Engineering Accreditation set up by IEM is the Washington Accord.**

This is taken up in subsequent Chapters.

**End of Chapter One**

# Chapter Two: Accreditation – A Matter of Conviction

## 2.0 Mr. Raj H Prayag takes over as IEM President.

### 2.1 A cursory glance at the profession

Mr Raj H Prayag PDSM, CEng, who took over as President of the Institution of Engineers in 2016, is not new to the Institution. He is one of those who took over from the founder members and served as President of IEM for the first time in 1985, really not so long ago, but still 31 years back. Therefore, someone who could reasonably sense that something was amiss with the engineering profession in Mauritius, which had seemingly remained static, except for one visible change at the University where the Bachelor of Technology (BTech) degree programmes of 3 years-plus-Industrial attachment was converted into 4-year Bachelor of Engineering (BEng) programmes in 1998, and some years later the Council of Registered Professional Engineers Mauritius (CRPE) switched its recognition of engineering degree programmes from 3-year to 4-year degree programmes. IEM had also obtained registration as a Training Centre, which itself was very positive initiative.

There has been a lot of talk about enhancement of the standard of the profession and setting up of an Engineering Council of Mauritius. An Engineering Council of Mauritius Draft Bill was even floated by the Council of Registered Professional Engineers (CRPE), with active involvement of the IEM, as early as 2008. Therefore, on his coming back to IEM as its President in 2016, one could excuse his perception that things had not moved during his absence. The Engineering Profession the world over had been fully involved with accreditation of engineering degree programmes; it was known that a forum known as the Washington Accord had come up and had developed consensus on what could be considered an appropriate academic standard for entry into professional engineering practice. The fact that it was the standard that the professional engineering bodies of the Anglo-Saxon nations (the UK, Ireland, Canada, the USA, Australia and New Zealand) deemed appropriate should not be an issue: why should the rest of the world, or Mauritius for that matter, practice standards that do not match those standards or practice a standard that was perceived to be of lower academic and professional value.

IEM President knew that the Mauritian engineering practice was still regulated by the 1965/67 legislation. That was certainly not a matter to be proud of in 2016, by which time most of the countries in the world which had realised, many years back, that the fate of their industry and economy depended on the quality of engineers they produce, and had taken serious steps to change the situation, and were already engaged in further reforms. In Mauritius, the 2008 draft document, which intended to drive a change in legislation, had progressed to a 2016 version and there were signs that it was a no-go document. Meanwhile two other categories of professionals, the Architects and the Quantity Surveyors, had managed, in the case of architects, to update their legislation, and in the case of the QS to bring in legislation to safeguard their practice, and society.

### 2.2 So what was amiss with the engineering profession?

Something needed to be done, but where to start from?

It was evident that the legislation regulating Engineering practice should be amended to replace the existing clause on qualification by one that would refer to an academic standard

rather than to a degree from a University in the UK. Further, the phraseology providing for an alternative qualification to a UK Degree, viz. "***or a degree, diploma or certificate in Engineering from any other University, Technical College, Institution or Society approved by the Council as being of satisfaction standard***", could have led to almost any qualification being pushed under the nose of the Council. Fortunately, Council's stand that the UK Degree implied a reference to a degree giving eligibility to Chartered Engineer status, though not specifically mentioned in the text of the legislation, has remained unchallenged to this day. One of the former legal Counsels of the CRPE had once advised that CRPE should go by the analogy that a reference to "dogs, cats and other animals", cannot refer to birds or reptiles, but only to some sort of 4-legged creatures; the fact that the law refers to the UK Degree ahead of or any other degree, diploma, etc, implies that the "others" have to be of the same standard as the "UK Degree". Since these days the profession swears by the accredited degrees, i.e. accredited to an international standard, the legislation should therefore replace the UK Degree by such a standard.

Secondly, the reference to Corporate Membership of the UK Engineering Institutions in the legislation was certainly, in 1965, a matter of status and pride since that status gave eligibility to the reputed title of Chartered Engineer (CEng). This is no longer so, since the CEng registration lies with the Engineering Council and the membership of the Institutions do not necessarily equate to Chartered Engineer. As a matter of fact, many engineering institutions or societies have even dissociated the standard of their qualifications for admission to membership from those required for eligibility for registration as Chartered Engineer. Some institutions have even ceased making any reference to the word "Corporate" when describing their members.

Such references have to go, but the profession should still recognise the need to give consideration to persons registered as Chartered Engineers or holding a Professional Engineers' License from any one of the Washington Accord community as persons eligible for direct registration; as a consequence, the law could make provision for such persons to be directly registered for practice in Mauritius. The process of assessing the fitness of an engineer for upgrading or registering as a Chartered Engineer (with the Engineering Council UK) or Professional Engineer with other Washington Accord bodies, with or without additional written examination is designed to confirm that "fitness".

## 2.3 How to Proceed?

The solution is known, and in fact has been known for the last twenty years. What have we been waiting for? There is need to explain that a change in the legislation regulating practice has to be initiated by the Council of Registered Professional Engineers (the CRPE). The Institution of Engineers Mauritius and others can extend support or cooperation. As regards other stakeholders, they may not realise or recognise that something is wrong, and is affecting economic growth, and that "something" is the quality of engineers or engineering education. The availability of engineers from overseas "on tap" has perhaps contributed to the skewed vision of decision makers on the usefulness of Mauritian engineers in their policies.

## 2.4 Past Attempts

However, there is need to give due regard to the profession. It has made some serious efforts to improve its lot, as evidenced by the following initiatives, reproduced here for record, and to dispel the perception that it did nothing.

### *2.4.1 The first recorded attempt (Mr Raj Prayag- 1983)*

For the initiative of Raj Prayag, then IEM Representative on CRPE Council, we will quote from an article by Roland Desmarais OBE in the 1985 Edition of the IEM Journal "***Institution of Engineers Mauritius: Historical background***"
Quote: "During the fall of 1983, the Council of IEM was actively engaged in the screening of the proposed amendments to the Ordinance No 49 of 1965 which had been produced by a Working Committee set up by the CRPE on the initiative of Mr R H Prayag, IEM's representative on the CRPE. On 24th November 1983, a forum was organised to discuss the draft that had been circulated to all members. The considered view of the Institution was then submitted to the CRPE Council at a special meeting. It was then left to the Council of the CRPE to submit the final draft to the Crown Counsel's office of the GM for vetting purposes prior to seeking approval of the Ministry of Works and the Government". Unquote
No one among us appears to know where that draft ended up, though some of us have a vague recollection that it was a no go because the draft did not contain any provision on "Power of the Minister". One can argue that if that was so, then the CRPE members were guided by the spirit of the existing (1967) Act which contains no provision conferring power to the Minister.

### *2.4.2 Council of Registered Professional Engineers Amendment (draft) Bill 2008*

CRPE had put up for discussions a draft Council of Registered Professional Engineers Amendment Bill in 2008. This Draft was a proposal to amend the existing Act. It introduced new terminology and provided their accompanying definitions, included a revised definition for practice of engineering. It was rather bulky with very few Schedules. It had prescribed a Standard of Professional Engineering Competence (adapted on the UKSPEC-2003) to be satisfied by a degree in engineering to be accredited for practice of engineering, the establishment of a Board of Engineering Accreditation, as well as Guidelines for accreditation. It included revised provisions for registration of Engineers (RPEM), proposed registration of Licensed Professional Engineers (3 years post registration), Technologists, the Establishment of a Standard Advisory Board, etc.

### *2.4.3 Revised Version 2008*

Towards the end of 2008, a lighter draft (with much of text shifted into Schedules) made its way to the Ministry of Public Infrastructure, and was put in circulation in March 2009 as Engineering Council of Mauritius (draft) Bill 2009. IEM was invited to make its comments by the 2nd week of April 2009, deadline which was then extended subsequently to 24th April 2009. The following were the Salient Features of the 2008/9 version of the draft Bill.

(i) Setting up an Engineering Standard Advisory Board

(ii) Establishment of a Board of Engineering Accreditation
(iii) Establishment of a Standard of Professional Engineering Competence adapted on the UKSPEC 2003
(iv) Prescribing Guidelines for an Autonomous Accreditation Body
(v) Prescribing Accreditation Procedures
(vi) Amending the clause on registrable qualifications to introduce qualifications satisfying Council's standard and provide for Washington Standard and ENAEE standard to be acceptable alternatives.
(vii) Proposing the Registration of Technologists (comparable to the UK Incorporated Engineers/Washington Accord technologists.
(viii) Providing for Registration of Licensed Professional Engineers (from registered engineers with 3 years post registration experience)
(ix) Giving Guidance on nature of experience for Registration of Engineers
(x) Introduction of a requirement for CPD on same lines as overseas Institutions,

The above clearly demonstrates the intention of IEM/CRPE which was to usher an era of engineering accreditation through its provisions.

### *2.4.4 Version 2009*

Following discussions at meetings chaired by PAS MPI Mr. R Sonea, several clauses were amended, and the amended draft was renamed Engineering Council of Mauritius draft Bill 2009. IEM Newsletter of 30 April 2009 covered that draft fairly exhaustively. A Power Point Presentation was made to UOM engineering staff and students on 14 April 2009. Following discussions at the MPI, the draft was further amended to shift several provisions from the main text to Schedules, which then numbered 10 in all. A copy of the draft Bill was forwarded (by mail on 23 February 2010) to SLO with a fairly extensive introductory letter.

### *2.4.5 Version 2011*

The CRPE/IEM draft (2009) was not acceptable to the SLO, which advised that the Engineers Bill be modelled on the Architects' Act. MPI acted on that guidance and produced a new draft: the Engineering Council draft Bill 2011. This was discussed at an MPI meeting on 17th June 2011 with representatives of IEM, CRPE, MPI and Govt. Professional Engineers Association. The proposed draft was dismissed by the engineering profession as being non-practical for engineers because of widely different education, training and professional development that distinguished engineers from architects. MPI agreed to permit CRPE/IEM to review its text, but to try and maintain certain alignment as regards administrative provisions.

### *2.4.6 Version 2012*

An IEM sub-committee examined the MPI draft (2011) [modelled on Architects Act 2011] and after lengthy discussions and consultations, amended it to re-insert provisions regarding the academic standard for recognising engineering degrees, an Accreditation Framework (a Board and its Accreditation Standard, Guidelines and Procedures) and reintroduced certain provisions from the 2009 draft version which concerned the autonomy of the Engineering Accreditation Board. That was Draft Bill 2012 which IEM forwarded to MPI during the first week of November 2012.

### *2.4.7 Version 2014*

That draft was circulated by CRPE in May 2014. It retained proposals on the Accreditation Board, registration of Technologists, and licensing of professional Engineers, but made no reference to any specific standard other than referring to qualifications satisfying routes to registration published on the CRPE website. IEM considered that the failure to prescribe a known standard or specify equivalency to a known international standard was a major weakness of that draft.

### *2.4.8 Version 2016*

This version, which suggests a compulsion to accommodate the diverging views earlier received from TEC, the objections of the Government Engineers Union, and the views of the SLO, and perhaps the need to adopt a fast track, resulted in several compromises in the draft. Some amendments are of a nature that digressed from the spirit of the introductory (explanatory) memorandum, and therefore from specifying reference to a standard such as the Washington Accord or the ENAEE. It provided for accreditation by a committee under the Council. Some of the innovative elements of the 2008/2009 draft were still there, but they no longer made sense after the amendments were made to other provisions. There was no reference to a "standard" or to the applicable benchmark.

The proposal relating to Licensed Professional Engineers had been removed, but IEM should have no issue with this. It is perhaps more appropriate that IEM adopts the model of Institution of Engineers Singapore or that of the Institution of Engineers India, and establish a register of Professional Engineers on the basis of the criteria prescribed by the International Register of Professional Engineers. IEM would have for that matter to open this Register to ALL Engineers of Mauritius, irrespective of which institution they belong to provided they are affiliated to an institution or society. The provision relating to Registration of Technologists was also removed. IEM believes this issue may require a rethink, if the Engineering Council of Mauritius would wish to see itself in the same light as those overseas, for example the Engineering Council of South Africa.

## 2.5 Possible explanation for the fate of the various drafts.

Some of the reasons quoted occasionally to explain the difficulty faced by IEM and CRPE to have their way with the several draft versions have been enumerated hereunder.

(i) The absence of wider consultation and briefing sessions with all stakeholders, including the Tertiary Education Commission. The latter had reacted negatively to the proposal for establishing an Institutional Regime for accreditation of engineering degree programmes by an accreditation board to be set up under CRPE Act (or an eventual Engineering Council of Mauritius Act). TEC had a reason for its stand: the Tertiary Education Act was amended in 2005 to include "accreditation of programmes of studies" within its purview, leading TEC to view the initiatives of CRPE as infringement on its prerogatives. However, TEC was not averse to the Council setting down the standard and issuing the Guidelines, but preferred that the accreditation tasks be left to the Commission.

(ii) The Government Engineers' Union viewed several proposals as a threat to their career path, especially, the provision regarding the Professional Engineers License (after 5 years' experience), a requirement for CPD, and also objected to registration of Engineering Technologists by the proposed Engineering Council; their apprehension was that the provision concerning the Licensed Professional Engineers (requiring an assessment, three years after their initial registration) could be taken up by the Pay Research Bureau and inserted in the career path;

(iii) Many engineers expressed concern on composition of members on the Council and the Accreditation Board, and the mode of appointment, especially finding the phrase "appointed by the Minister" totally unacceptable;

(iv) Advice from State Law Office to model the Engineers Act on the new Architects Act which was passed by Parliament; With hindsight, it is regretted that the profession had no face to face opportunity with either the TEC or SLO to explain its intentions and the need to adopt the world-wide practices for regulating engineering practice, and

(v) ignorance of many from within the engineering community itself who questioned why the profession was embarking on accreditation.

## 2.6 What next?

IEM believes the proposal of CRPE was perhaps too ambitious. IEM had its share in that ambition. The draft document would have had a greater chance of success if it had limited itself to the changes necessary to overcome the problems associated with the reference standards (UK Degree and Corporate membership). Having examined some models of accreditation frameworks within the Washington Accord community, IEM considers that an IEM driven project on accreditation has a better chance of introducing such a regime in Mauritius for accreditation of engineering programmes. The options for IEM (and Mauritius) have been dealt in another Chapter.

Let it suffice here to say that IEM considers that CRPE must continue to discharge its role as the regulatory body, and to assist it in this function, IEM can play the role of the Accreditor. We are giving hereunder what we consider to be the implications in moving forward for CRPE, assuming that CRPE (or the future Engineering Council) still wishes to go in that direction:

(i) deciding on the standard of engineering degrees to be accepted:
Will it be an academic standard reflected by Washington Accord or the European Network for Accreditation of Engineering Education (the ENAEE) for the EUR-ACE(Master) label, i.e. European Accredited Engineer.

(ii) general standard of engineering degrees that Council will approve and recognise.
All Washington Accord organisations recognise the degrees accredited by each other, as from the date they are signatory members of Washington Accord.

(iii) Council's power to recognise degrees that are substantially equivalent to the Washington Accord Degrees
What process will it put in place? Will it continue with the present one?

(iv) the establishment of an autonomous Board of Engineering Accreditation (by any name) under the IEM.
If IEM takes over this function, as it has already stated, through an autonomous Engineering Accreditation Board, then will CRPE recognise any IEM's accreditation work, prior to IEM becoming a full member of Washington Accord.

(v) the delegation of authority to the IEM Engineering Accreditation Board (EAB), or to any other that may be established. How will CRPE have a regulatory overview?
CRPE should be a constituent member of IEM's EAB, and exercise its oversight through its representatives or nominees on the Board of the IEM's EAB, if it needs to have either an overview or a legal participation in the accreditation responsibility of the EAB, as obtains in Singapore, Malaysia, etc.

(vi) recognition of all degrees accredited by that autonomous agency.
This should be explicitly stated in any amendment or new legislation that CRPE contemplates.

(vi) providing for direct registration to engineers already holding registration as Chartered Engineer or Professional Engineer, where such is granted on the basis of a degree accredited to its prescribed standard or otherwise.
This we believe should be a reasonable and acceptable provision to replace the "Corporate membership" provision currently in the CRPE Act 1967.

(viii) Effective date & Transitional arrangements.
IEM sees no possibility of becoming a signatory member before another 5 years from today, but the preliminaries and preparations for admission to Washington Accord, and thereafter seeking upgrading to full member, will require IEM EAB to conduct quite a few accreditations to Washington Accord standard. Therefore in additional to any transitional arrangements that CRPE may contemplate in an eventual amendment to the CRPE Act 1967, there should be a provision for recognition of any accreditation done by IEM/EAB, to the Washington Accord standard.

## 2.7 What Options for IEM?

For IEM, there is no turning back, it has to plough on its way to establishing an Institutional regime for Accreditation of Engineering Education.

**End of Chapter Two**

# Chapter Three: IEM resolves to establish an Engineering Accreditation Framework.

## 3.0 IEM's Conviction

### 3.1 IEM Steps in

On taking stock of the unsuccessful attempts made at the level of the Council of Registered Professional Engineer Mauritius, even with IEM's support and contribution, IEM President recognised and realised that a change of course was necessary, a course where the obstacles faced previously could be by-passed but with the support of the Educational Authorities. It was his resolve that IEM should step in boldly and announce itself as the driver of the engineering accreditation project. He was visibly determined to catch up with lost time considering that his professional priorities put him at a distance from IEM activities since his last Presidency of IEM in 1993.

President Raj H Prayag took few initiatives that were so significant and relevant to what was to come that it has been deemed fit to record these in this Chapter.

### 3.2 First Contacts

A scrutiny of e-mail exchanges between the members who formed part of his "Working Group" show that on Monday June 13th, 2016, the President mailed out a request to two IEM Past Presidents (Anand Kinnoo and Jagadish Soobarah) for a meeting at IEM House on Thursday (16th June) or Friday (17th) to discuss "the way forward to position IEM to assume the role of ACCREDITATOR in the context of the Engineers Bill, for the WASHINGTON ACCORD".

That meeting was held on Friday 17th June. It was followed by another mail on 27 June 2016 convening a larger group to a meeting on 1st July, this time announcing that "I am setting up an open ended informal group to propose the way forward to prepare IEM to play the role of accreditor in the Context of Washington Accord under the proposed Engineers Bill" he had expressed the wish that the group would "be able to assist IEM and the profession of Engineering in general"

### 3.3 Meeting with the Permanent Secretary Ministry of Public of Infrastructure

On or around Monday 11th July, he had a meeting with the Deputy Permanent Secretary (Mr Paramanand Mahwah) of the Ministry of Public Infrastructure and Land Transport who handles the Professional Engineering Practice Regulatory functions at the Ministry, during which he expressed his concern at the stagnant situation concerning the draft Engineering Council of Mauritius Bill which originated sometime in 2008. The latter shared his concern and pre-occupation and was also keen in getting a solution to the problem. The Ministry obliged IEM President on 15 July by sending him a copy of the dormant draft Engineering Council of Mauritius Bill which carried the identification Draft 2016. He was requested to submit his proposals for action.

### 3.4 Turning Point: Meeting at IEM House on 21st July 2017

IEM President convened yet another meeting of the "opened ended informal group" on 21st July 2016 at IEM House, Quatre Bornes. That meeting was attended by Dr Andre Chan Chim Yuk, Donald Dhondee, S (Deven) Daliah, and Jag Soobarah, and the President himself (Raj H Prayag). Jayesh Desai had sent in his apologies.

The outcome of the meeting at IEM House, after about 3 hours brainstorming was mailed out on 22nd July, to all the attendees and invitees. The decision taken on that day was significant and was

largely responsible for the turn of events that we have witnessed over the next twelve months within IEM. This has been elaborated upon in paragraph 3.7 below

## 3.5 IEM President gets the Green Signal (at the Court of UoM) on 21 July 2016

Next, the President chose the occasion of a meeting of the Court of the University of Mauritius held on 21 July 2016, when he got an opportunity to intervene, to express his concern at the engineering profession and voice out the idea that was developing in his mind. In his mail to the Working Group members on the following day he had this to say: "I made a statement at the Court of the University of Mauritius on IEM's position wrt Washington Accord and our proposal to work with ECSA (Engineering Council of South Africa) regarding the accreditation process. Our proposal was made in the presence of the UOM Chancellor and the Minister of Education; the latter referred to it in her speech thereafter, encouraged IEM to go down that path to raise standard and to make accredited degrees a reality in Mauritius".

President of IEM considers that he had the support and encouragement that was necessary to plough on. By now the stage was set for putting in motions the mechanism that would one day see the realisation of his wish for the Institution of Engineers Mauritius to hold responsibility for discharging engineering accreditation functions, albeit through an autonomous body that it will create.

## 3.6 Meeting with Dean of Faculty of Engineering (UoM) on 26 July 2017.

Yet another meeting in the series was held on 26 July 2017 with the Dean of the Faculty of Engineering, University of Mauritius, Dr S Rosunee, Associate Professor, and his key staff. This meeting though convened to discuss IEM-UoM collaboration, discussed the issue of accreditation. Dean explained that UoM already had an agreement under which the Engineering Council of South Africa was conducting an accreditation of some new programmes. This was agreed to be a welcome opportunity for collaboration. Dr Rosunee appreciated that an eventual entry of IEM into the Washington Accord, as full member, would make the IEM accreditation body the preferred choice for UoM to seek accreditation from, especially that in such an event any degree accredited by IEM would receive immediate recognition by all other Washington Accord members. The Dean welcomed IEM's initiative and expressed support. IEM agreed to communicate any Washington Accord documents to the Dean.

## 3.7 The Outcome of the IEM meeting of the 21st July 2017.

The following information is extracted from an exchange of mail between Working Group members that followed that meeting.

Essentially, it was felt that there was a need to rethink the draft Engineering Council of Mauritius (draft) Bill (2016), because it no longer reflected the objectives that were sought in the initial draft of 2008. There were two possible approaches as to the way forward:

a. We have come a long way, and should still look at how to improve it.
b. Draft 2016 has strayed too far from objectives initially set (when it all began with draft 2008), and no longer reflected a "professional engineers" legislation, and should therefore be dismissed altogether.

In the comments that followed, it was pointed out that from all appearances, documents on CRPE website show that we have already drifted towards Washington Accord, as evidenced by the following documents on the CRPE website (download section): Background information on Proposed Engineering Council Bill 2008, CRPE Press Notice 2010 on Registrable Qualifications, and

Registration Flow Chart, as well as Approved Qualifications for Registration (Oct 2012). CRPE document Standard of Professional Engineering Competence was still valid. There was also a Press Notice which already prescribed a 4-year course and qualifications of Washington Accord or ENAEE standard; the Flow Chart already provided for holders of Chartered Engineer status or Professional Engineers of Washington Accord bodies to be directly registrable.

The profession could set itself two key objectives:

A: Amendment to Qualifications for Registration, and

B: Restructuring required in preparedness for membership of Washington Accord.

**A: The Amendment to CRPE Act**.

This was deemed necessary because the Reference degree in the Act is still "the UK Degree", in addition to "Corporate membership" of UK institutions. Section 13(2)(b) which refers to qualifications for registration in existing CRPE ACT, should be amended:

(a) to prescribe:

(i) a degree obtained on successful completion of a 4-year full-time programme of studies accredited to the standard prescribed by any signatory member of the Washington Accord group of professional engineering agencies, or by any authorised member of the European Network for the Accreditation of Engineering Education (ENAEE), for engaging in the practice of professional engineering, or

(ii) any other degree that Council may recognise as being substantially equivalent,

as approved qualification for engaging in the practice of engineering, subject to the applicants submitting evidence of successful completion of two-years of training or work experience in the practice of engineering, as Council may approve.

(b) to replace the reference to Corporate Membership, by a reference to registration as Chartered Engineer or Professional Engineer where such registration is obtained on criteria that Council approves.

That would imply stating criteria such as degree of academic standard conforming to Sub-section (i), and an Assessment by way of a Professional Review of professional engineering competence at least 4 years post qualification.

**B: Restructuring IEM for setting itself on the Route to Washington Accord**

Recognising that the engineering structure was not identical in every country and that there were different models as to which body (the regulator or the professional institution) was delivering the engineering accreditation service, the meeting agreed to examine three different models for a decision on the one to adopt, from: UK, Singapore and Malaysia which are all members of the Washington Accord.

The Information communicated to the Meeting was as follows:

**(a) The UK Model: Engineering Council**

The Engineering Council sets the standard, which is the UKSPEC, first issued in 2003, and revised every 5 years. UKSPEC stands for the United Kingdom Standard for Professional Engineering Competence. Accreditation is carried out by the various engineering institutions, some 35 of them (IET, ICE, IStructE, IMechE, CIBSE, RAeS, etc), licensed by the Engineering Council (valid for 6 years) for undertaking accreditation assignments against the published standard for Chartered Engineer, Incorporated Engineer, or Engineering Technician. Programmes which are accredited are published on the website of the Engineering Council, indicating the Section of Engineering Council register for which the programme is accredited, i.e. CEng, IEng, EngTech.

Every licensed organisation is required to re-apply to the Engineering Council for renewal of their license upon which Engineering Council conducts a review of the system put in place by the institution and its resources, and its competence for sustaining accreditation to the Standard of the Engineering Council.

(b) **The Singapore Model**

In Singapore, the Institution of Engineers Singapore (IES) established the Engineering Accreditation Board (EAB), and appoints its members as well as the Chair of that EAB. The Constitution of IES was amended to provide for the EAB. The Constitution says the EAB is established to accredit engineering programmes under the framework of the Washington Accord and to ensure that these programmes are benchmarked to meet the standards of the Washington Accord of which IES is a signatory.

The Council of the IES delegates power to EAB to work independently on matters related to accreditation of engineering programmes under the framework of Washington Accord. The EAB is required to submit an annual report of its activities to IES President. The IES President is an ex-officio member of EAB, and also appoints the EAB Chairman. Other members of EAB shall be appointed by IES President in consultation with the various stakeholders for a period of up to three years in accordance with the following composition: Up to ten (10) Members from among (IES, government agencies, non-government organizations, industry, and business community), Three (3) Members from Professional Engineers Board, One (1) Member from Association of Consulting Engineers, Singapore (ACES). One (1) Member from National University of Singapore (NUS). One (1) Member from Nanyang Technological University (NTU). Up to three (3) Members from other universities with engineering programmes.

The Regulatory body, in Singapore, is the Professional Engineers Board set up under the Professional Engineers Board Act. The Act prescribes that degrees accredited by the EAB and other Washington Accord institutions are recognised degrees for registration as PE, subject to the applicants/incumbents also passing the two part-examination (Part-1 and Part-2). The Singapore Engineering Accreditation Manual from which the information was taken is undergoing amendment.

(c) **The Malaysian Model**

In Malaysia, it is the regulatory body, (Board of Engineers Malaysia – BEM) which has established the Engineering Accreditation Council, to which it has delegated authority for accreditation of engineering degrees. The EAC is made of representatives of the Board of Engineers Malaysia (BEM), the Institution of Engineers Malaysia (IEM), the Malaysian Qualification Agency (MQA) and the Public Services Department (Jabatan Perkhidmatan Awam Malaysia (JPA)). The Engineering Accreditation Council (EAC), is an independent body for the accreditation of engineering programmes. The policy on accreditation of engineering programmes is laid down by EAC and is subject to changes as deemed necessary by EAC.

Implementation of the policy is the responsibility of the EAC.

Members of EAC are appointed by BEM as follows: (i) A Chairman (nominated by BEM), (ii) A Deputy Chairman (nominated by IEM), (iii) 15 members representing each of major branches (e.g. Civil, Mechanical, Electrical, Chemical and Electronics, etc). Of these fifteen, 5 members are nominated by BEM, 5 members nominated by IEM, 1 member nominated by JPA, 1 member nominated by MQA, and 3 members from the major employers of engineers in Malaysia; the Registrar of BEM, and Secretary of BEM are ex-officio members.

The EAC comprises persons from academic institutions and industries, with a minimum of 50% from industries. In appointing the members of EAC, BEM is required to maintain a reasonable spread of expertise across various branches of engineering.

## 3.8 Issues for IEM

(i) IEM needed to decide on the model it would adopt. Indications during the meeting were that the Singapore Model was the preferred one, since previous initiatives which crashed were similar to the Malaysian Model, though CRPE's intentions were misunderstood.

(ii) Getting Council of IEM to support the President in its initiative and adopting the proposition. It could require IEM, at a later stage, to amend its Constitution.

(iii) Need to get into the specifics: Where does IEM start and how does it proceed? How will IEM ensure it succeeds where CRPE had failed?

(iv) Should IEM make a start by prescribing an accredited degree as a requirement of admission as member of IEM? Logically it should, if it wishes to accredit engineering degree programmes

(v) Considering that IEM will have at some stage to call a Special General Meeting (SGM) in accordance with the Rules of the Registrar of Association to make any changes to its Constitution, should it not examine its Constitution to see if there

are also other changes it could make at the same time. For example, introducing a new category of members deserving recognition as Professional Engineers at par with, say, those registered by the International Engineering Alliance or the International Professional Engineers Register?

## 3.9 A Window of Opportunity Opens up for IEM and the Engineering Profession.

### *(a) The Window*

In APPENDIX-1 we have supplied information about a Conference of ***Council of Academies of Engineering and Technological Sciences*** (CAETS), held on September 12-15, 2016, in London, to which two past Presidents of IEM (Jayesh Desai and Jagadish Soobarah) were invited, on the theme "***Engineering for a Better World – Capacity Building for the Developing World***", by the Royal Academy of Engineering UK.

This Conference, which many would have described as "a trip for the boys" at the expenses of the Royal Academy of Engineering UK, proved to be a pivotal element for IEM. The Launch of the GCRF Africa Catalyst Scheme (GCRF=Global Challenges Research Fund) on the Second day of the Conference on 13th September 2016 was exactly the sort of opportunity that the Institution of Engineers would have wished to dream about to kick-start its newly born ambition of establishing a system for accreditation of Engineering Degree programmes in Mauritius.

Readers are directed to **ANNEX-1** for more information about the Conference, that was inaugurated by H.E. Dr (Mrs) Ameenah Gurib-Fakim, the President of the Republic of Mauritius.
At **ANNEX-2** we provide some information about the Royal Academy of Engineering.
**ANNEX-3** gives the essential information about the GCRF Africa Catalyst Scheme.

### *(b) Food for thought*

At this stage in our narration, when the Institution has gone through the motions of

(i) submitting an application for funding a Pilot project on Building Engineering Capacity through the Accreditation of Engineering Degree Programmes;
(ii) satisfying the donor organisation on its credibility and the demonstrating that the objectives of the project were aligned with those of the GCRF Africa Catalyst Scheme, and assurance that IEM had the capability to deliver on its undertaking;
(iv) obtaining a grant, in competition with professional engineering institutions from 49 sub-Saharan countries; and
(v) implementing the project within the approved budget and the contractual project time;
(vi) knowing very well that the end objective of IEM was to seek and obtain admission as full member of the Washington Accord, could be attained

and its dream realised, subject to no unsurmountable hurdles on the way, in about 5 to 6 years,

it is appropriate to ask what should be the next step to ensure that the efforts don not stop here. The Working Group has undertaken all this with no expectation of any direct benefit to themselves, or even to the Institution itself, but with a prospect and potential for significant benefit for the profession at large, engineering education in Mauritius, and for the nation.

The members of the Working Group on Engineering Accreditation, setup by IEM, to drive the project, put it to the Readers of this Report to ponder upon this point: Should the stakeholders in engineering—the Government, the Higher Education Authorities, the Authorities Regulating Engineering practice, the Tertiary Educational Institutions delivering engineering programmes to the public, the Parents of students joining engineering degree programmes, the Graduates from engineering programmes, the engineering practitioners, the Employers of the outputs from engineering degree programmes, as well as the professional Engineering bodies themselves—not take the hint from the Royal Academy of Engineering or the British Government which funds it all, to come forward and support of the Engineering Profession? The Institution of Engineers Mauritius is convinced that the future of Mauritius and of the world is in the hands of Engineers. The sooner our policy makers realise this and boldly step in to support engineering education and its accreditation to an international level the better it will be for our economy and the earlier tangible results would flow out.

**End of Chapter Three**

# Chapter Four: IEM Application under the GCRF Africa Catalyst

## 4.0 Announcement by the Royal Academy of Engineering (the Academy)

### 4.1 Launch of the GCRF Africa Catalyst.

That event took place on 13th September 2016, the second day of the Conference of Council of Academies of Engineering and Technological Sciences (CAETS) in London. When launching the GCRF Africa Catalyst, the Academy explained that it was intended to support a new capacity building programme, under its remit as a delivery partner for the Global Challenges Research Fund.

### 4.2 The Global Challenges Research Fund

Readers may wish to go directly to the relevant source: please click here < Global Challenges Research Fund (GCRF) > or access this website
http://www.rcuk.ac.uk/funding/gcrf/

What we need to know is that it is a £1.5 billion fund announced by the UK Government to support cutting-edge research that addresses the challenges faced by developing countries through:

- challenge-led disciplinary and interdisciplinary research
- strengthening capacity for research and innovation within both the UK and developing countries
- providing an agile response to emergencies where there is an urgent research need.

That fund is administered through delivery partners including the Research Councils and National Academies, and that includes the Royal Academy of Engineering. Information on the GCRF website tells readers that when assessing whether an activity is ODA eligible or not, delivery partners consider whether projects and programmes satisfy the Organisation for Economic Cooperation and Development (OECD) criteria on eligibility by whether they:

- aim to promote the welfare and economic development of a country or countries on the DAC list of UK's Official Development Assistance (ODA) recipients
- are designed to address a development need, and
- focus on developing country problems.

For the above purposes, the GCRF delivery partners have prepared additional guidance with which applicants will have to comply. Some additional guidance on ODA was given. Any applications to the GCRF will need to comply with these guidelines. For IEM's application purposes, the guidance given by the Academy will be relevant.

### 4.3 GCRF Africa Catalyst: Capacity Building of Professional Engineering Institutes

Essential Information about the GCRF Africa Catalyst is given in **ANNEX-3** to this Report.

## 4.4 Other Instructions and information

The GCRF announcement included instructions plus other information of relevance to potential applicants. The deadline for applications to be made on-line on an Academy link was set for 9 November 2016, and decisions was to be announced by 28th November, and successful applicants should receive the contracts by 29th November, for signature and return by 2nd December 2016.

## 4.5 No place for Bureaucracy

This heading/comment is not an Africa Catalyst issue nor an Academy issue, but from the dates and timing of the schedule in paragraph 4.4, it was a notice to IEM that, if it wished to meet the deadline for the application and assuming its application was approved, it would have to use very expeditious procedures to respect the subsequent deadlines. The above schedule was already an indication that the Academy did not for a moment have in mind that applicants would be organisations which would have cumbersome internal procedures, which would require them to rush to a Legal Counsel for advice (before signature), obtain the clearance for signing the document, calling the Executive Council to ratify the decision to sign and rush the contract back to the originator.

## 4.6 CAETS Conference Attendees feedback to IEM President

(a) The London Conference attendee (Jag Soobarah) mailed out to IEM President (copied to second attendee Jayesh Desai) on 26 September 2016 the key news item about the Africa Catalyst and the prospect for IEM in the context of IEM President's vision on accreditation.
Jag's mail contained the following suggestion

Quote"

**ACCREDITATION**

I believe we should make a start about the Round Table forum. You might wish to have a second look at our last exchanges on this subject.

I believe that "***Setting Up an Engineering Programme Accreditation Framework for Mauritius***" could be a project for submission to the Royal Academy of Engineering for Funding under the Africa Catalyst programme.

I suggest we meet in a small group to agree on what our immediate and eventual objectives in matters of Accreditation are: Quote:

**First**

An (autonomous) Board or Council of Accreditation of Engineering Education, to be established either under the IEM Constitution (if we could secure funding for its administration) or under the CRPE Act, with a composition ensuring all Professional Engineering bodies are represented (IEM, local IET, ICE, IMechE, Aeronautical Society, Association of Consulting Engineers (if it is a professional body and not a Trade Union), CRPE, Business Mauritius (Employers Federation), Academia, MRC

Its organisation setup could comprise one department for **Academic Standard and Accreditation Guidelines** and a **separate department for Engineering Accreditatio**n

**Second**

Establishment of a Register of Professional Engineers of Mauritius P.Eng(M)

This will imply a register open to all engineers practising in Mauritius irrespective of institution to which they belong. We could envisage drafting a Charter for the Register of Professional Engineers to which all associations could agree. The Charter should make it mandatory for a P.Eng to be a member of a local institution of engineers, and write down the criteria for eligibility to be on this register. We could consult all associations and constitute a Professional Registration Board for this purpose. It shall not be an association so no membership." Unquote

(**b) A Coincidence**

On the same day, 26 September, the Royal Academy sent a message to J. Soobarah, an extract of which is reproduced hereunder:

Quote

"Dear … …. ,

I wanted to follow up on below email and let you know that we have updated the guidelines for Africa Catalyst.

**Please do let me know if you are interested in applying and if there is anything I can do to assist you at all.**

Regards,

…….. " Unquote.

The Readers of this Report may wish to know that both attendees of the CAETS Conference in London (Jag Soobarah and Jayesh Desai) had participated actively in the Workshop that had followed the Launch of the Africa Catalyst on 13 September 2016; we appreciate that our interest to participate in the project was noted.

## 4.7 Council of IEM approves submission of Application under Africa catalyst and sets up a Working Group.

IEM President convened a limited meeting on 30 November 2016; It was understood that he had briefed the IEM Council and obtained authority to submit an application, as evidenced by his communication to both J. Soobarah and to the Academy (Ms Louise Olofsson):

Quote: "Dear … , This is to inform you that the Council of IEM has on Wednesday 5.10.2016 formally approved that IEM would make an application under this scheme to build its capacity to raise engineering standard to a level equivalent to Washington Accord.

In this context, the Council has set up a core team comprising of Jagdish, Jayesh, Raj, Ghunshyam, Andre and Donald to work on the proposal and its first meeting is scheduled for Friday 7.10.16." Unquote.

The meeting referred to was held as planned, and was attended by Jagadish Soobarah, Ghunshyam Parsan, Raj H Prayag, Donald Dhondee, and DR Andre Chan Chim Yuk; the outcome of the meeting is described in the next paragraph.

## 4.8 Working Group meets and Identifies Elements of a Prospective Project, and takes cognizance of requisites for the eventual application, allocates tasks, and decides to inform other PEIs.

**(i) Setting up a Working Group**

IEM's President, RHP informed the members present that IEM Council, at its meeting on 5.10.16, had approved the setting up of a committee to work on and present a project on behalf of IEM, in the context of the Africa Catalyst Programme. This committee, better known as the Working Group for Engineering Accreditation) comprised of Raj H Prayag, Ghunshyam Parsan, Andre Chan Chin Yuk, Donald Dhondee, Jagadish Soobarah and Jayesh Desai. This team will also drive and implement the project.

**(ii) Identifying activities for inclusion in the application.**

The various activities that can be contemplated during the 6-month project are:

- Conducting a review and adaptation of the document set constituting the accreditation standards, rules, and guidelines of Washington Accord.
- Building up of a team of potential assessors who will eventually assess the engineering courses for compliance. This team of around 50 senior engineers should be representative of all fields of engineering taught in Mauritius.
- Training of the potential assessors. This could be done in collaboration with EC of UK, which can be approached for that purpose.
- Establishing the accreditation criteria and benchmark on those of the Washington Accord.
- Drafting the charter of the Accreditation Board.
- Organise round tables, seminars, awareness, and information campaigns in collaboration with all stake holders at national level.

Conduct mock assessments of existing engineering programmes to evaluate the assessors and the assessment procedures. This should be done with the participation of regional engineering organisation such as SAFEO

**(iii) Information required for completing the Application**

For the submission of the project and application of the grant by 9th of November, the following information needed to be supplied (in the application form)

- Project Details
    - Project Summary
    - Rationale
    - Activities
- Partners

- UK Base Partner
- Letter of Commitment

- Monitoring and Evaluation
  - Outputs, outcomes, and impact
  - Key indicators
  - Data collection methods
- Budget

**(iv) Members to compile information at their disposal**

All members to propose responses to the application form that will be the basis of further discussion at the next meeting, to be held on Friday 14th October 2016. These responses to be circulated by email for information and comments.

**(v) Inform other PEIs and seek their collaboration.**

It was agreed that representatives of other engineering professional bodies (e.g. ICE, IMechE etc) will be contacted and briefed on the project, and that their collaboration will be sought and secured. RHP will draft an official correspondence to that effect.

**(vii) Request assistance from RAEng (Ms Louise) to help identify UK Partner.**

Next meeting 14 Oct

## 4.9 Working Group gets into Action.

The communications by e-mail and work done during the period 14th October 2016 to 9th November 2016, to gather and coordinate all information necessary to be able to put up an application to the Academy, and do so in the Academy's format and on-line, is perhaps a story to be told to our grand-children during a winter evening to get them to sleep. But for the present purpose, we will go into a few essentials to give an opportunity to our Readers to appreciate what a few people can do, when they have set their minds to produce a result, without bothering whether it was within their terms of reference or whether they will be paid; they certainly looked forward to receiving a reward in terms of a positive assessment of the applications they intended to submit to the RAEng.

## 4.10 Known Issues, as well as others which cropped up on the way, which had to be addressed.

(1) Foreign funds will be involved- there was a need to enquire about procedures, clearances, etc., from the authorities.

(2) Information to all stakeholders about what IEM was about to do, even if it will only be two months later that we would know for sure.

(3) A criteria for the grant was to use the services of a UK partner, so how to go about it; can we request the Academy for assistance. We did and received the necessary references.

(4) A TOR (Terms of Reference) would be necessary- it must be drafted; that was done.

(5) Inform and invite Professional Engineering bodies to collaborate; that was done. The Aeronautical Society (AeSM) responded spontaneously; others had queries, they were not clear about IEM's intention, especially why IEM was embarking

into accreditation which they presumed was CRPE's prerogative. Eventually, they were satisfied with the information and clarifications given and they agreed.

(6) An issue of an oustanding MoU between IEM and AeSM to be resolved, since Jag Soobarah was a representative (in this project) of AeSM, though he was a past President of IEM and a Fellow of IEM; that was signed in an event on 25 January 2017.

(7) Opening discussions with potential UK partners; Engineering Council UK could not come in, Engineers Ireland was not in UK, the Working Group to follow up on engaging Engineers Against Poverty (EAP); IEM President proposes direct approach since time was against us; contact with Petter Matthews (Chief Executive of EAP) was established on 12 Oct 2016- with TOR Search for UK Partner.

(8) Consensus on which Stakeholders should be informed, and letters to be issues: Viz. Hon. Minister of Finance and Economic Development of the Republic of Mauritius; Minister of PMI; Minister of Education; Chairman of CRPE; Vice Chancellor University of Mauritius; Chairman of Court of University of Mauritius; Executive Director of UTM; Chief Executive of HRDC; Executive Director of TEC; Executive Director of MRC; CEO Business Mauritius; CEO Mauritius Qualifications Authority.

(9) Starting work on application: Shyam Parsan to work on Project Rationale; Jag on Project Summary and skeletal budget;

(10) Discussions with EAP- Petter Matthews agrees to be UK Partner.

(11) Drafting and sending out letters to Personalities and PEIs; establishing contact with Representative of IMechE and ICE (Ram Bahadoor)

(12) Assigning responsibilities for write-ups and data for different sections of applications, noting that "Summary" and "Rationale" have been done. The application form would permit the following amount of text:

1. Activities *(max 500 words)*
2. Partners *(max 400 words)*
3. Outputs/outcome/impact *(max 500 words)*
4. Data Collection Methods *(max 400 words)*
5. Reference *(max 200 words)*
6. Budget

(13) Finalising the TOR;

(14) Preparing for Webinar arranged by RAEng for prospective applicants;

(15) Obtain a Reference for the project: (Dr Arjoon Suddhoo Executive Director Mauritius Research Council approached and he agreed);

(16) Dealing with queries from stakeholders (TEC, IET, IMechE);

(17) Agreeing on a tentative programme, as a prerequisite for finalising budget; this will imply setting provisional dates for launch or Conference, focus group meetings between Experts and the Stakeholders, especially Government, TEC, the Universities, etc;

(18) Scheduling of training programmes and defining who does what?

(19) Budgetary preparations: enquiries on air-fares (London Mauritius Return) for Experts; quotes from Hotel for accommodation of experts and for holding

conferences, logistics, advertising, elements of catering for trainees for programmes running late or full days; transportations cost, etc.;

(20) Completing application form, respecting amount of text that is to be inserted in application (anyway, the on-line application will not allow entries beyond the permitted number of words in each section of the form);

(21) Reaching consensus on the application to be uploaded.

***The Completed Application was finally uploaded onto the Royal Academy Website during the early hours of 9th November 2016, when it was still 8th in the UK.***

## 4.11 Specifics of the respective roles of the UK Partner and IEM's.

The Terms of Reference (TOR) set out the respective roles of IEM (through the Working group) and the UK Partner. We are hereunder reproducing the key elements of these roles as communicated to Mr Petter Matthews the Executive Director of Engineers against Poverty (EAP).

### *4.11(1) The UK Partner's Roles*

**(a)** ***To apprise key stakeholders*** **(convened by the WGEA)** ***concerned*** with education, training, development, and employment of engineers of the world-wide initiatives in matters of the professional competence expected from a graduate in engineering for entry into the practice of engineering, which cumulated in an agreement (between world leaders in engineering education) on:

(i) the desirable academic standard of an engineering degree programmes for professional practice, and

(ii) the accreditation process to be put in place for ensuring that programme objectives delivered by the programme conform to the Learning Objectives prescribed in the Standard.

**(b)** ***To Present the case for accreditation*** of engineering degree programmes to key stakeholders, by elaborating on the ***need thereof***, its *benefits* to the public, students, the Universities and their Faculty of engineering, Educational Higher Authorities, Employers, and the State, and highlighting its voluntary nature (for universities), implications for the accreditation agency (need to maintain compliance and conformity with requisites of the Standard, and likely implications for non-accredited programmes within an accreditation regime.

**(c)** ***To impart training in the understanding and ability to interpret and apply*** the parameters and criteria used in the accreditation of engineering degree programmes benchmarked against an international standard such as advocated by the Washington Accord to a cohort of professional engineers and academics who will be called upon to serve an eventual Engineering

Accreditation Council as Evaluators and Team Chairs within accreditation teams that may be constituted to deliver an accreditation assignment.

**(d)** ***To familiarise the selected group referred to in (c)*** with procedures adopted by the Washington Accord organisations on handling accreditation requests.

### *4.11(2) The Working Group on Engineering Accreditation:*

**will create the environment necessary for the UK partner to deliver on his responsibilities, in addition to undertaking to deliver the following:**

**(a)** To acquaint members of the Professional Engineering Institutions generally, and a select cohort of Engineering Faculty members and Professional Engineers, (selected for their displayed motivation to collaborate and their potential to be trained for serving as future Evaluators and Accreditation Team Chairs), with the Standards and Accreditation Procedures and other Requisites (applicable to programmes and for compliance by approved accreditation bodies) for conducting Accreditation of engineering degree programmes in accordance with Guidelines published by one or more Washington Accord members holding Signatory Status.

**(b)** To apprise selected Audience of the IEA/ENAEE Best Practices for the Accreditation of Engineering Education as recommended in the joint IEA/ENAEE documentation on recommended accreditation practices.

**(c)** To develop and propose (with UK Partner's Assistance) to the Professional Engineering Institutions and to the Government a governance structure, together with a Charter for an eventual agency for the accreditation of engineering degree programmes, which could satisfy the requisites for an eventual application as provisional member of the Washington Accord.

### *4.11(3) The Letter of Support from UK Partner*

We are enclosing at **ANNEX-4** the **Letter of Support** issued by IEM's UK Partner, Engineers Against Poverty (UK)

### 4.12 Application has been Submitted.

We have mentioned at the end of paragraph 4.10 that the Completed Application was uploaded onto the Royal Academy Website during the early hours of 9th November 2016. The message that Jagadish Soobarah, Team leader of the IEM Working Group sent to his colleagues of the Working Group is reproduced hereunder:

Quote":

9 Nov 2016-
[Jag writes]
Hi Everybody
"… … …

We have today (a few minutes back) clicked on the SUBMIT button of the RAEng On-Line Application for funding a Pilot Project on "***Building Engineering Capacity through the Accreditation of Engineering Education***" under the GCRF Africa catalyst. I am enclosing a screen shot of the acknowledgement received. By the way, while writing this message I have received an e-mailed acknowledgement from the RAEng International Team.

… …. …."

Unquote

**4.13 Council of IEM approves on 17th November 2016**, following a proposal by the Acting President Donald Dhondee, that Jagadish Soobarah may sign an eventual contract on behalf of IEM, in the event IEM is successful in its application.

**4.14 On 30 November 2016,** the Royal Academy of Engineering (Ms Louise Olofsson) communicates the news that IEM's application has been successful.

We quote two sentences from the Academy's message:

"***We had a large number of strong applications and it is with great pleasure that I would like to inform you that your proposal has been successful***.
***The reviewing panel scored your application highly and agreed that the project aligned well with the objectives of GCRF Africa Catalyst."***

These two sentences contained the reward that the dedicated WGEA group had in mind when they set out to prepare for the execution of the project, even before putting in an application.

## End of Chapter Four

# Chapter Five: Understanding Accreditation

## 5.0 Accreditation: What are we talking about?

## 5.1 Undisputed meaning within the Engineering Profession.

Readers of this Report must certainly be thinking whether it is really worth the trouble of reading these pages to find out what they already know. The answer should be yes, if it was worth the trouble writing these pages. Engineers have written these pages for readers, a majority of whom, would be engineers or engineering academics. In engineering the saying is: we have neither the privilege nor right to a commit errors.

It is not the intention to refer to any dictionary for our purpose, but only to examine how the term "accreditation" is commonly used within the engineering profession or in a context that relates to a programme of studies in engineering.

## 5.2. The Registered Professional Council Act 1965/67.

There is no mention in the amended 1967 Act (nor in the original Ordinance No 49 of 1965) of the term accredit or accreditation. The founder members of the predecessor to the Institution of Engineers Mauritius, including its first President Mr Raymond Bérenger, can be excused for that omission. However, the term and its context was very much prevalent in the profession: In France, the Commission des Titres (d'Ingénieurs) was enacted in 1934 precisely to accredit programmes of studies in engineering which could be awarded the title of Diplomes d'Ingénieurs. In the US, around the same time 6 professional engineering bodies came together to create, what later became known as the Accreditation Board of Engineering and Technology (ABET) to "accredit" programmes in engineering and technology.

## 5.3. Mauritius: Education and Training (Miscellaneous Provisions) Act 2005 (Act No 18 of 2005), amending Education Act, Mauritius Qualifications Authority Act 2001, and the Tertiary Education Commission Act.

### *5.3.1 The provision of the law (Mauritian Practice)*

Section 12 A (of the Education Act) (Registration, Accreditation and Approval) imposes an obligation on every owner or manager of a private post-secondary educational institution to apply for the accreditation of every programme leading to an award by his institution; there is a provision that "Any registration or accreditation every programme under this section may be subject to such terms and conditions as the Commission may determine". WGEA's note: Sub-section (3) reproduced adverbatim.

The Act defines <accreditation> and <recognition> thus:

"accreditation", in relation to an institution or an educational programme, means confirmation that the institution or the programme satisfies the minimum criteria or standards for it to operate or be offered for a specified duration;

"recognition", in relation to an academic or professional qualification, means recognition that the qualification is of an acceptable quality at the specified level and may give access to further studies or employment or profession;"

The Tertiary Education Commission (TEC) has explained this term in the Introduction to TEC's Regulatory Framework for Post-Secondary Education, wherein there is an explanatory definition for "accreditation ", thus:

> Quote:
> "the process employed by an external accrediting body to verify that an educational institution has the wherewithal to offer education and training which are comparable with international norms, including academic level and standards, and which are in line with its mission statement. Accreditation is a means of assuring quality of educational provision. Thus, an accredited programme is deemed worthy of offer subject to the institution meeting the necessary accreditation criteria and quality assurance of delivery of the programme. For our purposes, ensuring and continuously enhancing quality of education provision is of paramount importance." Unquote

It is of significance that the TEC's definition, which amplifies the definition in the Act does the following:

(a) makes reference to international norms, including academic levels and standard, and
(b) it introduces an external accrediting agency in the process,
(c) requires the external agency to examine if the institution has the "wherewithal", and also
(d) requires that accrediting body to verify if the education offered is in line with its mission statement.

### *5.3.2. The Engineer's view of TEC's definition*

The TEC statement/definition is correct. However, if we wish to apply it to engineering programmes following the profession's practice, then the following clarification is required:

(a) **Re-International Norms**: there is only one known, recognised and acceptable standard for the academic content of an engineering degree (for entry into professional engineering practice), currently open to us, and that is the standard advocated by the forum known as Washington Accord within the International Engineering alliance. Another standard recognised as being substantially equivalent to the Washington Accord is the standard practiced by the E**uropean Network for the Accreditation of Engineering Education** (the ENAEE), which is a not available to our region.

(b) **Re-External agency**: Once the profession decides on the standard, (i.e. Washington Accord), it settles the case for the external accrediting agency. Washington Accord requires that any agency undertaking and delivering accreditation to Washington Accord standard, ***must be a member of the Accord***, for which purposes the external agency should comply and conform to the requisites for the same. Washington Accord's criteria are very specific: ***that body has to be autonomous from Government and higher educational authorities;*** its core activity should be accreditation of engineering programmes, and must

demonstrate that it has autonomy in the discharge of its accreditation responsibilities, and can only be admitted as a signatory member after its Procedures, system and resources including accreditation operation and decision taking has been reviewed initially by two nominators, and subsequently by three Washington Accord appointed Reviewers.

(c) **The Accreditation Criteria**: The engineering profession is more specific about the wherewithal that the external accrediting agency verifies. Washington Accord spells the Criteria and Procedures together with the graduate profile which the accrediting agency notifies to the education provider, and the latter's programme must comply with. This is a major activity.

(d) **The programme delivers what it publishes**: The accreditation agency must also verify if the Education Provider is delivering the programme in line with what it published about the programmes. This is also a Washington Accord requirement.

### *5.3.3 Who accredits, pursuant to TEC's definition.*

The IEM Working Group offers some comments hereunder, but makes no claim to the legal soundness of the arguments in the comments:
TEC is certainly discharging its responsibility because the institutions applying for registration must satisfy TEC's requirements if they are to operate. One could raise the issue of conflict of interest if TEC were to conduct the accreditation. Does "external" implies external to the educational establishment or external to the system. Washington Accord prescribes the accrediting agency to be autonomous from both Government and Higher Educational Authority's influences.
However, whatever be the interpretation of "external", TEC should step in to permit the educational provider to establish itself to run its programmes, but should perhaps impose an obligation for the educational provider to seek "external accreditation" prior to delivering its awards, or within a prescribed period.

## 5.4 Some other definitions

### *5.4.1 The European Consortium for Accreditation (ECA)*

Check website - http://ecahe.eu/w/index.php/Accreditation#cite_note-1

ECA gives two common definitions:

- A formal and independent decision indicating that a programme and/or an institution meets certain predefined quality standards.
- The process of external quality review used in higher education to scrutinize colleges, universities, and higher education programs for quality assurance and quality improvement. Success results in an accredited institution and/or program

### *5.4.2 University of Manchester Inst. of Science and Technology*

"a process of certifying the quality and the standards of educational provision carried out by institutions such as the Institution of Electrical Engineers and the Institution of Mechanical Engineers, and judging the suitability of the provision in institutions for

conferring professional status on the holders of degree qualifications from those institutions"

### *5.4.3 Council for Higher Education Accreditation- International Quality Review*

[Glossary of Terms] www.chea.org/international

"accreditation": "In the US, it refers to a collegiate process of self-study and external peer review for quality assurance, accountability, and quality improvement of an academic institution or program designed to determine whether or not it has met, or exceeded, the published standards of its accrediting association and is achieving its mission and stated purpose. "

### *5.4.4 European Standing Observatory for the Education of Professional Engineers [ESOEPE]:*

(Source: EUR-ACE Background Document -May 2005- Overview-Accreditation Procedures and
Criteria for Engineering programmes in Europe: <www.feani.org>)

"Accreditation is the primary quality assurance process used to ensure the suitability of an educational programme as the entry mode to the engineering profession. Accreditation involves a periodic audit against published standards of the engineering education provided by a particular course or programme. It is essentially a peer review process, undertaken by appropriately trained and independent panels comprising both engineering teachers and engineers from industry. The process normally involves both scrutiny of data and a structured visit to the educational institution."

### *5.4.5 Engineering Council (UK)*

In the Engineering Council's publication "Accreditation of Higher Educational Programmes", this definition is given under its Glossary of terms. Accreditation: "A process of peer review of a degree programme against published learning outcomes. This usually involves a visit from a team of professional engineers nominated by professional engineering institutions to the degree awarding body.

Interestingly, some years ago, in a PowerPoint presentation on the UKSPEC standard, John Birch of the Engineering Council gave a definition similar to that under paragraph 5.4.4, except for the word <mode> associated with <entry mode> being replaced by <route>

## 5.5. What should we understand?

Accreditation is a (*peer*) process (*put in place by an autonomous/external agency*) for evaluating whether an educational programme intended for a particular purpose (*in our case for entry into the practice of engineering at a professional level*), meets the standards of educational quality (satisfies the accreditation criteria) that have been set by the profession (*represented by recognised authority*) for the same purpose.

## 5.6. The Chacteristics of Accreditation.

Since IEM has decided that it will take steps to establish an engineering accreditation board in Mauritius, the Working Group considers that the various stakeholders in engineering should be briefed as to what constitutes accreditation, its implications, and benefits, including any far-reaching consequences it can have. If the definitions were not enough the following paragraphs should tell you all you should know, except about how to go about getting accredited.

The Working Group acknowledges with thanks the various sources (websites) from which it has picked the bits and pieces inventoried in the following paragraphs, obviously too numerous to mention; that list includes the various Resource persons who intervened in the Inaugural/Launch programme in January 2017 and as well as the Conference/seminar held in February 2017:

### *5.6.1 Accreditation of an engineering degree programmes,*

(1) It implies that the programme fully conforms with the parameters and criteria prescribed by established and recognised international leaders in matters of engineering degree accreditation;
(2) It carries with it the knowledge that the programme has been "accredited", against a specified standard, by a body whose credentials for undertaking the accreditation of that programme or programme of that nature have examined, verified and assessed, and have been determined to be appropriate for the purpose;
(3) It carries with it the assurance that the TEI (Tertiary Educational Institution) or HEI (Higher Educational Institution) has been subjected to a totally transparent process;
(4) It offers assurance of a system totally free from possible sources of conflict of interest;
(5) It offers assurance of decisions uninfluenced by government or higher educational authorities and the knowledge that whatever the outcome, the result is unbiased and fair;
(6) It gives the message that the TEI or HEI has voluntarily subjected itself to accreditation by an autonomous external, and independent party (that has itself received accreditation from an internationally recognised body);
(7) It Implies the programme has received the right mix of engineering competence and the requisites of the corporate world;
(8) When a programme provider (a TEI or HEI) declares or publishes that its programme delivers a knowledge and competence base represented by a known standard, then a subsequent accreditation confirms that the programme indeed conforms to the standard, - this confirmation is the guarantee or assurance or confidence that society desires to find or obtain from the Higher Educational Institutions.

### *5.6.2 Why should an HEI desire Accreditation of its Programmes?*

(1) HEIs recognize that the system will highlight, not only deficiencies vis-à-vis the standard, but weaknesses in the HEI's set up (resources and programme, including content and deliveries), which are vital for course correction;
(2) Accreditation satisfies a need to know where the programme stands, should the HEI decide to do something about its content or standard;
(3) The HEI will be in presence of information on the strengths/weaknesses which can be put to gainful use towards exploring design and offer of new programmes or remedial measures respectively;
(4) If the programme is fully compliant with the standard, the HEI earns recognition as a member of an internationally recognised fraternity;
(5) It's a major boost to the HEI's desire to build its reputation as a leading HEI in the state or region or the world;
(6) Accredited programme providers attract students, and, in our case, should help Mauritius in its endeavour to become a Regional Educational Hub;
(7) Programme accreditation increases employability of graduates from such programmes by the more performing reputation of its graduates;
(8) It improves its positioning and credibility towards funding agencies and eligibility for the same;
(9) The HEI receives feedback on whether it is still aligned with its declared vision, and how it is performing towards achieving its mission;
(10) Accreditation enhances mobility prospects of its graduates at regional and international levels.

### *5.6.3 Other Benefits to the TEI itself*

(1) It will need less efforts to advertise itself since "news" about the accredited status of its programmes is in itself a motivation for students;
(2) Academic staff will have a heightened sense of achievement and pride at the consideration of having been instrumental in obtaining the results;
(3) It will have information and data in hand, plus the experiences of undergoing accreditation assignments which can facilitate future accreditation or the maintenance of current status;
(4) It earns recognition as being among leading tertiary educational institutions;
(5) HEI is motivated towards exploring use of innovative pedagogical tools;
(6) It earns recognition among professional engineering institutions as an Institution delivering recognisable degrees;
(7) It creates new opportunities for intra-institutional networking and co-operation and exchange programmes.

### *5.6.4 Why impose accreditation? It should be left to the Programme Providers to decide.*

(1) Government may decide to impose accreditation as a matter of education policy?
(2) Government and stakeholders requiring technical manpower with the right profile for developing and sustaining the nation's infrastructure, and delivering on the nation's international commitments in matters requiring intervention by technically competent work force, e.g. on SDGs, might be inclined to impose accreditation.

(3) Government's programmes on employability or need to respond to request from emerging technology sectors may be inclined to adopt a compulsory accreditation policy.
(4) When HEI's intakes represent highly educated cohorts could also be a reason for imposing accreditation.
(6) The Governing Board of an HEI which is sensitised to accreditation will see it as a performance monitoring mechanism.
(7) Faculty sees accreditation criteria (e.g.) feedback from employers, alumni, etc. as a tool for course correction (remedy – improve quality)
(8) Funding sources who may use it as a criterion for allocation of funds to HEI's may request accreditation as a pre-condition.
(9) Educational Authorities implementing government policy to attract students to the HEI.
(10) Statutory authorities regulating the profession of engineering can influence accreditation by implementing assessment procedures that is more rigorous for non-accredited degree holders.

### *5.6.5 Benefits to Society*

(1) Better performers entering the job market create a potential for greater productivity in the Industry and generally all engineering sectors of the economy.
(2) Employers' efforts on training and formation lessened by employment of graduates that can become effective and productive earlier.
(3) HEIs attract request for research and investigations from industry, once they build up their reputation as delivering accredited programmes.
(4) Parents have a wider range of options of programmes and schools to choose from when searching for programmes with long term opportunities in view.
(5) HEIs with accredited programmes are favourably positioning for receiving grant-in-aids for research and programme expansion.
(6) Facilitates migration to other jurisdictions re-work permits, employment opportunities.
(7) Accredited degree holders find no hurdles in their way to admission to other universities into post graduate programmes.
(8) Graduates seeking membership or professional registration of/with profession bodies will have already satisfied a critical requirement for membership or registration with such bodies.
(9) Accreditation confers assurance to society regarding the professional competence of practising engineers with such degrees.
(10) Parents get the satisfaction that their children (from accredited programmes) will fare better than their counter parts from non-accredited programmes.

## 5.7 Looking forward with Optimism

The Working Group on Engineering Accreditation would like to believe that the information supplied in this Chapter has been more than adequate for dispelling any apprehension that any stakeholder could have entertained about the outcome of implementing an accreditation regime in Mauritius. It wishes to reiterate that accreditation is not an IEM "affair", but a national endeavour, which meets Government's own national objective in education. IEM would wish everyone to look at it from this view and extend

his/her full collaboration, and that appeal goes to the Government as well, since a major issue that will arise sooner or later will be the sustainability of an accreditation system in Mauritius. Mauritius will not require a mammoth size accreditation body for the small number of HEIs in Mauritius and their Engineering programmes. The Governance Structure that has been developed by the Working Group and gained fairly wide consensus among the representatives of stakeholders who have participated in the Pilot Project, has provided for the Board of the Engineering Accreditation Board to be comprise the professionals and academics from IEM, the Professional Institutions and the HEIs to operate the system.

By the end of October 2017, IEM will have already submitted an application for a grant from the Royal Academy of Engineering which has open a new Window under the GCRF Africa Catalyst with a potential for £300,000 (to be disbursed over 3 years) which, if IEM is successful in its application, will enable the proposed Engineering Accreditation Board to work its way into Washington Accord as a Provisional Member. IEM has identified one or two sources of funding which could enable it to progress, beyond the Academy funding, to the full membership status of Washington Accord. A Government commitment will be required to tide over a shortfall of resources.

## End of Chapter Five

# Chapter Six: Execution of the Pilot Project

## 6.0 Delivering on IEM's Commitment

## 6.1 IEM's Objective

In Chapter Two, we stated one of the possible reasons for the failure of the previous IEM/CRPE's initiatives was the absence of consultations prior to development of the draft of 2008. The Working Group on Engineering Accreditation (the WGEA) decided that this time it would do things otherwise.

Readers will find (at **ANNEX-9**) a copy of one such letters that was issued; this one to PEIs.

Thus, the various letters that were sent out to stakeholders as soon as the Working Group was constituted and the follow-on exchanges took place even before an application was made to the RAEng reflected IEM's determination to succeed this time. The project we had embarked upon was a Pilot one. Establishing an institutional accreditation system for engineering education was certainly IEM's ambition, and both IEM and the Working Group knew that such a development was not within reach in less than about 4 to 5 years. In front of the Working Group was a Project that was limited in time and resources: £40,000 and 6 months, but with a potential for creating an initial capacity that would permit us to go further.

## 6.2 Obligations of IEM under the Contract

In Chapter Four an indication is given of the respective roles of the IEM and Engineers Against Poverty (UK) as set out in the Terms of Reference for a UK Partner. As engineers who are used to engineering and construction contracts which bind the contractual parties to their responsibilities, obligations and liabilities, the WGEA has had to work to an entirely innovative contract format signed on the one hand between the Academy (funding agency), and on the other hand the Awardee (Lead member who applied for the Grant) and the Recipient (the Institution). Under this contract, the Academy held the Applicant Person (Awardee) responsible for delivery of the contract, i.e. the execution of the contract, while the Institution was contractually bound to the Awardee to provide all facilities, resources, logistics, etc., to enable the Awardee to ensure the execution of the contract. A specific provision required the Recipient to cooperate with any Consultant that the Academy may appoint to evaluate the contract, as well as requiring the Recipient (IEM) to grant access to the Academy's representatives (on reasonable notice) to inspect the accounting records and take copies.

A copy of the Agreement signed between the Awardee and the Recipient is included as **ANNEX-5** to this Report.

Another Agreement that was required was one on Intellectual Property Rights to cater for ownership of any Intellectual Property that would be created during the project. A Copy of that Agreement is included at **ANNEX-6** to this Report.

The contract also provided for any amount underspent on the Programme of Activities or any funds not spent exclusively on the Programme of Activities to be refunded to the Academy by the Recipient within 4 weeks of the Award End Date. Further the Recipient was to ensure that no Award funds were to be used for purposes other than for the Programme of Activities. As on the date of completion the accounts showed an underspent amount of £1430 in respect of which the Academy's instructions were awaited.

The contract contained the usual provisions regarding the client's obligation for the necessary legal and regulatory clearances and formalities for the conducting of the Programme of Activities, including necessary licences, visas and approvals are obtained, and maintained during the period of the Award. It contained some provision regarding likelihood of cancellation of contract which kept both the Awardee and the Recipient on their toes during the implementation of the project covered by the contract.

## 6.3 The Project Launch

The subject of accreditation has been exhaustively defined and explained in the previous Chapter, without getting into the technicalities, or even into the standards and criteria. The Working Group needed to find the best way to communicate the same to the stakeholders. For that purpose, it organised a major Project Launch at Voila Hotel. Contractually, the Project Commencement Date was 10th January 2017. However, it was felt that that date was too close to the New year's festivities for an announcement to be effective on that date. The Working Group needed to get its acts ready. The date of 23rd January 2017 was chosen after consulting a few VVIPs whose messages carry loud and far. The unexpected resignation of former PM Sir Anerood Jugnauth and the swearing-in ceremony of Hon Pravin Jugnauth as PM and that of his Cabinet of Ministers prevented the Hon Minister responsible for Education Human Resources, Tertiary Education and Scientific Research, as well as the Minister for Public Infrastructure and Land Transport respectively, from attending the launch function; H.E the President Dr (Mrs) Ameenah Gurib-Fakim, saved the day by being present and delivering the inaugural message. The Video of that days' event is still available on the IEM website here **<http://iemauritius.com/2016/#*>**. IEM was delighted to have the presence of Prof Chris Atkin President of the Royal Aeronautical Society, who had come to Mauritius in connection with a joint RAeS-AeSM programme scheduled for two days after the Inaugural Launch of IEM's Pilot Programme. His encouragement to IEM and his advice on likely difficulties on the way to Washington Accord accreditation were welcome.

A copy of the Inaugural Programme is included at **ANNEX-7.** A detailed Announcement of the GCRF Africa Catalyst Award was published on IEM website-Please see **ANNEX-8.** The IEM website carries additional information about the Africa Catalyst Project.

## 6.4 IEM's Specific Objectives

6.4.1 The IEM Working Group considers that the launch programme succeeded in communication the following key messages to stakeholders concerned with the education, training, professional development and employment of engineers, and in particular:

- that delivering engineering degree programmes to an internationally agreed academic standard is key to
  - building engineering capacity in the country;
  - enhancing the employment of engineers;
  - enhancing their cross-border mobility prospects;
  - bring international recognition to Mauritian University Degrees in engineering;

- that such a standard (e.g. Washington Accord), has been in existence, for more than a decade;

- that accreditation involves a process that places emphasis on ***what is learnt (and can be demonstrated) and NOT on what is taught,***

6.4.2 The Launch additionally provided an opportunity to apprise the audience of the intentions of the IEM through the Pilot Project: these could be summarised as follows:

(a) Creating a motivated and dedicated cohort comprising Leading Professional engineers & Academics, to take the project forward

(b) Imparting training to this cohort on:
- the deliverables expected from accredited engineering programmes;
- the applicable criteria for compliance with Washington Accord;
- the interpretation of these criteria;
- the process for ensuring compliance with the standard.

(c) Ensuring that by the end of the project a first cohort of engineers and academics will have acquired necessary knowledge, understanding and competence, under the purview of an eventual Engineering Accreditation agency:
- for serving as Evaluators and Team Chairs,
- for undertaking the accreditation of engineering degree programmes,

## 6.5 The Working Group Strategy

### *6.5.1 Seek and Enlist Expertise*

- This is a critical requirement for going public on a subject matter like accreditation; It was appreciated within IEM, that though it has been in existence since 1948, it has not developed competence in-house for accreditation of engineering degree programmes;
- IEM will be required to prove its credibility and seriousness of purpose, and would be required to acquire that competence if it gets involved in accreditation.

IEM requested its UK Partner (Engineers Against Poverty) to identify the professionals with the appropriate profile to help attain the objectives of the project.

### *6.5.2 Enlist support of VVIP with high credibility for the project launch;*

The Project Launch described under sub-paragraph 6.3 was part of the IEM Strategy; H.E the President is a person with very well-established credentials locally and overseas, and therefore a very credible person to speak about the need and purpose of accreditation of engineering degree programmes. H.E Dr Gurib-Fakim was incidentally the Inaugural Speaker at the CAETS Conference in London when the Academy launched the GCRF Africa catalyst Scheme. The honour that the Academy thus bestowed on Mauritius was perhaps not significant to most of our people, but the profession reaped the benefits therefrom.

### *6.5.3 Media Coverage*

For reason beyond IEM's control the Mauritius media's attention was drawn to more news worthy matters on the day of the Launch- Swearing-in of PM Hon Pravin

Jugnauth and his Cabinet. Nevertheless, the Inaugural launch was live-streamed on the website of the IEM as well as that of the Royal Academy of Engineering. The Video presentation of the launch is still available for viewing on both websites.

### *6.5.4 Bringing stakeholders on board.*

Following the Launch which was more of a public affair, the Working Group on Engineering Accreditation decided to move to the next strategy which was intended to

- Bring all concerned stakeholders on board, viz. those concerned with education, training, professional development, and employment of engineers, etc.
- Use Experts to introduce engineering programme accreditation to a selective audience, representative of the stakeholders; their wide experience can instil trust and confidence;
- Use the Experts' services to make a strong case for engineering degree accreditation;
- Invite Senior Government officials to state the Government policy-related view on accreditation of engineering degree programmes;
- Invite the Authorities and Programme Providers to participate;

## 6.6 Conference /Seminar /Follow on Activities

### *6.6.1 Securing the services of an Expert*

IEM's UK Partner had identified a few very able and distinguished personalities to help us achieve this first objective. We decided on Professor Barry G Clarke, Professor of Civil Engineering and Geotechnical Engineering at Leeds University, who was on the Engineering Council UK Washington Accord Team. He would be with us for a week from 13th to 17th February 2017. The programme catered for a Conference/Seminar which would run for a full day, and meetings with important personalities and focus groups during the remaining days Two presentations sessions were scheduled. To the University of Mauritius Engineering Faculty staff and students, as well as to the engineers.

A copy of Professor Barry G Clarke's programme is included at **ANNEX-10.**
The Conference Programme is included at **ANNEX-11**

IEM had pinned its hopes on Prof Barry Clarke to achieve the following:

### *6.6.2 To introduce and highlight specific Washington Accord Guidelines and Criteria and requirements, including;*

- that IEM satisfied the critical requisites of autonomy that would be required in its governance and accreditation decisions, and
- that IEM has the potential to satisfy certain other criteria upon completion of project ***though not all***, and
- that IEM has the potential to satisfy ***all the criteria*** during the time-span of provisional membership of the Acord, i.e. 4 years.

### 6.6.3 *To win over everyone to the cause of accreditation.*

- By Sustaining interest through follow-up sessions by EAP Expert Prof Barry Clarke
- Presentations: UoM (engineering students), and Engineers (IEM and other PEIs)
- One-to-one Meetings with:
    - PS Ministry of Education Tertiary Education & Scientific Research;
    - The Director TEC;
    - Chairman & members (CRPE); Exec Director (MRC); BOI (Sen Exec);
    - Head of Engineering Departments of other Univ: UTM, UdM, Universite de Nantes.

### 6.6.4 *Training of Evaluators – The Rationale*

It was also necessary to apprise the stakeholders of the following aspects of accreditation:

- That training of Accreditors / Evaluators is key to building capacity for conducting engineering accreditation and the operation of the accreditation system.
- That Accreditor training is a mandatory requirement of Washington Accord, and is key to demonstrating the credibility and competence of an eventual accrediting agency, and
- That Accreditation responsibility must be discharged by specially trained evaluators who can understand, interpret and apply standards, guidelines, assessment criteria, make judgements, and conduct Accreditation Visits to programme providers' premises and prepare reports for a decision by a Board.
- IEM would subsequently rely on the trained professionals for the successful implementation of accreditation in Mauritius. They would thereafter require hands-on practice to build the competence necessary to conduct actual accreditation assignments—which would be undertaken in a separately exercise.

### 6.6.5 *Creating a cohort of accreditors.*

The Working Group had foreseen the necessity of creating a group of like-minded and dedicated professionals for the tasks that were planned and included within the project. Letters issued to academics and practising engineers in January 2017 had notified the recipients of IEM's intentions and had requested them to show interest in the training sessions that were to be held on Washington Accord Documentation Review as well as in receiving training as potential accreditors. The Working Group plan was as follows:

- Familiarise a select cohort of academics and engineers on Washington Accord Rules and Accreditation Standards and procedures.

- Ensure a thorough understanding of Washington Accord Accreditation Process.
- Present specific examples of implementation of accreditation by a few organisations
- Prepare the cohort for subsequent activities planned within the project.
- Apprise the potential accreditors of the process to be put in place for the accreditation of engineering degree programmes, including the accreditation criteria that are considered in the evaluation of programmes when determining conformity with the Washington Accord standard, and
- Impart knowledge and ability in the interpretation and application of accreditation criteria to actual engineering degree programmes and the delivery environment.
- Impart the skills, ability, and confidence necessary to conduct a review of engineering programmes towards ascertaining and evaluating whether the programme published objectives conformed to the WA standard, and also delivered on its published learning objectives.

### 6.6.6 *Apprise the Cohort of Practitioners of the tasks ahead.*

The Working Group have had a rethink during the implementation of the project. The rethink had to do more with the engagement of the stakeholders associated with the project than with the activities. Capacity was being built up on the project, so why not start capitalising on the capacity being progressively built up. The participants had by this time become aware that in due course IEM will establish contact with Washington Accord Secretariat in respect of its eventual application for provisional membership. When this happens and the Secretariat is agreeable to receive IEM's application it will designate two Washington Accord members' representatives to act as Nominators (or proposers) for an eventual IEM application. The Nominators will want to see the Engineering Accreditation Board established by IEM in operation, and scrutinise the Board's Governance Manual, its manuals on Accreditation Standards and Procedures, Guidelines on Accreditation Visits, and generally how the Board has conformed to and complied with the requirements of Washington Accord. They would also wish to see how the Board's accreditor teams go about preparing for and undertaking accreditation. The Nominators would have yet another task: to see evidence that the accreditation activity would be sustainable.

The Working Group had to impress upon the stakeholders that it counted upon them not only to help establishing and running the EAB, but also to produce the various accreditation manuals and procedures that will eventually be used by the HEIs to redesign their programmes. However, a start would have to be made, and that with the development of the Governance Structure for an autonomous EAB itself. Without such a document, no progress was possible. IEM and the Working group had already announced that they had opted for the Singapore Model, where it was the Institution of Engineers Singapore which established the autonomous Engineering Accreditation Board.

## 6.7 What has been achieved

### *6.7.1 Conference/Seminar fall-outs*

During the week 14th to 17th February 2017, Professor Barry Clarke had intervened as the Keynote Speaker at the Conference held at Voila Hotel on 14th, in the presence of Mrs N D Ghoorah, the Permanent Secretary of the Ministry of Education, Tertiary Education and Scientific Research. Other Speakers included the IEM President Mr R H Prayag PDSM, Mr Roland Fayolle (Chair CRPE), Prof S Nair Director of TEC, Mr J. Soobarah (Team Leader WGEA-IEM Member, VP AeSM), Prof T Ramjeawon, Head of Dept, Civil Engg at UoM), Mr A Gungoosingh Consulting Engineer). The Conference concluded with a Q&A session where the audience could put up their questions to the Speakers and obtain clarification on issues of interest.

A full Report on the Conference and the various meetings with different stakeholders during that week is included at **ANNEX**- **12.**

Professor Barry Clarke's Presentation has been included as a separate **ANNEX-13** in this Report. His presentation covers the Washington Accord Accreditation Standard (the Graduate Attributes) in a sufficiently detailed manner, thus avoiding the Working Group the task of elaborating separately thereon.

Let it be mentioned here that meetings and one to one presentations were held with the Ministry of Education, Tertiary Education and Scientific Research, the Director Tertiary Education Commission, the Chairman Council of Registered Professional Engineers, the Executive Director Mauritius Research Council, the Senior Officers of Board of Investment, the Dean of the University of Mauritius, the Head of the UTM, and the Head of the Ecole des Nantes.

Professor Clarke's Summary of the Report is reproduced hereunder:

Quote:

"**SUMMARY**: A programme of meetings with stakeholders from industry, education and government undertaken by Prof Barry Clarke during his visit to Mauritius between 12th and 17th February 2017 in connection with a Pilot Project aimed at Building Engineering Capacity through the Accreditation of Engineering Degree Programmes, initiated by the Institution of Engineers Mauritius, led to the conclusion that gaining international recognition of the engineering programmes delivered by private and public universities in Mauritius aligns with the government's aims for education and the economy. Therefore, it is recommended that a collaborative approach to support IEM's application to become a signatory of the Washington Accord, an international agreement for engineering education should be supported and implemented." Unquote.

Professor Clarke's Recommendations are also reproduced hereunder:

Quote: "RECOMMENDATIONS: Given the momentum that this project created amongst the stakeholders in Mauritius, it would be appropriate to

- to establish the proposed Engineering Accreditation Board as soon as feasible;
- set up a Working Group to prepare an application for provisional membership to Washington Accord;
- develop the procedures for accreditation of engineering degrees in consultation with government, industry and education that comply with those of the Washington Accord;
- seek resources and support to undertake these activities and to obtain the services of two Nominators from among Washington Accord members, and

subsequently two Mentors to help develop the procedures and practice; " Unquote

### *6.7.2 Documentation Review Sessions*

The Working Group had decided that the Washington Accord organisations whose accreditation documents it would Review with the "trainees" were the UK, South Africa, Singapore, New Zealand, and Canada and, of course, Washington Accord itself. It sought and obtained the necessary authorisation from the Professional engineering bodies which were members of the WA, for downloading, reproducing and distributing the accreditation related documentation on their respective websites.

The Documentation Review sessions were carried out by the Working Group members; a total of 14 sessions were carried out. The first session covered the Best Practices for the Accreditation of Engineering Degree programmes as recommended by the International Engineering Alliance (IEA) and the European Network for the Accreditation of Engineering Education (ENAEE) in their joint publications on the same topic.

Twelve other sessions covered the accreditation standards and procedures of the Engineering Council South Africa, Engineers Canada, Institution of Engineers Singapore, Institution of Engineers New Zealand, and the Engineering Council UK. Two sessions were allocated to the Washington Accord Rules and Procedures, including the requirements for both the provisional admission into Washington Accord and the requirements for upgrading to "signatory" status.

A final session was reserved for presentations by representatives of the State and private Universities which had agreed to speak about their own initiatives to review or redesign their programmes in engineering towards eventual accreditation. The Working group team leader made a presentation on the objectives of the Pilot project and generally on the GCRF Africa Catalyst Scheme.

### 6.7.3 Training of Accreditors.

#### *(a) The Resource persons*

The intervention of our UK Partner, Engineer Against Poverty UK, through its Executive Director was instrumental in our obtaining the services of two very distinguished accreditors from the Institution of Engineering and Technology (UK), (the IET). The two Experts were:

(i) **Prof. Sean James Wellington**, BEng (Hons), MPhil, PhD, MBA, CEng, FIET, FHEA.

Associate Dean Strategy and Development - Faculty of Technology, Design and Environment, Oxford Brookes University. He holds the Chair of the IET Academic Accreditation Committee.

(ii) **Prof. Andrew Corin Downton**, BSc (Hons.), PhD, CEng., FIEE, SMIEEE.
Emeritus Professor (retired) De Montfort University. Prof Downton has a wide and specialist experience within the IET accreditation set up. He is a member of IET Accreditation Committee since 2006, and is the IET Chair of Accreditation panels for Electrical/Electronic Engineering degrees since 2006, and also serve on the IET/BCS, as well as the EAB joint accreditation panels.

### *(b) The Programme*

A copy of the Training programme for the potential Accred**i**tors is included in this Report at **ANNEX-14**

During the Working Group's discussions with the experts over the IET Conference suggested the following elements be included in the training programme, which were agreed:

1. **M**apping of Washington Accord criteria to a specific accreditation process and criteria (IET / UK EAB models); its applicability to Mauritius.
2. Accreditation criteria and the applicable processes; organisational logistics and infrastructure to deliver an accreditation service efficiently and robustly.
3. **I**nitial accreditation data review; identification of follow-up issues;
4. **S**imulating some aspects of a visit. (Simulating meetings with academic department staff and institution's industry partners during an actual visit). In each case the Trainers would join opposite sides, and either help moderate or interpret the questions on one side and responses on the other.
5. Post visit accreditation report and action plan; follow-up with the institution; final review week work and key learning points.
6. Debrief session with Working group.

### *(c) Our Assessment of the Training*

On the basis of feedback, from trainees, we can reasonably state that:

(i) trainees have become knowledgeable about the criteria that are considered in an accreditation assignment;

(ii) they have the ability to interpret these criteria and have gained knowledge on how to apply them to actual programmes and their delivery environment, and

(iii) they should be able, ***initially, under guidance and supervision of trained accreditors***, to conduct an accreditation assignment, towards developing their competence and confidence to the standard deemed acceptable.

### *(d) Could we have done more in terms of Training?*

There has been a demand for "more" from the potential accreditors (the attendees). The Working Group wishes to point out that when formulating the Pilot Project, it had to consider the following factors:

(i) the Pilot nature of the project imposed an obligation on the Working Group to ensure that only those activities be included which were directly relevant to the project's objective, and which were capable of being executed within the time-frame of the GCRF Africa Catalyst Scheme announced.

(ii) the Budget likely to be available comprising both the GCRF Africa Catalyst Funds and IEM contribution.

(iii) ***the impracticality of going beyond***, even if could have been desirable, exemplified by, say, including a component which would have involved a review of a particular programme of a specific University volunteering to subject its programme for a mock accreditation visit. The Working Group could not within the given time frame, and in the absence of its own procedure request an HEI to give access to the Experts, even for training of Accreditors.

## 6.8 Development of a Draft Governance Structure.

This task proved to be more difficult than was imagined. The document had to satisfy different constituencies. Firstly, it would have to be a document that provides readers with the background information about the IEM itself and explain the rationale of its decision to embark on accreditation. Stakeholders would wish to see therein some background information about Washington Accord, and how the different Washington Accord community members have established an accreditation framework within their jurisdictions. It should also contain sufficient information therein about the Washington Accord accreditation standards and requirements for the information of decision makers, especially the members of IEM Council who would have to approve the proposals contain therein prior to deciding to amend their institution's Charter or Constitution. There should also be a run down on the educational set up in Mauritius as well as the regulatory environment for engineering practice. The Working Group could draw on the experience of Institution of Engineers Singapore for amending the Institution's Constitution and establishing the Board of Accreditation, and draft the provisions relating to the Composition and functions of the Board as well as the criteria for appointment of the Chair and other Board Members along with the necessary delegation of authority to maintain the independence of the Board from the IEM Council itself and other sectors of influence specifically provided for by the Washington Accord Rules.

The Working Group agreed that the Leader of the Group produces a skeletal version of the proposed draft which could then be worked upon by other Working group members. A first draft was then ready for consultations. The attendees of the Washington Accord Review sessions as well as the trainees who attended the accreditation sessions were requested to indicate their willingness to be part of a Consultative Committee on Engineering

Accreditation. Some twenty-five of them responded. They were convened to two Review sessions at one week's interval when the Draft was discussed paragraph by paragraph.

The Working Group is extremely grateful and thankful to twenty- one of them who made it their duty to attend and contribute to improving the draft. It was explained to them that to the extent possible their suggestions to amend clauses should not be of a nature to affect or reduce the autonomy of the proposed Board.

The Draft Document was also forwarded to IEM's UK partner (EAP) for review. Most of the suggestions received from all sources were retained for consideration, except where it was felt that any proposed amendment would conflict with some Rules of the Washington Accord.

A final Draft version of the Governance Structure (dated 28 July 2017) was finally handed over to President of IEM, after obtaining clearance from EAP on use of its logo, and from the Royal Academy on the Disclaimer inserted on the inside cover page. It is understood that IEM will put the document in circulation and call for comments prior to requesting its Council to approve the document, which should then become the Governance Manual for the proposed Engineering Accreditation, after making such amendment to IEM's constitution as may be necessary to accommodate the establishment of the EAB.

The size of the document does not permit its inclusion as an Annex to this Report, but a Table of Contents is included as **ANNEX 15**

Also annexed is ***a list of members who agreed to be part of the Consultative Committee*** on Engineering Accreditation (CCEA). **ANNEX-16**

## 6.9 Support from the Regulatory Body and the Tertiary Education Commission.

It has been stated elsewhere that the **International Engineering Alliance**, which comprises the three Accords, viz. **Washington Accord** catering for Professional Engineers, **Sydney Accord** catering for Technologists (also referred to as Incorporated Engineers in the UK, and Associate Engineers in Ireland) insist on the autonomous and interference free nature of the accreditation operations by the Accrediting Body. In addition to this, the accreditation body must demonstrate that it is the body recognised for accrediting engineering degree programmes as well as being representative of the engineering profession in its jurisdiction.
The Working Group on Engineering Accreditation and IEM are satisfied that the IEM Engineering Accreditation Board proposed in the Draft Governance Document has received the support of the Council of Registered Professional Engineers which will have at least three representatives on the Board of the EAB. A further consideration as regards the regulatory authority is that while Washington Accord impresses upon its members to use its endeavour with the Regulatory body to accept or recognise programmes accredited to Washington Accord standard as satisfying the academic requirement for licensing, it does not involve itself with the licensure requirements which are local requirements.

Likewise, the Working Group and IEM have noted with satisfaction that the requirements of Washington Accord and those of the Tertiary Education Commission complement each other and are not in conflict with each other. TEC has a statutory function which requires the Commission to ensure that the HEI seeking to establish itself has the resources necessary and satisfy the requirements of the Commission prior to being authorised to set up campus in Mauritius. Further the Commission must ensure that the programmes being

offered to the public are of an approved standard for the level at which the programmes are dispensed.

Accreditation under Washington Accord steps in only after the programme has delivered a cohort of graduates and in in the process of delivering the second cohort.
Institution, and the accrediting body should only accredit programmes duly authorised to be offered in the jurisdiction of the Accord Member.

## 6.10 Support from Government

IEM and the Working Group have noted with great satisfaction the announcement made in Parliament by the Government, through the voice of **Mrs Dookun-Luchoomun,** the Hon Minister of Education, Tertiary Education and Scientific Research of the notice that Government has taken of the initiative of IEM. We quote hereunder the Response to a Parliamentary Question on 28 March 2017 to a Honorable member who had a question for the Hon Minister:

Quote: " *I am also informed that the Institution of Engineers, Mauritius has since February 2017 taken steps to make Mauritius an eventual signatory of the Washington Accord which is a constituent forum of global initiative called the International Engineering Alliance. We understand that this alliance has set accreditation standards for engineering at the professional level through the Washington Accord.*" Unquote
To a Supplementary Question, the Honourable Minister's response was: Quote: **"** *… I also understand that the Washington Accord Member undertakes to recognise the accredited programmes of other Washington Accord Members as equivalent to its own and this can be only be beneficial for our local universities offering the engineering programmes. … "* Unquote

And again: Quote: "Madam Speaker, … … … *As I have just mentioned in my answer, we are in the process of becoming a Signatory of the Washington Accord.* ***"*** Unquote

The Working Group on Engineering Accreditation considers that the project's initial aim which was to bring awareness about accreditation among the stakeholders in education in particular and among the public has been achieved; equally IEM has achieved its objective of producing an initial capacity that can take the accreditation project forward.

## 6.11 Reporting to the Academy and Mid Term-Evaluation by the Academy's appointed Consultants.

### *6.11.1 Contractual Obligations on Reporting*

The Contract binding the IEM to the Academy required the Awardee to submit Progress/Status Reports as follows:

(i) a Commencement Report on 10th January 2017;

(ii) A Mid-Term Report on 17th March; this date was extended for IEM to 21st March because of a problem faced by Team Leader while accessing the designated portal for uploading the Report.

(iii) A Completion Report by 17th June, extended to 28th July on request of the Africa Catalyst applicants.

(iv) Submission of Commencement of Activity Reports.

The Working Group is satisfied that it was able to comply with the above contractual requirements and do so in time. Copies of the Mid-Term Report as well as the Completion Report have been included with this Report as **ANNEX-17** (Mid Term Report) and **ANNEX-18** (Completion Report).
A copy of the Budget/Expenditure Statement is included at **ANNEX-19**

### *6.11.2 Mid Term Evaluation.*

The Royal Academy of Engineering had appointed Messrs **Cambridge Economic Policy Associates, (CEPA)** London, to conduct an External Evaluation of the project based on the Mid-Term Report submitted by the Working Group on Engineering Accreditation of IEM.

That evaluation was conducted over SKYPE on Monday 27th March at 17H00 Mauritius Standard Time, for about 90 minutes, during which the following members of the Working Group were on standby at IEM House, Quatre Bornes, to provided answers to the Consultants' queries and supply clarifications on such issues as the Consultants deemed fit to raise: Jagadish Soobarah, Raj H Prayag, Jayesh Desai, Dr Andre Chan Chim Yuk, Donald Dhondee and Deven Daliah. The Consultants (Messrs Oliver Bubb Humfryes, Michael Obanubi, and their colleagues) had previously indicated by mail that they would discuss the following:

- the contents of your mid-term report;
- what plans are in place to continue and (if appropriate) scale-up your pilot project; and
- any feedback you may have on the Academy's approach to implementing the GCRF Africa Catalyst programme.

The Working Group was quite satisfied with the nature of the communications exchanged over Skype, and was confident that it had satisfied the Consultants of CEPA.

### *6.11.3 Re-Completion Report*

The Completion Report was effectively uploaded on the Academy's website on 28th July.
For the purposes of the Project the last activity was the development and production of the Draft Governance Report which was completed and handed over to the President of IEM.
There were some queries on that Report from the Programme Manager Ms Louise Olofsson, which have been answered by the Working Group. No other query is expected, but the Working Group and IEM will supply any other clarification that may be sought by the Academy.

We expect that a copy of the Draft Governance Manual will also be submitted to the Academy, once IEM has pronounced itself thereon.

If there is anything else that is outstanding then it is a copy of this Report which should be submitted to close the Pilot Project definitely, with any refund that the Academy would wish us to make, after scrutiny of the Project Accounts.

**End of Chapter Six**

**28 July 2017.**

# Chapter Seven: Beyond the Pilot Project

## 7.0 Execution of the Pilot Project

### 7.1 Looking back

Chapter Six is for all practical purposes the final Chapter of this Report as on the date of the Project Completion. We find ourselves in a position where, after writing everything that needed to be said, we feel it necessary to "re-open the envelope" to add a few more words. The Working Group craves your indulgence for a few minutes more.

Our Reports to the Academy have given rise to certain queries based on our own statements or issues that we raised in these Reports. We would like to mention three of them.

#### *7.1.1 Would we have implemented the Project differently if we were to restart?*

The answer is no. We only most probably have repeated what we did, as can be made out from the following comments:
We have started in a vacuum and had to reach a certain point before contemplating the next move: that is, we needed to create a critical capacity to be able to plan forward. IEM can confidently state that Mauritius now has that capacity which we can incorporate in what we could term the Extension or Stage-2 of the project. From here on, IEM has to look at a multi-pronged action, as follows:

(i) Establish the EAB and provide it the means to kick start its preparations.

(ii) Create opportunities for imparting accreditation skills to the participants of the present project. Only UoM has seriously embarked on redesigning programmes to satisfy a standard substantially equivalent to Washington Accord. Therefore, locally UoM, which currently has an agreement with ECSA seems to be the only outlet for our prospective accreditors.

(iii) Motivate the HEIs offering engineering degree programmes to prepare themselves to be "Washington Accord ready" and put in a request for accreditation, which would create some opportunities for training, even as Observers, in the absence of an Accreditation Board already up and running.

#### *7.1.2. Can the project be replicated?*

WE believe it can be replicated in jurisdictions similar to ours, i.e where there are no opportunities for accrediting programmes locally. In such circumstances, they would have to think similarly and we presume act as we did, or seek accreditation from other Washington Accord countries. But here IEM decided that there should be a Mauritian accreditation body for engineering programmes. However, not every small jurisdiction needs to do so. Washington Accord Rules and procedures already make provision for Washington Accord organisations to undertake accreditation in non-Accord jurisdictions.

### *7.1.3 Can the accreditation system be sustained*

Before replying to this question, may we examine the current situation. There is no accreditation service in Mauritius.

Mauritius Universities ***desiring accreditation*** have the option of seeking accreditation from the nearest Washington Accord country/accrediting organisation. They are doing that. That would be the Engineering Council of South Africa. If accreditation could be effected by an exchange of e-mails then the only question that would arise is whether the Universities can afford the cost thereof. State funded Universities can always redirect their invoices to their Governments or other funding agencies, if the latter are happy with the arrangements. Private Universities would pass the bills to their students through the fees. Currently only UoM is known to have an agreement with ECSA.

If accreditation were a mandatory requirement for continuing to offer engineering degree programmes, then the situation would be discriminatory to the private Universities and could leave them with dwindling intakes in engineering programmes. However, it is not likely to be made mandatory; neither IEM is requesting this nor the Working Group has recommended making it compulsory.

It should be recognised that an accreditation body in Mauritius would save all the Institutions desiring accreditation at least the cost of airfare for at least 3 accreditors for several visits during an accreditation assignment, and reduce their accreditation bills since the cost of services in Mauritius are certainly lower than practiced elsewhere. IEM has decided not to make a business out of accreditation.

The sustainability issue has been raised by the Academy, its Consultants as well as potential partners for an eventual Stage-2 project. It is not intended that IEM/EAB creates a monstrous organisation with the capabilities of the Accreditation system of major countries having hundreds of Universities and thousands of programmes, ranging from aerospace to nuclear engineering, to accredit, not to mention the thousands of engineering students. It is expected that it should hold develop capacity to accredit common engineering programmes delivered by Mauritian Universities and make arrangements with other Washington Accord organisations for engineering disciplines for which it has no trained accreditors or Team Chairs.

As a potential Washington Accord signatory, it will have to assume certain obligations such as paying its membership dues, attending the meetings of the International Engineering Alliance (wherever they are held), providing accreditors if designated for some assignments, accepting Mentors and Reviewers who will be designated by Washington Accord to scrutinise the EAB's processes and reporting thereon, or even accept the presence of External Accreditors at its accreditation operations. These obligations call for some resources at the disposal of IEM/EAB.
We are including at **ANNEX-20** the Requirements published by the International Engineering Alliance in documents on its website. These are published as Schedule B1 and B2. The notes on **ANNEX-20** are our own.

IEM has already identified certain sources; these include contributions from engineering institutions and the CRPE. IEM expects to convince the Government to

recognise in the profession's initiative as a national effort and extend support without affecting the autonomy of the EAB.

IEM is optimistic that the accreditation arm that has been proposed will be sustainable. HEI's, Employers, including the State, and the Economy which will reap the benefits of accreditation should realise that the benefits can only come at a cost and they cannot look the other way and expect the benefits to come their way.

## 7.2 Acknowledging the support of the Royal Academy of Engineering

This Chapter of the Report—the last—is coming to its end, and with that the story of IEM's initiative, which is in fact the next major initiative since the enactment of the Registered Professional Engineers Council Ordinance in 1965 and the failed initiatives of the past. It has operated reasonably independently all these years since 1948. IEM is grateful for the support received from the Royal Academy of Engineering (UK) under the GCRF Africa Catalyst Scheme which has thus permitted Mauritius to take pride in having created an initial capacity in matters of engineering degree programmes to an international standard.

IEM offers its thanks and gratitude to **Professor Dame Ann Dowling FREng, President of the Royal Academy of Engineering** for all the Academy's efforts to enhance the engineering dimension, from which we have just benefited.

The Working Group on its part is thankful to the Africa Catalyst Programme Manager ***Ms Louise Olofsson*** and International Development Manager ***Ms Meredith Ettridge*** for having been there at all times for responding to the call for help from the IEM Working Group Project Leader throughout the implementation of the project. We are also thankful for assistance to the Academy towards completing the Africa Catalyst application form, through the ***GCRF Africa Catalyst Webinar*** conducted by the Communications Manager of ADEPT, Haja Bally, on 21st October 2016.

More recently the Academy provided an opportunity to the Team Leader Jagadish Soobarah to attend the Academy's Conference in Ethiopia to make a presentation on the IEM Pilot Project. This was another networking opportunity contributing to instilling confidence in us that we are doing things the right way.

The Team Leader wishes to place on record assistance provided by Academy Staff Ms Rebecca Gaitch and Terri Johnson in connection with travel and other arrangements for the two participants (Jagadish Soobarah and Jayesh Desai) from Mauritius to the CAETS Conference held in London in September 2016.

IEM and the Working Group are looking forward to yet another opportunity to work with the Academy. Hopefully that will come under the Stage-2 of the GCRF Africa catalyst Scheme.

## 7.3 Acknowledging the Assistance from our UK Partner and Collaborator Engineers Against Poverty.

Engineers Against Poverty (EAP) UK, through its Executive Director Petter Matthews, has been constantly in touch with us, ready for any coordination and assistance that the Working Group needed to ensure the smooth execution of the project. We are grateful to EAP Associate Mrs Deborah Seddon whose provided us with very relevant Guidance

material for working our way to Washington Accord and reviewed the Draft Governance Structure developed by the Working Group.

We thank Petter for having agreed to collaborate with us and issue us with a Letter of Support that made the collaboration possible. We thank Petter for having coordinated the missions of Professor Barry G Clarke of Leeds University, as well as the services of Professor Sean Wellington, Chair of the IET Accreditation Committee, and Prof Andrew C Downton member of the IET Accreditation Board.

We extend our thanks to EAP's staff Sean Henderson and Mia Jeannot who had kept the communications line in operation while Petter was off on his trips to the horn of Africa or to some more distant location.

We acknowledge the assistance received from Paul Jowitt CBE FRSE FREng FICE, President, Commonwealth Engineers Council (CEC), who kept us informed of the progress with our applications.

### 7.4 Acknowledging the Assistance the Experts from UK.

The Working Group considers that the following distinguished Professors: Barry G Clarke of Leeds University, Sean Wellington Chair of the IET Accreditation Committee, and Andrew C Downton member of the IET Accreditation Board have rendered an immense service to IEM and the engineering profession in Mauritius.
They have been instrumental in our delivering the key objectives that IEM and the Working Group had targeted, namely sensitizing the stakeholders concerned with the education, training, professional development and employment of engineers to the effect that accreditation of engineering degree programmes is key to building capacity to face tomorrow's global challenges, and secondly help us create a cohort of potential accreditors by imparting knowledge and understanding of accreditation criteria and procedures to a select group.
The Working Group wishes to place on record its appreciation and thanks to them for the services rendered.

### 7.5 Acknowledging the Collaboration of Professional Engineering Institutions.

The Working Group is thankful to the IET (Mauritius) and the Aeronautical Society of Mauritius for their collaboration at the Working group level, and appreciated the expression of encouragement and support from the Mauritius Chapters of ICE and IMechE**.** The Working Group was pleased to note that the individual members of those distinguished institutions extended close collaboration with the IEM.

### 7.6 Acknowledging the successful collaboration of Colleagues from the Profession and the Academia.

This Project, the Pilot project on ***Building Engineering capacity through the Accreditation of Engineering Degree Programmes*** is a very small project by any scale of comparison. It is said that engineers do not know how to advertise themselves or their ingenuity or even their technical excellence. Does this explain why the news of the accreditation project never hit the headlines, even after a sincere effort at engaging media expertise. The Working Group is nevertheless happy with the outcome. Information has gone to those stakeholders

for whom our message was intended. Members of our august Parliament came to know about IEM's initiative from no other than the Hon Minister of Human Resources, Tertiary Education and Scientific Research, herself, through her reply to the Question of a Honourable Member of the Parliament.

The Working Group is very appreciative of the encouragement as well as freedom of operation received from the President of IEM and the Executive Council of IEM. With the completion of this project Council of IEM now have copy of the Completion Report as well as copy of the Draft Governance Structure that would (i) inform the Council of what has been achieved, and (ii) suggest the likely next step towards accreditation.

At the time of writing, information has been received from the President of IEM that IEM Council has approved the Draft Governance Structure, developed by the Working Group with the collaboration of the Consultative Committee on Engineering Accreditation (constituted by the participants to the various training workshops conducted during the project). That means IEM has now a Governance Manual for the EAB. The Working Group is pleased to record its gratitude to all the participants and collaborators, including resource persons who have intervened at various stages of the project towards its success. These persons, who have contributed to the improvement of the contents, purpose and objectives of the Draft Governance Structure, being too numerous to be mentioned here, have been identified in **ANNEX-12** (Professor Barry's Report) and **ANNEX-16** (Consultative Group), who are also persons who attended most of the sessions on Washington Accord Documentation Review and the Training of Evaluators.

The Pilot project has permitted the Working Group to make use of facilities available Voila Hotel Bagatelle, as well as at the Offices of Pro-Five Consulting Engineers. The Working Group is happy to record that the facilities at both locations were excellent for running the accreditation related training programmes.
Last but not the least the Working Group wishes to thank H.E Dr (Mrs) Ameenah Gurib-Fakim for having launched the project on 23rd January 2017, with a reminder that she had been the Inaugural Speaker at the September 2016 CAETS Conference hosted by the Royal Academy of Engineering in London, when the GCRF Africa Catalyst Scheme was launched.

### 7.7 Compelling thoughts

The Institution of Engineers Mauritius, and for that matter, the Engineering Profession and the Academics, have realised that to build Engineering Capacity it is essential to start creating that initial capacity in terms of the human capital that will be called upon to innovate and create the capacity that the nation requires now and in future years. The UK Government has done a lot of thinking about how to come to the aid of the Sub-Saharan states which comprise us and others like us, and has agreed to grant assistance under its Global Challenges Research Fund. We are still fortunate to have a Per Capita income which puts us in the UK Overseas Development Assistance List of eligible nations —eligible for its assistance. The Government of Mauritius wants to make Mauritius a high income earning nation. How high? Our query arises from the fact that if Mauritius finds itself with a per Capita Income higher than the GNI for Upper Middle-Income Countries, i.e. $4126-$12725, then Mauritius will graduate out of this list, and no longer eligible to the ODA funds.

The above development should not be a concern if Government steps in to assume its responsibility for the purpose for which IEM had turned to the Royal Academy of Engineering. With due respect to our policy makers, we hope that this does not come too soon! At least not before we complete the mission we have undertaken or before Government steps in to take over from where the UK Government, through the Academy, leaves us.

The Working Group on Engineering Accreditation which has taken note of the so many the highly ambitious development projects that Government has initiated, believes that these development initiatives should be accompanied by equally ambitious initiatives to build capacity. Many in Mauritius are thankful, nay, grateful to all those foreign nations, international organisations, Universities, and NGOs, in and out of Mauritius who, in the past and some still at present, have stepped in to offer opportunities to Mauritian citizens to complete their education, training and development, or to pursue higher education or do research.
The Working Group strongly recommends that Government creates a Budget Item "Capacity Building" and allocates funds into it for capacity building in any filed where shortage of skills is felt.

### 7.7 A New Window of Opportunity Opens up

The Working Group is pleased to announce to the stakeholders in engineering education, training, professional development and employment of engineers, and especially to its collaborators and participants in the Pilot Project on ***Building Engineering capacity through the Accreditation of Engineering Degree Programmes*** that IEM has received a message from the Royal Academy of Engineering to the effect that **a new call for grant proposals will be open from 5pm on Monday 17 July 2017 – 4 pm on 23 October 2017.**

The message from Ms Louise Olofsson, GCRF Africa Catalyst Programme Manager reads as follows:
Quote:

> "Following discussions with various stakeholders, a mid-term review of the pilot projects and recommendations from external consultants, the Royal Academy of Engineering has revised the strategy for the programme to ensure that maximum impact is achieved. More information will be published on the Academy's website on Monday, but to give you a brief insight to the next phase, please see below.
>
> The aim of GCRF Africa Catalyst is still to strengthen professional engineering bodies in sub-Saharan Africa so that they can effectively promote the profession, share best practise and increase local engineering capacity, to help drive development. This is to be supported by high quality research focusing on expanding the evidence base for the importance of robust engineering institutions and the role they play in delivering sustainable growth, and mapping engineering capacity and diversity in the countries where grant funding has been administered.
>
> In phase two of the programme, the Academy will allocate funding under two closely connected programme areas, both promoting collaboration between countries in sub-

Saharan Africa and the UK. In addition, the Academy is encouraging further collaborations, both locally, regionally and internationally.

- The first programme area consists of grants for capacity building which are open to professional engineering bodies, including registered not-for-profit federations, organisations, institutions and associations based in sub-Saharan Africa*, working in collaboration with a UK partner.
- The second programme area is focused on research, and will be an open tender for universities and leading researchers in the UK, working in collaboration with researchers and professional engineering bodies in programme-relevant countries in sub-Saharan Africa. **This tender will be published in August 2017.**

*For the purposes of the programme, the Academy considers the following 49 countries to be part of sub-Saharan Africa: Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Republic of the Congo, Democratic Republic of the Congo, Côte d'Ivoire, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gabon, The Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Lesotho, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, South Sudan, Sudan, Swaziland, Tanzania, Togo, Uganda, Zambia and Zimbabwe.As mentioned above, more information will be available on the website on Monday. If you have any questions, please do not hesitate to get in touch. "

Unquote

Our Readers would have guessed right. IEM will most certainly put in an application under Stage-2 of GCRF Africa catalyst. The FIRST Condition is that the Working Group, which requires some new blood and some invigoration can put in a successful bid, with a potential of receiving a grant of up to £300,000, then IEM/EAB will be at the door-step of signatory status of Washington Accord. The SECOND Condition is demonstrating that the the Accreditation System in Mauritius will be sustainable.

***The Working Group leaves the Readers with the following BIG QUESTION is: Will IEM/EAB be able to satisfactorily demonstrate and convince the Funding Agency as well as the eventual collaborators of the sustainability of the accreditation system that IEM would wish to establish, considering that it is the economy that will stand to gain; IEM/EAB will only be the means***.

**IEM and the Engineering Profession expects the Government and the Authorities to take a call on this issue.**

IEM will expect an answer by mid-October 2017, if it is to finalise an application for uploading on or before 23 October 2017.

**End of Chapter Seven and Last Chapter.**

**Institution of Engineers Mauritius**
**Report on a Pilot Project to**
**Build Capacity through Accreditation of Engineering Degree Programmes**

# The Conference
# of
# Council of Academies of Engineering and Technological Sciences (CAETS)
## September 12-15, 2016

## A window of Opportunity for the Engineering Profession of Mauritius

On 12 July 2016, the Royal Academy of Engineering UK invited four members of IEM to put in an application for a grant to attend a Conference of the Council of Academies of Engineering and Technological Sciences (CAETS) which it was hosting in London, at the seat of the IET (at Savoy Place) on the theme "***Engineering for a Better World – Capacity Building in the Developing World***".

The invitation said that the Academy was offering grants, on a competitive basis, to assist the following groups to attend:

> **(i)** Engineers from developing and emerging economies who are involved in founding or developing engineering academies or institutions, or in supporting the development of the engineering profession more widely, in their country or region.
>
> (ii) Early career engineers, including students, from developing or emerging countries, who are interested in supporting the development of the engineering profession in their country or region.

The Sender (Camila Walker) impressed upon the recipients to apply. It would be a brilliant opportunity to attend the CAETS conference and to be part of a discussion about strengthening the engineering profession globally, and that they had space for more than one per organisation.

All the IEM members had to do was to fill a form and answer a few questions. Two members were chosen (Jayesh Desai and Jagadish Soobarah). We presume the fact that they were both Past President of IEM must have played in their favour.

We have reproduced below information taken from the RAEng website, since that would be more faithful record than what we would try to recall from memory. We will how draw your attention to the information that the inaugural address was given by H.E Dr (Mrs) Ameenah Gurib –Fakim GCSK PhD, who in her address called for increased efforts towards to attract girls to science and engineering.

The other important information that we wish to share is that on the second day of the Conference (13th September) —a coincidence IEM members would say since it coincided with Engineers day in Mauritius, where the guest speaker at IEM Annual Dinner function was none other than the Vice President of the Republic—the Royal Academy of Engineering launched the GCRF Africa Calatyst Scheme, that subsequently offered IEM the opportunity to implement the Pilot Project on Engineering Capacity Building through the Accreditation of Engineering Degree Programmes.

# Institution of Engineers Mauritius

## Report on a Pilot Project to Build Capacity through Accreditation of Engineering Degree Programmes

IEM is indeed thankful to the Academy for invitation two of us there and opening this Window of Opportunity to IEM and in fact to the Mauritian Engineering profession.

The second part of this APPENDIX concerns the CAETS and the Summary of the Conference Proceedings.

### The CAETS

What we need to know about the Council of Academies of Engineering and Technological Sciences

It was founded in 1978 by five National Academies as follows:

1. Australian Academy of Technological Sciences and Engineering (ATSE), [Formerly Australian Academy of Technological Sciences (ATS)]
2. Royal Academy of Engineering of the United Kingdom (RAEng), [Formerly the Fellowship of Engineering (FoE)]
3. Academy of Engineering (Mexico) (AI), [Formed in 2002 by merger of the National Academy of Engineering (ANI, Founding Member) and the Mexican Academy of Engineering (AMI)]
4. National Academy of Engineering (United States) (NAE), and
5. Royal Swedish Academy of Engineering Sciences (IVA)

The five Founding Academies (page 5) were involved in the 1978 and the subsequent convocations, and helped form the nature of and the launching of CAETS in 1985. Thereafter, new member academies were added through the election process. In 1985 the name "Council of Academies of Engineering and Technological Sciences (CAETS)" was agreed. On incorporation in 2000, the name became the " International Council of Academies of Engineering and Technological Sciences, Inc. (CAETS)." Twenty-one more members have joined the CAETS.

CAETS is a non-profit corporation, incorporated in the District of Columbia, USA, <e-mail: caets@nae.edu>

CAETS is an independent non-political, non-governmental international organization of engineering and technological sciences academies, one-member academy per country, with the following objectives:

The objectives of the CAETS are as follows:

- It is prepared to advise governments and international organizations on technical and policy issues related to its areas of expertise;
- It contributes to the strengthening of engineering and technological activities to promote sustainable economic growth and social welfare throughout the world;
- It fosters a balanced understanding of the applications of engineering and technology by the public;
- It provides an international forum for discussion and communication of engineering and technological issues of common concern;
- It fosters cooperative international engineering and technological efforts through meaningful contacts for development of programs of bilateral and multilateral interest;
- It encourages improvement of engineering education and practice internationally; and

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- It fosters establishment of additional engineering academies in countries where none exist.

Readers may please access the CAETS website at **http://www.caets.org/** for more information about the CAETS and its activities.
We believe we will do justice to the Conference by reproducing here the Conference Summary published on the website of the RAEng, hereunder:

## … Text Reproduced from the website of the Royal Academy of Engineering…

23 Sep 2016.

Last week, the Royal Academy of Engineering hosted more than 400 people from over 40 countries at the *Engineering a Better World* conference, a two-day event and associated fringe activities that explored how engineering can drive progress towards the UN's Sustainable Development Goals.

The first day of the conference brought together inspiring speakers from around the world to discuss and debate how engineering – at scale, and through grassroots innovation and entrepreneurship – can transform lives in both developed and developing countries, and how to enable engineering to have a greater impact.

An audience of engineers, entrepreneurs, academics and experienced international development professionals heard keynote speeches from the President of Mauritius (herself a biodiversity scientist) Dr Ameenah Gurib-Fakim, and Amir Dossal, President and CEO, UN Global Partnerships Forum.
Engineering a Better World: the highlights

Dr Gurib-Fakim commented that “only through science, technology, engineering and mathematics can we as a global community increase the prosperity of our people” and called for more measures to attract girls to science and engineering.

Amir Dossal challenged the private sector, academia and civil society to work more closely together to address the Sustainable Development Goals.
Other thought-provoking international speakers included:
• Dr Jo Da Silva OBE FREng, Director, ARUP International Development, who spoke about the need for “tangible engineering that helps solve the world’s biggest challenges: poverty, urbanisation and climate change”.
• Dr Allyson Lawless FREng, Managing Director, South African Institution of Civil Engineering (SAICE) Professional Development, who called for the development of young engineers through workplace learning.
• Yassmin Abdel-Magied, Founder, Youth Without Borders, who spoke about the need for greater diversity in engineering.

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• Dato' Sri Idris Jala, Advisor to the Prime Minister of Malaysia and CEO of PEMANDU, who called for greater collaboration within the private sector and the need for the public sector to act as a catalyst for social and economic change.

Royal Academy of Engineering Royal Fellow HRH Princess Anne, The Princess Royal was unable to attend the event due to illness, but sent a message to delegates, in which she highlighted the need to build a more diverse engineering community.

Bill Gates also delivered a video message. He highlighted the need to make science and technological innovations available to the world's poorest communities and challenged delegates to work together to maximise the contribution of engineering to the UN Sustainable Development Goals: https://www.youtube.com/watch?v=bjApCgaSFoM

*Engineering a Better World* marked the Academy's presidency of the International Council of Academies of Engineering and Technological Sciences (CAETS).
Day two of the conference built on the themes and issues discussed on the first day, but focused on the role of national engineering academies and institutions, and how they can have a genuine impact on social and economic change. Delegates from all 26 members of CAETS took part in a series of lectures, panel discussions and workshops to share best practice in building engineering capacity.

Following the conference, the CAETS academies have agreed to take measures to boost their own capacity to meet the Sustainable Development Goals, including through a new Engineering for the SDGs network, a forum in which the best global engineers can share knowledge and build partnerships with the international development community.
Outside of the main conference, a day-long event allowed young engineers from the UK and abroad to share ideas, build international connections with other engineering leaders of the future and learn how they can contribute to achieving the Sustainable Development Goals. 85 young engineers from eight different countries attended, and were assigned challenges in groups to identify ways of addressing the Sustainable Development Goals.
Engineering a Better World culminated in a celebratory reception at St James' Palace, hosted by HRH The Duke of Kent.

Professor Dame Ann Dowling OM DBE FREng FRS, President of the Royal Academy of Engineering, said:

"This conference isn't just about celebrating engineering's contribution to economic and social development. We also need to show how it can be improved in the years to come.

"In the UN's 17 Sustainable Development Goals, we have a challenge every bit as ambitious as President Kennedy's moonshot- and a need that is even more acute. If we are live up to our responsibilities to the world's poorest, we need to work better and smarter as a global community."

The conference is part of the Academy's broader programme of international work to build capacity in engineering education, research and innovation in developing countries, and to

share best practice in engineering capacity building for the global community to benefit from.
Information about the event programme and speakers, as well as content from the day, can be found at www.raeng.org.uk/engineeringabetterworld.

- Ends -

**Notes for editors**

1. **Royal Academy of Engineering.** As the UK's national academy for engineering, we bring together the most successful and talented engineers for a shared purpose: to advance and promote excellence in engineering. We provide analysis and policy support to promote the UK's role as a great place to do business. We take a lead on engineering education and we invest in the UK's world-class research base to underpin innovation. We work to improve public awareness and understanding of engineering. We are a national academy with a global outlook.
We have four strategic challenges:

- Make the UK the leading nation for engineering innovation
- Address the engineering skills crisis
- Position engineering at the heart of society
- Lead the profession

For more information please contact:
Shenel Otkay at the Royal Academy of Engineering
T: 020 7766 0744
E: Shenel Otkay

…… **End of Text Reproduced from the Website of the RAeng** ……..

# Institution of Engineers Mauritius

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## The Royal Academy of Engineering (UK)

**Note from The IEM Working Group on Engineering Accreditation (WGEA).**

In this ANNEX (2) it is wished to give Readers some information about the Royal Academy of Engineering (UK). The WGEA considers that it would be more appropriate if the Readers could read what the Academy itself must say. The Academy website can be accessed by entering either of the following addresses in your Search browsers:
< http://www.raeng.org.uk/about-us> or
< http://www.raeng.org.uk/about-us/what-we-do> or else
click on this link.

For information about Grants and Prizes please click here or access
http://www.raeng.org.uk/grants-and-prizes

For information specifically about the GCRF Africa Catalyst Scheme to which IEM responded please click here or http://www.raeng.org.uk/grants-and-prizes/international-research-and-collaborations/africa-catalyst/current-and-recent-awards
Readers will find information on the Academy's website about a Stage-2 of the Africa catalyst Scheme now opened.

**Text Reproduced from the <About us> page from the Academy's website**

**What we do**

Engineering is at the heart of our nation and our future, transforming ideas and materials into global infrastructure, products and services that in turn increase the wealth and health of our economy and society.

**Royal Academy of Engineering**

As the UK's national academy for engineering, we bring together the most successful and talented engineers from across the engineering sectors for a shared purpose: to advance and promote excellence in engineering.

We provide analysis and policy support to promote the UK's role as a great place to do business. We take a lead on engineering education and we invest in the UK's world-class research base to underpin innovation. We work to improve public awareness and understanding of engineering.

We are a national academy with a global outlook, and we use our international partnerships to ensure that the UK benefits from international networks, expertise and investment.

**The Fellowship**

The Academy's activities are shaped, led and delivered by its exceptional Fellowship, which represents the nation's best practising engineers, innovators and entrepreneurs, often in leading roles across business and academia.

**Strategic challenges**

The Academy's work programmes for 2015-2020 are driven by **four strategic challenges**, each of which provides a key contribution to a strong and vibrant engineering sector and to the health and wealth of society.

# Institution of Engineers Mauritius

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**1. Make the UK the leading nation for engineering innovation**

- Supporting the development of successful engineering innovation and businesses in the UK in order to create wealth, employment and benefit for the nation.

**2. Address the engineering skills crisis**

- Meeting the UK's needs by inspiring a generation of young people from all backgrounds and equipping them with the high-quality skills they need for a rewarding career in engineering.

**3. Position engineering at the heart of society**

- Improving public awareness and recognition of the crucial role of engineers everywhere.

**4. Lead the profession**

- Harnessing the expertise, energy and capacity of the profession to provide strategic direction for engineering and collaborate on solutions to engineering grand challenges.

……

**WGEA's Note:**

Readers will find here many useful links on the **Academy's** website to which their attention is drawn.

http://www.raeng.org.uk/about-us/what-we-do/40-years-of-the-academy.

There is a Six-minutes Video on the Academy.

http://www.raeng.org.uk/events/list-of-events/2011/february/the-pre-history-of-the-fellowship-of-engineering

http://raeng.tv/Media/2011/The-pre-history-of-the-Fellowship-of-Engineering.aspx

Readers will find a Video of 1H26 minutes about the early history of the Academy, recounting how the Council of Engineering Institutions launched the Fellowship of Engineering, recounted by Dr Peter Collins, Director Royal Society Centre for Historical Science at an event held on 28 February 2011.

Readers will find a very illuminating Q and A Session which discussed the relations between the Royal Society and the Fellowship of Engineering (now the Royal Academy); how the usage of the word technology which used to encompass engineering gradually gave place to engineering becoming more specific.

**Institution of Engineers Mauritius**
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# The GCRF Africa Catalyst

Note from the Working group

We have reproduced and reformatted the relevant Part of the document published on the Academy's website here. Readers are directed to the webpage for the original document.


**Application guidance notes**

## GCRF Africa Catalyst

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## Introduction

Under its remit as a delivery partner for the Global Challenges Research Fund, the Academy is pleased to launch this new capacity building programme.

GCRF Africa Catalyst is offering grants of £40,000 to organisations supporting the engineering profession in sub-Saharan Africa working in partnership with the engineering research, policy and business communities in the UK and sub-Saharan Africa. The Academy is seeking a wide range of short pilot projects to run between mid-December 2016 – mid-June 2017, with the intention to evaluate the result of different interventions. During this pilot stage, the lead applicant must be an organisation based in sub-Saharan Africa. Although we strongly encourage UK partners the Academy is open to a number of different ways this partnership could take place during this learning period. **Should you wish to have introductions made or support in any other way to help set up partnerships, the Academy is more than happy to facilitate this.**

This is a one-off call, where lessons learnt and successful models will be shaping the future of the programme; following this call, larger-scale proposals will be accepted.

# Institution of Engineers Mauritius

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## Programme Objectives

The overarching aim is to ensure there is sufficient, and appropriately skilled, local engineering capacity to participate in and drive national and regional development in sub-Saharan Africa. GCRF Africa Catalyst helps achieve this by focusing on better connecting Professional Engineering Institutes (PEIs), Engineering Councils/Associations and other organisations working to strengthen engineering capacity, to the engineering research, policy and business communities. GCRF Africa Catalyst will support these organisations take a leadership role by working to ensure appropriate accreditation, professionalism and opportunities for engineers nationally and regionally. At this pilot stage, the Academy is looking for projects that are contributing to at least one of the objectives below.

The programme's objectives are to:

- Build engineering capacity by improving engineering education at all levels to meet recognised international standards.
- Support the development of professional engineering institutions/councils/associations that can effectively support the profession and promote professionalism.
- Support the Federation of African Engineering Organizations (FAEO) in its leadership role across the continent.
- Strengthen the evidence base for the role robust engineering institutions play in driving development, such as mapping engineering capacity in sub-Saharan Africa.

## Eligibility criteria

- The suggested project should clearly align with the overall aims and objectives of the scheme, however, the Academy encourages original ideas and local solutions.
- Project activities must include a budget of £40,000 delivered over a maximum of six months.
- **Pilot projects must run between mid-December 2016 and mid-June 2017**.
- Applicants must be not-for-profit organisation based in sub-Saharan Africa*.
- The lead applicant must propose a means of collaboration with at least one partner based in the UK. A partner may also be considered as the UK institution if it is headquartered in the UK.

*For the purposes of the programme, the Academy consider the following 49 countries to be part of sub-Saharan Africa: Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Republic of the Congo, Democratic Republic of the Congo, Côte d'Ivoire, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gabon, The Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Lesotho, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, South Sudan, Sudan, Swaziland, Tanzania, Togo, Uganda, Zambia and Zimbabwe.
Please contact Louise Olofsson if you have any question regarding your eligibility.

### Contact

If you have any queries please contact the Programme Manager, Louise Olofsson, at louise.olofsson@raeng.org.uk or call +44 (0) 207 766 060.

# Institution of Engineers Mauritius

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ENGINEERS AGAINST POVERTY

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www.engineersagainstpoverty.org

04 November 2016

To Whom It May Concern,

**LETTER OF SUPPORT: INSTITUTION ENGINEERS MAURITIUS (IEM) APPLICATION FOR GRANT SUPPORT TO THE GCRF AFRICA CATALYST**

This letter is to confirm that EAP is pleased to collaborate with the Institution of Engineers Mauritius (IEM) and act as the UK Partner for the purposes of this grant application. The title of the grant application is 'Building Engineering Capacity through Accreditation of Engineering Degree Programmes'.

EAP's role will involve providing support and advice in two areas:

1. Raising awareness of stakeholders to accreditation, through Conferences/Seminars on the need for engineering accreditation, its implications and benefits to the various stakeholders, and hold meetings/discussions with Focus Groups which include Educational Authorities and others concerned with education, training, professional development and employment of engineers. There will also be working sessions with the Working Group on Engineering Accreditation of the IEM and its Exec Council, and some Leading members of Professional Engineering Institutions. These presentations will serve as the launch of the Project and are intended to build support for the programme.

2. Providing training to senior engineers and academics on how to understand and interpret standards and accreditation procedures and conducting an accreditation assignment. This requires an understanding of the different weightages applicable to different accreditation parameters and how to apply them in an accreditation assignment.

EAP's contribution will be delivered by Professor Paul Jowitt and Deborah Seddon. Should a need arise for individuals with additional or complimentary expertise, EAP will source them through its networks.

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Paul Jowitt is Professor of Civil Engineering Systems at Heriot Watt University, President of the Commonwealth Engineers Council and a Past President of the Institution of Civil Engineers. Paul has experience as an Assessor on the Joint Board of Moderators which is responsible for assessing and making recommendations on the accreditation and approval

**Charity number 1071974 Company number 3613056**

of relevant educational programmes that it will accept as meeting the requirement to register as a professional engineer with the Engineering Council.

Deborah was until recently Head of Policy and Standards at the Engineering Council, the UK regulatory body for the engineering profession, and a member of its Executive Team. Her main responsibilities included the UK Standard for Professional Engineering Competence (UK-SPEC), the Information and Communications Technology Technician (ICT Tech) Standard, and the processes and criteria for accrediting degrees and approving non-degree qualifications such as Apprenticeships. Deborah is currently employed by the Engineering Council on a part time basis as Policy and Standards Adviser, but her involvement in this programme will be on a personal basis.

We are happy to provide additional information on request.

Yours sincerely

Petter Matthews
Executive Director

## Institution of Engineers Mauritius

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# Contract
# Between the AWARDEE and the RECIPIENT

**…….. Copy ……**

## Africa Catalyst 16/17 Project

**"Building Engineering Capacity through Accreditation of Engineering Education"**

This project is supported by the Royal Academy of Engineering under the Africa Catalyst 16/17 scheme

**Contract of Performance between:**

On the one hand:

the Institution of Engineers Mauritius, herein after referred to as the RECIPIENT, and

On the other,

Mr Jagadish Soobarah, Project Team Leader, a citizen of Mauritius known to the RECIPIENT, herein after referred to as the Awardees, and

Any third party, that may be notified to the RECIPIENT jointly by the AWARDEES,

**WHEREAS**:

The Royal Academy of Engineering of the United Kingdom, herein after called the ACADEMY, has approved to support, through an award of a grant of £ 40,000, a Pilot Project submitted to the ACADEMY by the RECIPIENT, under the Global Challenges Research Fund (GCRF) Africa Catalyst Scheme and which is aimed at Building Engineering Capacity through Accreditation of Engineering Education, and that a legally binding Contract herein after called the CONTRACT, bearing the Academy Reference AC1617/1/17, has been duly signed between the RECIPIENT and the ACADEMY, and

**WHEREAS**,

Section 2.4 of the CONTRACT stipulates as follows:

**QUOTE**: "The Recipient shall procure that the Awardee(s) performs all activities necessary for the fulfilment of the terms of this Contract. The Recipient shall put in place suitable contractual arrangements with the Awardee(s) and any third parties and will ensure that the Awardee(s) is made aware of any relevant obligations required to be met by the Recipient for which the Awardee(s)'s contribution is required, including but not limited to the provision of any Reports." **UNQUOTE**

**NOW THEREFORE**:

The AWARDEES and the RECIPIENT agree to be bound by this present CONTRACT of PERFORMANCE, which shall constitute their AGREEMENT to discharge their respective obligations and fulfil the Terms of the CONTRACT, including and not limited to:

(i) Performance by the AWARDEES of all their obligations, undertaken in the RECIPIENT's application, as set out in Annex B 5.1.2 of the CONTRACT, towards satisfactory implementation and completion of the PROJECT,

# Institution of Engineers Mauritius

**Report on a Pilot Project on**
**the Accreditation of Engineering Degree Programmes**

(ii) Performance by the RECIPIENT's UK based Partner and Collaborator, Engineers Against Poverty (the EAP) of Woolgate Exchange, 25 Basinghall Street, London EC2V 5HA, United Kingdom, represented by its Executive Director Mr Petter Matthews of such obligations that Mr Petter Matthews has undertaken, on behalf of EAP, to fulfil directly or through its assignees, towards the satisfactory completion of the CONTRACT.

(iii) Pursuant to Section 4.2 of the CONTRACT, the RECIPIENT will provide additional funds for costs not covered by the Award which are necessary for the successful completion of the Programme of Activities.

(iv) Pursuant to Section 4.3 of the CONTRACT, the RECIPIENT will provide the AWARDEES with sufficient access to funds to enable the successful completion of the Programme of Activities.

(v) Pursuant to Section 6.2 of the CONTRACT, the RECIPIENT undertakes to support the AWARDEES in the Programme of Activities and to ensure access to facilities specified in Annex B and any other facilities necessary for completion of the Programme of Activities

(vi) Pursuant to Section 6.9 of the CONTRACT, the RECIPIENT shall ensure that the AWARDEES acknowledge the Academy's financial contribution in all publications regarding or resulting from the Programme of Activities, in the manner approved by the ACADEMY.

(vii) Pursuant to Section 4.6 of the CONTRACT, RECIPIENT will note its obligations re-underspending or overspending of funds granted by the ACADEMY.

(viii) Pursuant to Section 6.1 of the CONTRACT, RECIPIENT will ensure legal clearances and other formalities (visa, work permit) for UK Partner experts are obtained.

(ix) Pursuant to Section 7.2 and 7.3 RECIPIENT and AWARDEES will comply with obligations of the CONTRACT in matters of Intellectual Property Rights

In consequence thereof, the RECIPIENT and the AWARDEES sign this AGREEMENT:

==========➔ On behalf of the RECIPIENT:

**Signed** **Signed**

**……..** **……**

**(1)Name**: Raj H. Prayag
**Position**: President
**Date**: .. January 2017

(2) Name: Aboo Peermamode
Position: Secretary
Date: .. January 2017

==========➔ By the AWARDEES.

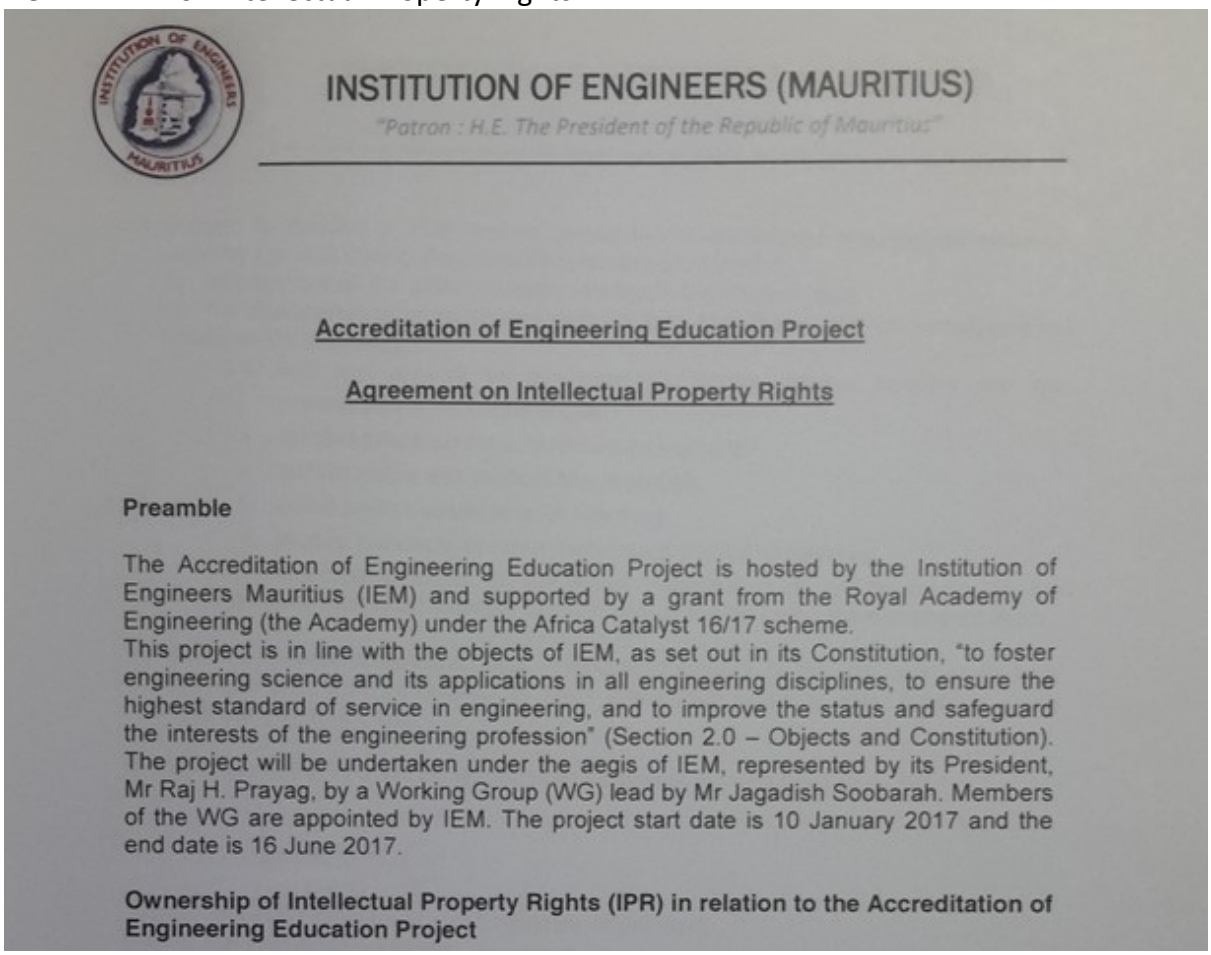
**Signed**
**…….**
**1. Name**: Jagadish Soobarah
**Position**: Team Leader,
IEM Working Group on Engineering Accreditation
**Date**: 03 January 2017

Done in Triplicates this day: ……
at IEM House, Cnr Hitchcock and Ollier Streets, Quatre Bornes, Mauritius

# Institution of Engineers Mauritius

**Report on a Pilot Project on**
**the Accreditation of Engineering Degree Programmes**

AGREEMENT on Intellectual Property Rights



INSTITUTION OF ENGINEERS (MAURITIUS)

"Patron : H.E. The President of the Republic of Mauritius"

**Accreditation of Engineering Education Project**

**Agreement on Intellectual Property Rights**

**Preamble**

The Accreditation of Engineering Education Project is hosted by the Institution of Engineers Mauritius (IEM) and supported by a grant from the Royal Academy of Engineering (the Academy) under the Africa Catalyst 16/17 scheme.
This project is in line with the objects of IEM, as set out in its Constitution, "to foster engineering science and its applications in all engineering disciplines, to ensure the highest standard of service in engineering, and to improve the status and safeguard the interests of the engineering profession" (Section 2.0 – Objects and Constitution).
The project will be undertaken under the aegis of IEM, represented by its President, Mr Raj H. Prayag, by a Working Group (WG) lead by Mr Jagadish Soobarah. Members of the WG are appointed by IEM. The project start date is 10 January 2017 and the end date is 16 June 2017.

**Ownership of Intellectual Property Rights (IPR) in relation to the Accreditation of Engineering Education Project**

It is agreed between IEM and the WG that, within the scope of this project,

1. The legislation governing the ownership of IPR will be the Copyright, Patents and Trademarks Acts currently in force in Mauritius.
2. As per the contract signed between the Academy and IEM, "*the Academy will not own or be granted a licence under any intellectual property rights relating to or resulting from the Programme of Activities*".
3. Output created during the course of the Project and any intellectual property in it will be owned by IEM. A non-exhaustive list of output includes :
    - datasets,
    - course and training materials,
    - video and sound recordings,
    - accreditation standards, methodology and procedures,
    - reports for sponsors/funders.

IEM House,
Corner of Ollier and Hitchcock Avenues
Quatre Bornes
Mauritius
Telephone (230) 4543065

P.O BOX 28
QUATRE BORNES
MAURITIUS
Web Site : www.iemauritius.com
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# Institution of Engineers Mauritius

**Report on a Pilot Project on**
**the Accreditation of Engineering Degree Programmes**

AGREEMENT on Intellectual Property Rights

## INSTITUTION OF ENGINEERS (MAURITIUS)

*"Patron : H.E. The President of the Republic of Mauritius"*

4 Subject to Section 5, IEM waives ownership of intellectual property on materials used by the WG during the project implementation period:
(i) to carry out all the activities associated with the Project, and
(ii) for dissemination of outcomes derived from the Project for the benefits of the public, in the following:

- text and artwork for publication in books, papers, posters and oral presentations for conferences;
- articles prepared for submission to journals;
- lecture notes and preparatory materials,
- audio and/or visual aids for teaching;
- lecture handouts or other materials provided to trainees.

The intellectual property for the above materials in (ii) will be owned by the respective individual member or members of the WG who have authored them.

5 After the project completion date, individual members of the WG will jointly hold copyright with IEM in respect of such intellectual property they produce using materials owned by IEM.

6 Members of the WG will be responsible for complying with third-party IPR.

Signed on behalf of Institution of Engineers (Mauritius)
**Name**: Raj Hemansing Prayag
**Position**: President
**Date**: 6 January 2017

Signed on behalf of **Working Group**
**Name**: Jagadish Soobarah
**Position**: Group leader
**Date**: 6 January 2017

**ANNEX-7**

**Institution of Engineers Mauritius**
**Report on a Pilot Project on**
**the Accreditation of Engineering Degree Programmes**

# INSTITUTION OF ENGINEERS (MAURITIUS)

## Launching Ceremony of a Pilot Project on

## "Building Engineering Capacity through the Accreditation of Engineering Programmes"

**Undertaken by the Institution of Engineers Mauritius**

with the support of the
Royal Academy of Engineering (UK) Under the
GCRF Africa catalyst Scheme **on**

**Monday 23 January 2017 at 18h00**
**Voila Hotel, Bagatelle**
**In partnership with Engineers Against Poverty**

1. **Welcome by IEM**
2. **Speech by**
   Mr Raj H Prayag *PDSM, BSc, MSc, CEng, MICE, MWIEM, FIEM, RPEM*
   President of IEM
3. **Address by**
   Prof. Chris Atkin CEng., FRAeS,
   President of the Royal Aeronautical Society (RAeS)
4. **Speech by**
   Hon. Nandcoomar Bodha, GCSK, *[1]
   Minister of Public Infrastructure and Land Transport
5. **Address and Project Launch by**
   Dr (Mrs) Ameenah Gurib-Fakim, GCSK, CSK, PhD, DSc
   H.E. President of Republic of Mauritius
6. **Vote of thanks by**
   Mr J. Soobarah, B.E(Hons), CEng, FRAeS, FAeSM, FIEM, MIET
   Project Team Leader
7. **End of ceremony**

( Refreshments )

* Note from IEM-WGEA- Event coincided with Swearing Ceremony of Hon Pravin Jugnauth as PM–Apologies received from Hon N Bodha

# Institution of Engineers Mauritius

**Report on a Pilot Project on**
**the Accreditation of Engineering Degree Programmes**

**English Version: 11 January 2017**

## The Royal Academy of Engineering UK has agreed to extend financial support to a Project submitted by the Institution of Engineers Mauritius for financing under the GCRF Africa Catalyst Programme

**"Engineering Capacity Building through Accreditation of Engineering Education"**

***Introductory Comment:***

*Is the Mauritian society aware that outside Mauritius, especially in the industrialised and emerging economies, Universities and other institutions which offer engineering degrees for professional engineering practice have made great efforts at delivering programmes of studies which conform to a global standard known as Washington Accord, while within Europe similar efforts are undertaken by Universities to ensure that the degree programmes conform to the standard set by the European network for Accreditation of Engineering Education (the ENAEE).*

*The process to which programmes are subjected for that purpose is called accreditation, and this responsibility is assumed by the profession and not by the authorities, notwithstanding the fact that Higher Education Authorities have a statutory obligation to ensure that the Tertiary Educational Institutions comply with certain legal requirements prior to being authorised to offer their programmes. The Authorities call this "accreditation" but this accreditation, to an unspecified standard, is far from being the accreditation process that professional engineering institutions implement for ensuring that programmes so accredited receive international recognition. While other institutions or authorities choose not to make a difference between accreditation, validation and recognition, the engineering profession sticks to accreditation (of an engineering programme offered by an institution legally authorised to award a degree by a non-government and autonomous organisation)*

The Royal Academy of Engineering (RAEng) has the funding of a Pilot Project submitted by Institution of Engineers Mauritius (IEM)under the GCRF Africa catalyst programme.
The project which is aimed at ***Building Engineering capacity through Accreditation of Engineering Education*** was launched on 14th September during a **Conference of the Council of Academies of Engineering and Technological Sciences (CAETS)**inaugurated by H.E Dr (Mrs) Ameenah Gurib-Fakim the President of the Republic of Mauritius. Two Past Presidents of the IEM (Mr Jayesh Desai and Jagadish Soobarah) also attended the Conference at the invitation of RAEng.
The **GCRF** (**Global Challenges Research Fund)** is a £1.5 billion (Rs67 billion) fund announced by the UK Government to support cutting-edge research that addresses the challenges faced by developing countries. It is administered through delivery partners including the **Research Councils** of the UK and national academies, including the **Royal Academy of Engineering**. The Scheme proposed to consider some 15 projects from 49 Sub-Saharan countries for financing each to a limit of £40,000.

The **Royal Academy of Engineering (the RAEng**) was founded in 1976. Its aim is the "*pursuit, encouragement, and maintenance of excellence in the whole field of engineering to useful purpose in order to promote the advancement of the science, art and practice of engineering for the benefit of the public"*. Under its Royal Charter, the RAEng has power "*to promote excellence in the education, training, and experience of those engaged in engineering, or related disciplines, and to stimulate excellence and encourage creativity and innovation in engineering and in research, development and design in the manufacture of engineering products and in engineering services"*.

# Institution of Engineers Mauritius

**Report on a Pilot Project on**
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The objective of the GCRF Africa Catalyst Programme is to assist ***Sub-Saharan Professional Engineering Institutions*** towards *ensuring there is sufficient, and appropriately skilled, local engineering capacity to participate in and drive national and regional development in sub-Saharan Africa****".*** More specifically, the **GCRF Africa Catalyst Programme** will focus on "*better connecting Professional Engineering Institutes (PEIs), Engineering Councils/Associations and other organisations working to strengthen engineering capacity, to the engineering research, policy, and business communities*". To achieve its aim the **GCRF Africa Catalyst** "*will supports organisations which take a leadership role by working to ensure appropriate accreditation, professionalism, and opportunities for engineers nationally and regionally.*"

IEM has seen this as a unique opportunity to set the foundation for accreditation of engineering degree programmes in Mauritius in line with international practices. The IEM Executive Council appointed a ***Working Group on Engineering Accreditation*** which worked overnight to submit an application before the deadline set for 9th November. Since IEM had to enlist the collaboration of a UK Partner for delivery of its project, it chose a well-known organisation with a wide foot print in Africa: **Engineers Against Poverty (EAP)** for the purpose**.** EAP will bring in the collaboration of experts with wide experience with the Commonwealth Engineering Council and the Engineering Council UK.

IEM proposes, through this project, to createa core group of engineers as well as academics who will be knowledgeable about engineering accreditation and who can subsequently assist IEM towards setting up, operating and sustaining an eventual institutional regime for accreditation of engineering education in Mauritius. Such a capacity is necessary for if IEM is to put an application for membership of the Washington Accord, which it intends to do through an autonomous Engineering Accreditation Council to be established. This project will require the full collaboration of all Professional Engineering Bodies as well as the Faculties of Engineering of the Universities established in Mauritius, as well as authorities concerned with formulation and implementation of policies and delivery of engineering programmes, intended for professional engineering practice, as well as employers and regulatory bodies.

**Why Washington Accord.**

**First Reason**: The Washington Accord represents an academic standard which is ***globally recognised as the academic standard to be set for graduates in engineering engaging in professional engineering practice.*** It was established in 1989 by the professional engineering bodies of the UK, Ireland, Canada, USA, Australia, and New Zealand in the search for a consensus on the academic standard of an engineering degree that could be acceptable for engaging in engineering practice at professional level. That need was perhaps felt given an anticipated influx of job-seekers they were likely to face in the aftermath of collapse of trade barriers after WTO and GATS (General Agreement on Trade and Services) agreements. However, that standard has been there for 25 years now, and is regarded as the standard to impose professional engineers.
The Washington Accord standard represents an aggregate of Knowledge and Understanding of mathematics, science, and engineering principles, and skills and abilities, including transferable skills that a person completing an accredited degree programme (of 4 academic year or equivalent) ***must possess and be capable of demonstrating on graduation.*** The emphasis of the standard is ***what graduates have learnt*** and not ***what they have been taught.*** The only alternative to Washington Accord standard is that developed by the **European Network for the Accreditation of Engineering Education (ENAEE),** leading to the award of the **European Accredited Engineer (ACE) label: EUR-**

# Institution of Engineers Mauritius

**Report on a Pilot Project on**
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**ACE(Master)** equivalent to **Washington Accord** for degree programmes of the integrated **First** and **Second Cycle,** and **EUR-ACE (Bachelor)** for **First Cycle** programme. The **EUR-ACE** accreditation services are unfortunately not available to our Region.
To date, Washington Accord has been joined by 12* other Countries, the last to join was the China Association of Science and Technology (CAST) earlier this year (2016), while Sri Lanka and India were admitted in 2014. Other full members (Signatories) are: Republic of SA, Singapore, Malaysia, Russia, Hong-Kong, China(Taipei), Japan, Korea, and Turkey. ****Note: Now 13, Pakistan joined in June 2017***

**Second Reason**: The second and more compelling reason is that any engineering degree programme***,*** that would be accredited by any Mauritian agency admitted as a Signatory (full member) of the Washington Accord, ***would be recognized by every other member of the Accord,*** thus bringing ***international recognition*** *to the engineering programme so accredited*. It can be appreciated that international recognition would be at the door-step of Mauritius even if no other programmes of the same University or any other would have been accredited.

**Why IEM**
To appreciate this point, one should know that the Washington Accord standard goes beyond the graduates' attributes. There are certain rules which govern the structure of its eventual members, and concern their own operations. The accreditation agency must:

(a) be ***autonomous body***, from ***Government and Higher Educational Authorities***, and autonomous ***in its decision-making responsibilities***.
(b) have ***authority for the accreditation process,*** that is, for setting academic standard of engineering degree programmes and the accreditation criteria.
(c) be ***representative of the engineering profession and be recognized*** as such, and ***accreditation of engineering degree programmes should constitute its core activities***.

The above criteria, especially the requirement of "autonomy" leaves us with very few choices. Most of the Washington Accord members are either professional engineering institutions and societies or corporate bodies established by the professional bodies themselves***.*** Where any Government body has been admitted, the accreditation body has had to be autonomous. Of interest is the **National Board of Accreditation (India**) (established 1994, under the All India Council for Technical Education Act (AICTE)). It applied for Provisional Membership of the Washington Accord in 2007, but had to make changes to its governance structure. It became *autonomous in January 2010* and in April 2013 the Memorandum of Association and Rules of NBA were amended to make the NBA ***completely independent*** of AICTE, administratively as well as financially. It achieved full membership in 2014 after 7 years as provisional Member. Even then Washington Accord recognises only the degree programmes of TIER-1 Institutions, that is those which are autonomous. Government controlled Universities are excluded.

**IEM's attributes**: IEM is the ideal candidate for Washington Accord, but it must establish an Engineering Accreditation Council. It is open to all branches of engineering and has remained so since it was founded in 1948 with Raymond Berenger, the Chief Engineer of the Public Works Department as its first President. It was IEM's efforts under Roland Desmarais, that brought about the Ordinance 49 of 1965, which subsequently became the Registered Professional Engineers Act (1967) that regulates the profession of engineering in Mauritius. It was also an IEM initiative, under Raj H Prayag in 1988, with the blessing of the PM Anerood Jugnauth that the engineers got their Engineers' day (13$^{th}$ September), and has ever since been celebrating Engineers day on 13$^{th}$ September each year. The IEM has been discharging its professional role within the Council of Registered Professional Engineers as well as at the level of several Boards, including the MSB, CIDB, and the CIDB.

# Institution of Engineers Mauritius

**Report on a Pilot Project on**
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IEM's present initiatives must be regarded as its Plan-B to establish engineering accreditation in Mauritius. Its previous efforts had failed. IEM recalls that its representatives had contributed to developing a ***Standard of Professional Engineering Competence*** as well as a set of ***Assessment Procedures*** shortly after the UK promulgated its revised standard the UKSPEC in 2003. These were adapted from UKSPEC (2003). IEM had also contributed to developing amendments to the CRPE Act, including a draft Engineering Council Bill (in 2007) which would have replaced the current legislation. IEM has had to recognize that the draft of 2007, after successive versions became an unrecognizable document in 2016. IEM has advised that it be shelved. All that is now history.

**Where does CRPE fit in?**

No change is intended nor proposed. IEM has a statutory role and responsibility to recognize and approve qualifications of applicants desiring to enter in the practice of engineering. That role it should continue to discharge. It has already in 2010 issued a press notice wherein it says it recognized qualifications accredited by Washington Accord organisations as well as those certified by the ENAEE. Therefore, any day (say in perhaps 4 to 5 years) when IEM secures signatory status of Washington Accord, any degree in engineering it accredits (to Washington Accord standard) would stand automatically recognized by CRPE. IEM believes CRPE can take steps as Singapore and Malaysia have done. Amend Section 13 of the CRPE Act to provide, in the law, for the registrable degree to be of 4-year full time duration or equivalent, and to be accredited in accordance with the Standards and procedures of Washington Accord, or a body approved by the Council.
In anticipation of a change in the law the registration fees were changed from Rs500 to Rs1500; however, the fees were changed but not the law.

**What about the Tertiary Education Commission (TEC)**

No issue foreseen, since TEC like any other authority in Mauritius should be only too glad that by IEM's initiative there is hope of international recognition coming to Mauritian engineering education. Issues, if any, can arise only from a narrow interpretation of the amendment done to TEC Act in 2005 when the definition of accreditation, which previously concerned only the establishments, was extended to programme of studies. IEM's view is that the amendment rightly empowered TEC to ensure that when licensing a tertiary educational institution, it should also apply some criteria to accredit the programmes in its own way. That is its duty and responsibility towards students, their parents and to society. Those amendments have not taken away the autonomy of the Universities to seek accreditation from any organization which can offer services to a standard of interest to them; neither do the amendments prevent any organisation from seeking membership of the Washington Accord and get "qualified" as a competent body to offer accreditation services; and again the amendments have not taken away the legal prerogative of CRPE to do what it must do to recognize any degree or other qualification in engineering.

As regards accreditation of engineering education, the Washington Accord process steps in only when an institution has passed out at least two batches of graduates, and will only accredit programmes delivered by an establishment duly licensed by Government authority, which is the TEC. Washington Accord accreditation is purely voluntary and will not be imposed. So how can there be an issue between TEC, IEM or even CRPE in matters of accreditation of engineering programmes.

Compiled by the Working Group on Engineering Accreditation
IEM House
11 January 2017.

# Institution of Engineers Mauritius

**Report on a Pilot Project on**
**the Accreditation of Engineering Degree Programmes**

## Letter to PEIs

**Note from IEM-Working Group on Engineering Accreditation**

This is a copy of a letter issued on 10th October 2016 by the IEM President to Representatives of the Institutions of Engineering/ Professional Engineering Societies mentioned hereunder, informing them of IEM decisions (to establish an accreditation framework in Mauritius and of IEM's intention to submit an application to the Royal Academy of Engineering for consideration of funding through a grant under the GCRF Africa Catalyst Scheme, and seeking their collaboration.

…….

10 October 2016

To representative of ICE (Mauritius)
To representative of IEE (Mauritius)
To representative of IMechE (Mauritius)
To representative of AeSM (Mauritius)

Dear Colleague

**Accreditation of Engineering Education in Mauritius**

I shall be grateful for a few minutes of your time to present to you a project very dear to all engineers having graduated in Mauritius and prospective graduates: "***Accreditation of Engineering Education in Mauritius".*** We also seek your kind indulgence for requesting your urgent attention and response (positive or otherwise) from you, given the context of our initiatives in the interest of the engineering profession and that of the nation.

The purpose of this letter to you is four-fold:

☐ **firstly *to inform you*** of the decision of the Council of Institution of Engineers Mauritius (IEM) to set up a **Working Group on Engineering Accreditation** (**WGEA**) as an instrument for paving the way to achieving international recognition for engineering in degrees awarded by the **Tertiary Educational Institutions (TEIs)** in Mauritius. This objective can certainly, and perhaps only, be attained through the admission of an eligible Mauritian Agency as a ***signatory*** of the **Washington Accord** forum within the **IEA International Engineering Alliance (IEA).** Your Institution must certainly be aware that the **Washington Accord** is the Gold Standard in matters of accreditation of engineering education. The only other acclaimed alternative is the **EUR-ACE (Master)** degree label awarded by accreditation bodies certified by the **European Network for the Accreditation of Engineering Education (ENAEE).** The latter is not available to our region. Towards this objective, the **WGEA** has constituted itself into an **Interim Council for the Accreditation of Engineering Education.**

☐ **Secondly *to seek your Institution's official collaboration*** in this venture, and permission to include your Institution's commitment in this regard on documents and proceedings that the **WGEA** may produce in its move towards that objective. ***No financial commitment*** is presently intended, implied or being sought. Your institution will be at liberty to end its collaboration with the **WGEA** and the Interim Council, or with an eventual full-fledged Council or Board of Engineering Accreditation, if and whenever financial commitments of a nature unacceptable to your institution comes up, and do so without any liability to your Institution, (in the absence of any other agreement stating otherwise).

Note: Enquiries and response to this mail message may be addressed to the Working Group on Engineering Accreditation (WGEA) on iem@intnet.mu , or to rhpdrenv@intnet.mu or soobarah.jag@intnet.mu with copy to iem@intnet.mu or on Tel 5422 4010. Non-urgent issues can be addressed to Secretary, Institution of Engineers Mauritius, IEM House, Cnr Hitchcock/Ollier St, Q Bornes, Mauritius.

# Institution of Engineers Mauritius

**Report on a Pilot Project on**
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## Letter to PEIs

**Kindly communicate your agreement (with or without comments) by submitting to us the name of an experienced engineer (CEng, Fellow, or full Member) to join the WGEA .**

☐ **The third and urgent purpose,** is to inform you that **Working Group (WGEA)** has initiated a project for ***Building Engineering Capacity in Mauritius through the Accreditation of Engineering Education***, and to submit an application for funding a Pilot Project to the **Royal Academy of Engineering (UK)** under the **GCRF Africa Catalyst Programme**. A grant of £40,000 would be available if our project is selected. The **WGEA** is actively working on the activities that could be commenced as early as January 2017 and be completed during a six-months period ending June 2017, **if approved for funding**. It is our earnest hope that the successful completion of the proposed project should bring the necessary and sufficient awareness of issues relating to accreditation of engineering education, including the benefits of accreditation to an international standard to the engineering community, as well as to education providers, the employers (both public and private sectors), to present and future engineering students and last but not least to the Mauritian economy.

The project target is to train a sizeable number of professional engineers from all disciplines, including academics with engineering experience on (i***) current international standards in engineering degree programmes***, (ii) ***the accreditation process, including criteria***, applied to actual engineering programmes offered by Universities, and (iii) ***the knowledge, understanding, interpretation and application of the assessment criteria*** to such programmes towards determining whether they qualify for accreditation to a standard substantially equivalent to the Washington Accord. It should be appreciated that the successful implementation of the proposed project will create an initial pool of ***trained Evaluators and Team Leaders*** who can be called upon and be tasked to undertake accreditation assignments at Universities desiring the accreditation of any of their engineering degree programmes, by an eventual ***Council or Board of Engineering Accreditation***. The collaboration of UK Institutions will be sought to deliver the project.

☐ **Lastly, to seek your collaboration and enlist your support for the GCRF Africa Catalyst project.**
Our project must finalised by **end of this month** for us to make a submission on line, so we have time constraints for engaging in detailed consultations in respect of our submission, but such can be done once approved. Project Approval will be known by the **third week of December 2016**. Given the nature of (i) the Objective of the ***GCRF Africa Catalyst Programme*** and (ii) the nature of the project we are proposing, it should be clear that it concerns all the professional engineering institutions established in Mauritius, whether autonomous or set up as a Local Branch of an overseas institution. We welcome all the engineering education providers and the authorities having oversight responsibility over them, as well as professional engineering bodies, including yours, to support our Project, which clearly falls within the ambit of the **UN Sustainable Development Goals** while satisfying one or more objectives of **the GCRF Africa Catalyst Programme Objectives.**
**Kindly advise us *if we can include your Institution/Society/Establishment as a co-sponsor of the project.***

**Concluding Note:**
Authorities and other stakeholders concerned with education policies, and the education, training, development, registration and employment of Professional Engineers, should certainly be aware, if they have been following overseas developments in matters of accreditation of engineering degree programmes for entry into the practice of engineering, that:

(i) Responsibility for accreditation of engineering degree programmes for entry into engineering practice rests with the profession;

Note: Enquiries and response to this mail message may be addressed to the Working Group on Engineering Accreditation (WGEA) on iem@intnet.mu , or to rhpdrenv@intnet.mu or soobarah.jag@intnet.mu with copy to iem@intnet.mu or on Tel 5422 4010. Non-urgent issues can be addressed to Secretary, Institution of Engineers Mauritius, IEM House, Cnr Hitchcock/Ollier St, Q Bornes, Mauritius.

# Institution of Engineers Mauritius

**Report on a Pilot Project on**
**the Accreditation of Engineering Degree Programmes**

## Letter to PEIs

(ii) The global standard for accreditation of engineering degree programmes is that set by the **Washington Accord** forum (within the International Engineering Alliance) and advocated by the **World Federation of Engineering Organisations** (the **WFEO**); the **ENAEE** standard within Europe.

(iii) International Recognition comes with being a **signatory** of the **Washington Accord**, or award of **EUR-ACE (Master**) label of the **ENAEE**.

(iv) For entry into the Washington Accord the accreditation agency must be ***non-governmental, be legally incorporated, autonomous from Higher Educational Authorities, and free to set policies and make accreditation/recognition decisions independent of stakeholder influence.***

Our present initiative should be viewed as the only acceptable and valid pathway to give recognition to Mauritian engineering education following the failure of all our past initiatives to amend the Registered Professional Engineers Council Act of 1967.

Yours sincerely
Raj H Prayag PDSM
President of the Institution of Engineers Mauritius

Note: Enquiries and response to this mail message may be addressed to the Working Group on Engineering Accreditation (WGEA) on iem@intnet.mu , or to rhpdrenv@intnet.mu or soobarah.jag@intnet.mu with copy to iem@intnet.mu or on Tel 5422 4010. Non-urgent issues can be addressed to Secretary, Institution of Engineers Mauritius, IEM House, Cnr Hitchcock/Ollier St, Q Bornes, Mauritius.

**ANNEX-10**

## Institution of Engineers Mauritius- Prof. B G Clarke Mission (13-17 Feb 2017)

## Accreditation of Engineering Education Project
## in collaboration with Engineers Against Poverty
## and the support of the Royal Academy of Engineering (UK)

**Prof. Barry Clarke: Programme of mission (12 to 17 February 2017)**

| | | |
|---|---|---|
| Sunday 12 Feb | | Arrival |
| | 19:00 | Working session and Dinner with Working Group and Council members |
| Monday 13 Feb | 10:00-12.30 | Meeting with IEM Working Group on Accreditation at AXIS House, Office of Pro-Five Consulting Engineers Ltd. |
| Tuesday 14 Feb | 08:30-14:30 | Conference on Accreditation of Engineering Degree Programmes |
| Wednesday 15 Feb | 14:00-15:00 | Council of Registered Professional Engineers (Mr J. R. Fayolle, President, and members of Council) |
| | 15:30-16:30 | Tertiary Education Commission (Prof Nair, Director, and Senior Staff) |
| | 17:30 – 19:00 | Presentation to Professional Engineering Institutions and IEM Members at IEM House on "Role of Education and Training in the route to the formation of the practising Engineer." |
| Thursday 16 Feb | 09:30-10:30 | Mauritius Ecole Centrale de Nantes (Meet Prof Frederic Meslin at the Pierrefonds Campus) |
| | 11:00-12:00 | University of Technology Mauritius (Mrs Seetulsing Goorah, Director) |
| | 13:30-14:30 | Talk to students and staff at UoM: "Engineering, the Future." |
| | 14:30-14:45 | Meeting with the Dean and Heads of Engineering Departments, UOM |
| Friday 17 Feb | 10:00-11:00 | Ministry of Education (Permanent Secretary Mrs Nema Devi Ghoorah, Mr Kiran Bhujun Director Tertiary Education-and Senior Staff) |
| | 13:00-14:00 | Mauritius Research Council (A Suddhoo, Director) |
| | 14:30-15:30 | Board of Investment: Mr Atma Narasiah , Head (Technology, Innovation & Services) and Senior Execs |
| | 16:00 | Debriefing meeting with Working Group |
| | 17:00 | Departure |

**Institution of Engineers Mauritius- Conference programme (14th Feb 2017)**

**INSTITUTION OF ENGINEERS (MAURITIUS)**
in collaboration with Engineers Against Poverty and with support
from the Royal Academy of Engineering (UK)

Africa Catalyst 16/17: IEM Project on Building Engineering Capacity
Through Accreditation of Engineering Education

**Conference on Accreditation of Engineering Degree Programmes (Tuesday 14 February 2017, Le Voila Hotel, Bagatelle)**

**Conference Programme**

**8:30 – Registration of participants**

**9:00 –** ***Opening address and Presentation of IEM Project*** **b**y Mr. R.H. Prayag, PDSM, President of IEM

**9.:15 – Address by the Permanent Secretary, Ministry of Education of Education and Human Resources, Tertiary Education and Scientific Research,** Mrs N D Goorah

**9:30 –** ***The role of engineers in addressing society's challenges*** by Prof B.G. Clarke, past President of UK Institution of Civil Engineers

**10:00 – Tea break**

**10:15 –** ***Registration of Professional Engineers: The Mauritian Practice*** by Mr. R. Fayolle, Chairman, Council Registered Professional Engineers

**10:35 –** ***Quality of engineering education: employability and the graduate*** by Prof. S. Nair, Director, Tertiary Education Commission

**10:55 –** ***Accreditation – challenges, issues and the vision of IEM: the case of Mauritius*** by Mr. J. Soobarah, Vice-President, Aeronautical Society of Mauritius, Past President of CRPE.

**11: 25 –** ***Engineering education reform in the context of accreditation: the UoM experience*** by Prof T. Ramjeawon, Head, Department of Civil Engineering, UoM

**11:45 – Mobility of engineers** by Mr. G. Parsan, Vice-President of IEM and Mr. R. Gungoosingh, Consulting Engineer

**12: 05 – Lunch**

**13:00 – Panel Discussion (Chair: Prof B.G. Clarke)**

**14:00 –** ***Summing-up and the way forward*** **by Prof B. G. Clarke**

**14:20 – Vote of thanks and closure.**

**Refreshments.**

**Institution of Engineers Mauritius: Professor Barry G Clarke Mission Report**

ENGINEERS AGAINST POVERTY

**Institution of Engineers Mauritius**

**Accreditation of Engineering Education Project in collaboration with Engineers Against Poverty and the support of the Royal Academy of Engineering (UK)**

**Prof B G Clarke's visit 12th to 17th February 2017**

## Summary

A programme of meetings with stakeholders from industry, education and government undertaken by Prof Barry Clarke during his visit to Mauritius between 12th and 17th February 2017 in connection with a Pilot Project aimed at Building Engineering Capacity through the Accreditation of Engineering Degree Programmes, initiated by the Institution of Engineers Mauritius, led to the conclusion that gaining international recognition of the engineering programmes delivered by private and public universities in Mauritius aligns with the government's aims for education and the economy. Therefore, it is recommended that a collaborative approach to support IEM's application to become a signatory of the Washington Accord, an international agreement for engineering education should be supported and implemented.

## Introduction

This is a report on the programme of activities undertaken by Prof Barry Clarke, Past President of the UK Institution of Civil Engineers, during his visit to Mauritius between 12th and 17th February 2017 in connection with a Pilot Project aimed at Building Engineering Capacity through the Accreditation of Engineering Degree Programmes, initiated by the Institution of Engineers Mauritius with the collaboration of Engineers Against Poverty (UK) and the support of the RAEng under the GCRF African Catalyst Scheme, which was launched on the 23rd January 2017 in the presence of the President of Mauritius and Prof. Chris Atkins, President of the Royal Aeronautical Society (UK).

The aims of the project are: -

- To create an awareness among stakeholders, concerned with education, training, professional competence development and employment of engineers in Mauritius, that delivering engineering degree programmes to an internationally agreed academic standard is key to building engineering capacity in the country, as well as enhancing the employment of engineers, including their cross-border mobility prospects.
- To reassure them that such a standard (e.g. Washington Accord), has been in existence for more than a decade, and that implicit in that standard is an

accreditation process which places emphasis on what has been learnt and can be demonstrated rather than what is taught, and to familiarise them with the accreditation process.

- To train leading professional engineers likely to be involved with administration of accreditation, and interested engineering faculty staff involved in design and delivery of engineering programmes, on the deliverables expected from accredited engineering programmes, the applicable criteria for compliance with Washington Accord, and the interpretation of these criteria. They will be informed of the process for ensuring compliance with the standard.

The aim of the visit was to support the Institution of Engineers, Mauritius to build capacity and shape capability of engineering in Mauritius with a focus on engineering education thus meeting the first and, to some extent, the second aims. The IEM working group, led by Jagadish Soobarah (Appendix 1), had undertaken significant preparatory work in advance of the visit to maximise the benefit of the visit to achieve a positive outcome. The programme of activity, that is meetings, workshops, presentation and a conference, is given in Appendix 2.

**Programme details**

12th February 2017

A preliminary meeting took place with key members of the Working Group on arrival to place the project in context. The discussion focused on the aim of the project, the week's activities, and the role of engineering in Mauritius. In particular, the roles of IEM, the Tertiary Education Commission and the Statutory Engineers licensing body (the CRPE) in the education and training of engineers needed to be clarified in order to gain international recognition of engineering education in Mauritius. This was followed by a working dinner with the IEM Working Group and Council members.

13th February 2017

A meeting was held with the working group to plan the week ahead and the meetings with stakeholders to set out the aims of the meetings, items to discuss and expected outcomes. The Conference programme was reviewed. The remainder of the day was an opportunity to refine the conference presentation and prepare the accompanying speech (Appendix 4). The Working Group had arranged to meet a number of groups representing stakeholders in engineering. It was agreed that support from all stakeholders to IEM's initiative was a key Washington Accord criteria for any autonomous professional body seeking membership of Washington Accord.

14th February 2017

The day's Conference was the second event of the project which was launched on the 23rd January 2017 in the presence of the President of Mauritius and Prof. Chris Atkins, President of the Royal Aeronautical Society (UK).

**Institution of Engineers Mauritius: Professor Barry G Clarke Mission Report**

The Conference (Appendix 3) was an opportunity to discuss building engineering capacity at all levels to international standards. Eminent speakers set out their vision for the future of engineering in Mauritius. The day started with an introduction by Raj Prayag, the President of IEM, followed by a presentation by the Permanent Secretary to the Ministry of Education Mrs N Ghoorah who placed engineering education in context of the economy. The IEM President recalled that IEM received support, in the form of a £40,000 grant from the Royal Academy of Engineering UK, for the accreditation project which had national outreach considering that its successful implementation should lead to IEM obtaining signatory status of Washington Accord; such an outcome had the potential of bringing international recognition to engineering degree programmes delivered by Mauritian Universities and accredited by IEM. Two important points emerged from the presentation of the Permanent Secretary Mrs Ghoorah: - the Government was supportive of the IEM initiative and the initiative was a key factor in the government's aim to create a tertiary education hub in Mauritius and build capacity in the digital world.

The presentation by Prof B G Clarke, Appendix 4 [ extracted and Included as **ANNEX-13** ], focused on the role of engineering and engineers in addressing society's challenges and the role of international standards of engineering education in shaping capability and building capacity. He elaborated on the set of knowledge and understanding, skills and abilities described as the twelve Graduates' Attributes (for an accredited engineering programme) within the Washington Accord community of engineering bodies.

The presentation by Mr Fayolle, Chair of the Council Registration for Professional Engineers, described the legal status of engineers which was set out in Council of Registered Professional Engineers Ordinance 1965, as amended in the 1967 Act. He concluded that changes in technology since 1966, the merger of traditional disciplines and emerging disciplines, the changes in engineering education and the move towards a systems approach meant that the Act had to be revised. Therefore, the IEM initiative was timely.

The presentation by Prof S. Nair, Director of the Tertiary Education Commission, focused on the fact that one of the main aims of vocational degrees is to prepare graduates for employment. Given his background as an engineer working in higher education and practice in Australia, he presented a useful insight into the attributes of professional engineers and the role of engineers in society. He saw IEM's accreditation initiative as a necessary quality assurance step following on the approval granted by TEC to establishments to offer programmes of studies in engineering.

Mr Soobarah (IEM Working Group leader and Past President CRPE) gave an overview of the vision, issues, and challenges of introducing accreditation into Mauritius.

The University of Mauritius (UoM) is currently working with Engineering Council of South Africa (ECSA) to gain accreditation for their engineering degrees. This was the theme of Prof Ramjeawon's presentation. As Head of Civil Engineering, he addressed the actions needed to ensure that engineering programmes could be internationally recognised. A local body with Washington Accord signatory status would be a welcome alternative to ECSA.

**Institution of Engineers Mauritius: Professor Barry G Clarke Mission Report**

The final presentation by Mr R. Gungoosingh concerned the mobility of engineers, an important component of the Mauritian economy both as a tertiary education hub and as a regional centre for engineering excellence. He pointed out that Mauritian engineering graduates were at a disadvantage compared to others from accredited programmes when competing for jobs because their degrees were not necessarily recognised internationally.

These presentations were followed by an open discussion covering engagement of stakeholders, building academic capacity, registration of new types of engineers, mentoring, professional development and actions needed to generate a new Act for the registration of engineers.

It was concluded that: -

- The government were supportive of the IEM initiative;
- Engineering education had a key role to play in the Mauritian economy;
- Gaining international recognition for engineering education in Mauritius required a collaborative approach;
- And gaining international recognition would be beneficial to students of engineering, the Mauritian economy and the government's vision of Mauritius as a tertiary education hub.

15th February 2017

The aim of the meeting with the Director of CRPE, the Registrar and Council members was to understand the implication of setting international standards for engineering education on the registration of engineers. The discussion centred on the role of CRPE and the challenges faced. CRPE were generally supportive of setting international standards and welcomed the IEM initiative. They recognised the role of IEM as a possible signatory to the Washington Accord and perceived benefits of working with IEM to develop the role of the professional engineer. They were also interested in developing with IEM the status of engineering technologists and technicians.

The meeting with the Director of the Tertiary Education Commission (TEC) and the Head of Accreditation and Quality Assurance helped understand the roles industry and government have in educating engineers. The government audits public universities to ensure that the quality of provision meets expected standards. There are three public universities which set their own programmes and are assessed every 5 years. TEC also accredits private and overseas universities which is part of the Government's economic drive to attract overseas universities. Applications are vetted by an expert panel and the pathways for the programmes are assessed against fourteen generic criteria. TEC also welcomed IEM's initiative and the roles of IEM and TEC were identified through discussion.

The day ended with a presentation to an open IEM meeting which was attended by engineers with a range of experiences allowing a broad discussion to take place around education and training for the formation of the practicing engineer.

**Institution of Engineers Mauritius: Professor Barry G Clarke Mission Report**

16th February 2017

The focus of this day was higher education. Ecole Centrale de Nantes, at Pierrefonds, is one of several overseas universities to set up a campus in Mauritius in support of the government's vision to create a tertiary education hub. The Director, Prof Frederic Meslin, described the vision and how it would be achieved, and in particular, the role Centrale Nantes had in educating engineers within the government's vision for a tertiary education hub. Ecole Centrale de Nantes has five overseas campuses with 40% of its students being international. It delivers a five-year programme (2yr in Mauritius and 3yr in France) leading to a Dipl Engineer qualification. A key component of their engineering programmes is the internship (equivalent to a placement) which is used to develop professional skills. It also offers a 4yr degree with one year in France leading to a BSc Engineering. The Ecole Centrale de Nantes Mauritius campus is accredited by TEC but would welcome accreditation of its engineering degrees to international standards.

The second meeting was with the University of Technology Mauritius (UTM). The Director of UTM, Mrs Seetulsing Goorah, is keen to engage in the accreditation process because of the benefits it could bring in their ambition to be internationally recognised. It was recognised that this would require considerable effort in developing their programmes. The meeting was also attended by representatives of the JSS Academy of Technical Education (JSSATE), which is managed by the JSS
Education Foundation Pvt. Ltd. Mysore, India. The college is approved by the Government of Mauritius, registered and accredited by Tertiary Education Commission (TEC), Mauritius and affiliated to the Visvesvaraya Technological University (VTU), Government of Karnataka, India.

The final meeting was with the University of Mauritius (UoM). Given that they are already developing their engineering programmes to align with the Washington Accord graduate attributes, this was a general discussion about the challenges faced in implementing the necessary changes. This meeting was preceded by a talk to students and staff talk on ***Engineering the Future*** covering the challenges graduates will face in their career, the contribution engineers make to society and the economy, the impact of the 4th industrial revolution, the characteristics of engineers of the future, and the internationalisation of engineering.

17th February 2017

The Permanent Secretary at the Ministry of Education asked for a meeting. This was an opportunity to review the progress made during the week and reinforce the benefits of international recognition of engineering degrees. It was agreed that IEM would draft a paper the Permanent Secretary so that she could present this to Cabinet.

The team met the Director of the Mauritius Research Council (Mr A Suddhoo) to discuss the role of research informed teaching in engineering education. The most significant themes were renewable energy and the ocean economy.

**Institution of Engineers Mauritius: Professor Barry G Clarke Mission Report**

The role of engineering education in the economy figured highly throughout the week. Therefore, it was useful to meet representatives of the Board of Investment to discuss capability and capacity. Prof Barry Clarke and the IEM team were received by Mr Atma Narasiah, Head (Technology, Innovation & Services) and his Senior Executives. Discussions centred on Investment in relevant sectors (agro-industry, aquaculture, education, smart cities, ICT-BPO, manufacturing, ocean economy, and renewable energy). The contribution engineering makes to these sectors is significant and, importantly, may require a shift in engineering education to produce the graduates for the emerging sectors of the economy.

The visit concluded with a debriefing meeting with the Working group members Raj Prayag (IEM
President), Jag Soobarah (Working Group Team Leader), Dr. Andre Chan Chim Yuk, Jayesh Desai of J Desai Associates (Past President of IEM) , Deven Daliah Consulting Engineer (Pro-Five Group), Donald Dhondee (executive Council Member of IEM).

**Observations**

1. The success of the visit was due to the significant amount of preparatory work the Working Group, led by Jagadish Soobarah, had undertaken. They had already met the stakeholders to introduce the initiative. These is no doubt that this together with the RAEng funds contributed to a successful outcome.
2. Recognising the contribution engineering makes to the Mauritian economy was a key to the success of the project. Mauritius connects Asia, Africa and Australia. It is politically stable with more than thirty years of sustained economic growth. It is an ocean state with one of the largest Exclusive Economic Zones in the world. The mobility of engineers, hence the relevance of international accreditation, is important to the government's initiative to establish Mauritius as a tertiary education hub. Engineering underpins most of the economic development areas for inward investment and sustaining the ocean state.
3. The government recognised the initiative of IEM, in collaboration with other professional Engineering Institutions, as a national effort, which had implications for the educational sector and employment, and contributed to Government's own undertakings under the UN Sustainable Development Goals, and society's expectations that engineers find solutions to the challenges facing Mauritius, whether they arise from development and use of renewable energy, climatic challenges or global warming, or building and maintaining infrastructure, all in an increasingly digital environment
4. Accrediting engineering degrees against international standards has recognised benefits to Mauritius in addition to shaping capability and building capacity. It is seen by the government, and private and public universities as a marketing tool of value to the government's vision of Mauritius as a tertiary education hub.
5. The UoM experience of gaining accreditation highlights the challenges faced in developing the curriculum and engaging academics in developing the teaching,

learning and assessment requirements needed to move to an outcome focused degree that meets international standards.

6. This initiative to build capacity and shape capability though accreditation of engineering degrees is only one element in the formation of a professional engineer. Industry and government also recognised the need for mentoring of early career engineers, and continuing professional development of registered engineers. Further the recognition of engineering technologists and technicians was an extension of this initiative. There appears to be momentum, partly triggered by this initiative, to create a more structured approach to the education and training of engineers at all levels.
7. The working group of the IEM with the support of the President of the IEM had made enormous progress in engaging stakeholders at all levels to the extent that IEM were seen as leaders in setting this agenda. However, this generated expectation which must be carefully managed. There is a resource issue which suggests that building capacity and shaping capability will be through a partnership of government, industry and academia recognising the role each of the partners must play.

**Recommendations**

Given the momentum that this project created amongst the stakeholders in Mauritius, it would be appropriate to

- to establish the proposed Engineering Accreditation Board as soon as feasible;
- set up a Working Group to prepare an application for provisional membership to Washington Accord;
- develop the procedures for accreditation of engineering degrees in consultation with government, industry and education that comply with those of the Washington Accord;
- seek resources and support to undertake these activities and to obtain the services of two Nominators from among Washington Accord members, and subsequently two Mentors to help develop the procedures and practice;

Finally, the organisation of the visit, the quality of debate and engagement with stakeholders was due to the working group of the IEM who acted as perfect hosts ensuring that the visit was seamless, informative and beneficial.

Prof B G Clarke
Professor of Civil Engineering Geotechnics, University of Leeds
Past President of the UK Institution of Civil Engineers

Appendix 1 The Working Group of the IEM

| | |
|---|---|
| Raj Prayag: | (President IEM), Past Chairman Registered Professional Engineers Council Mauritius |
| Jagadish Soobarah: | (Chair Working Group): Past President IEM, Vice president Aeronautical Society of Mauritius |
| Dr Andre Chan Chim Yuk: | IEM Executive Committee member, retired academic staff, Department of Civil Engineering, University of Mauritius. |
| Deven Daliah: | IEM Executive Council member, and Director of Pro-Five (Electrical Consulting Engineers) |
| Jayesh Desai: | Past President IEM and CEO J Desai Associates Consulting Engineers |
| Donald Dhondee: | IEM Executive Council Member |
| Ghunshyam Parsan: | Vice President IEM |
| Shyam Roy: | Past President IEM, Retired CEO EMTEL Mauritius |
| H Gungoosingh: | Member IEM, partner in Servansingh Jadav Structural Consulting Engineers |
| Hisham Rojoa: | Representative IET Mauritius |

Appendix 2: Programme of Activity [ **included as a separate ANNEX-Please see ANNEX-11**]

Appendix 3 Conference Programme [**Included separately as ANNEX-10]**

# Institution of Engineers Mauritius

**Report on a Pilot Project on**
**the Accreditation of Engineering Degree Programme**

## Institution of Engineers Mauritius- Presentation of Prof Barry G Clarke

**Working Group's Note**: Highly recommended to Readers who wish a quick learning session on Washington Accord and the WA Graduate Attributes and benefits of accreditation. Full text of Professor Barr G Clarke's presentation to the Conference on Accreditation of Engineering Programmes on the 14th February, Mauritius, organised by the Institution of Engineers Mauritius at Voila Hotel, Bagatelle, Mauritius.

# The role of engineers in addressing society's challenges

**Prof B.G. Clarke, past President of UK Institution of Civil Engineers**

**University of Leeds, UK; b.g.clarke@leeds.ac.uk**

It is an honour to be invited by the Institution of Engineers to speak to you today at the Conference on Accreditation of Engineering programmes in Mauritius with the support of the Royal Academy of Engineering and Engineers Against Poverty. The importance of this project is emphasised by the eminent speakers Presenting today and the intensive week ahead with meetings with stakeholders – IEM, students, academics, CRPE, government and industry.

**INTRODUCTION**

The aim of this project is to build engineering capacity in Mauritius as part of the government's initiative to enhance the economy by creating an internationally recognised community of engineers who can address the global challenges ahead.

As a past President of the UK Institution of Civil Engineers, former Chair of the UK Engineering Accreditation Board and current member of the Engineering Council's team for the International Engineering Alliance, I will talk about the role engineers have in addressing society's challenges and the role engineering education has in preparing graduate engineers for those challenges.

**There are three questions to answer:-**

- **What are those challenges?**
- **What are the characteristics of an engineering education that helps graduates deal with those challenges?**
- **And how do we know that the degree programmes are relevant?**

**THE CHALLENGES**

Engineers transform people's lives by creating the lifelines that society relies on, producing a safe environment in which to live and providing the tools they use. This is what society expects.

The transformation process has been affected over the years by political, social, and economic decisions within the context of environmental and technological change underpinned by scientific discovery. The pace of change is accelerating due to climate change, population growth, urbanisation, globalisation, and digital development against a decline in resources, changes in energy supply, increasing number of pandemics, rising sea levels, and poverty. Engineers graduating today will have to address these challenges. Therefore:- **Engineers have a duty to society**

**THE ECONOMY**

Engineering addresses the complete life-cycle of a product, process, or service, from conception, through design and manufacture, to decommissioning and disposal, within the constraints imposed by economic, legal, social, cultural, and environmental considerations. Engineering can be found in all sectors of the economy.

**Engineers generate about 25% of an economy and employ about 20% of the work force.**

I will address three of those sectors covering infrastructure, manufacturing, and healthcare.

# Institution of Engineers Mauritius

**Report on a Pilot Project on**
**the Accreditation of Engineering Degree Programme**

## Institution of Engineers Mauritius- Presentation of Prof Barry G Clarke

The first sector is the built environment – the environment in which we spend most of our lives. The built environment, created through a series of political, social, economic, and technical decisions comprises critical infrastructure of lifeline systems of energy, communications, transportation, waste disposal, water supply; social infrastructure of healthcare, education, retail, leisure, finance, commercial and industrial facilities; and domestic infrastructure. The planning, design, construction, maintenance, operation and use of these infrastructure systems must be considered within the context of the natural environment and the society it supports in to create resilient infrastructure that communities rely on; that is the community and infrastructure must be robust with built in redundancy that can be rapidly restored in a resourceful manner if subject to extreme events.

**The built environment and its operation is essential to society's health, wealth and wellbeing.**

The second major sector is manufacturing which transforms resources into value added products. Trade in manufactured goods is a cornerstone of the economy. It has always existed but it is the industrial revolutions led by engineers that transformed society.

- The first industrial revolution began in the 18th century when we switched to the use of fossil fuels as the prime source of energy to generate steam to drive mechanical equipment;
- The second revolution began in the 19th century when energy shifted to a distributed system of electricity with improved communication, setting of standards and mass production.
- The third revolution centred in the 20th century with developments in electronics, IT and automated production.
- We are now entering the fourth industrial revolution in which technology is embedded in society creating new ways to work and live though the interaction of cyber and physical systems. There are four underlying features of this revolution:- interoperability, information transparency, technical assistance and decentralised decisions.
    - Interoperability is the ability of machines, devices, sensors, and people to connect and communicate with each other via the Internet of Things or the Internet of People.
    - Information transparency is the ability of information systems to create a virtual copy of the physical world by enriching digital models with sensor data. This requires the aggregation of raw sensor data to higher-value context information.
    - Technical assistance is the ability of assistance systems to support humans by aggregating and visualizing information comprehensibly for making informed decisions and solving urgent problems on short notice; and the ability of cyber systems to physically support humans by conducting a range of tasks that are unpleasant, too exhausting, or unsafe for their human co-workers.
    - And decentralized decisions is the ability of cyber systems to make decisions on their own and to perform their tasks as autonomously as possible. Only in the case of exceptions, interferences, or conflicting goals, are tasks delegated to a higher level.

The 4IR's key technological advances are pervasive digital connectivity, widespread automation, and advanced computer software based on machine learning and artificial intelligence techniques. All these give rise to a range of economically disruptive products and services, including driverless vehicles, robotic manufacturing and 3D printing. This shift from the simple digitisation of information

that is so characteristic of the third industrial revolution to a fusion of technologies that will help businesses, streamline production, lower costs and deliver new products is truly revolutionary.

Each of these revolutions have been facilitated by developments in the underpinning infrastructure – canals, ports, rail, water supply, waste treatment, roads and communications; creates opportunities is and improves people's lives. However, there are downsides to these revolutions. The fourth revolution will emphasise inequality, increase unemployment, increase demand for new skills as traditional jobs go into decline, lead to misinformation and cyber warfare, and transform society.

Engineering is central to these changes but not necessarily the traditional areas of engineering. Graduates will be faced with a connected world with unprecedented processing power and data storage, decision making based on algorithms analysing big data, improvements in health care through digital health leading to significant changes in the built environment, use of 3D printers to create products locally avoiding the need for mass production and introducing more complex processes, increased automation and autonomy, and introduction of block chain technology changing transactional processes.

**The fourth industrial revolution creates a connected society routed in knowledge to provide global opportunities.**

The third sector that engineering supports is our healthcare. In the 19$^{th}$ century engineers introduced clean water, removed areas of urban squalor as infrastructure was created and developed waste processing. This had a significant effect on life expectancy - in the UK it went from 35 to 47. Improvements in medical treatment and diet raised this to 65 in the 20$^{th}$ century. It is now 79 as a result of preventative medicine. This will rise further as a result of tailor made healthcare and advances in bioengineering.

We are going to have address conditions associated with ageing, cope with increase in demand for medical services, educate people to make use of telemedicine, and make use of robots for personal healthcare. This will be facilitated by improved diagnostics and treatment through use of data collected on a global scale, use of nanotechnology, impact of genomics, targeted drug development

**We are going to live longer because of developments in medicine and technology which means the built environment will have to be adapted to cope with an ageing population.**

Thus, engineering is concerned with developing, providing and maintaining infrastructure, products, processes, and services for society. It is about systems of systems.

**Thus, society assumes, indeed expects, engineers will sustain its health, wealth, and well-being creating a resilient society.**

**PRINCIPLES OF ENGINEERING**

This starts with the education of engineers which is defined by graduate attributes supported by knowledge to solve complex problems.

A period of initial professional development follows this to become professionally competent at registration and continuing professional development thereafter. Graduate attributes and professional competencies are a public demonstration of the ability of engineers to deliver what society relies on to create a sustainable future in an increasingly complex world where engineers operate globally. Engineers have to be accountable and as the pace of change accelerates will have to play a more central role in society because of their knowledge of complex systems.

Engineering relies on three core elements: - scientific principles, mathematics, and 'realisation'.

- Scientific principles clearly underpin all engineering;
- Mathematics is the language used to communicate parameters, model and optimise solutions;

# Institution of Engineers Mauritius

**Report on a Pilot Project on**
**the Accreditation of Engineering Degree Programme**

## Institution of Engineers Mauritius- Presentation of Prof Barry G Clarke

- Realisation encapsulates the whole range of creative abilities which distinguish the engineer from

the scientist; to conceive, make and bring to fruition something which has never existed before.

**Creativity and innovation to develop economically viable and ethically sound sustainable solutions is an essential and distinguishing characteristic of engineering, shared by the many diverse, established and emerging disciplines within engineering.**

The creative way of approaching all engineering challenges is a 'way of thinking' which is generic across all disciplines. Engineering graduates will:

- be rational and pragmatic, interested in the practical steps necessary for a concept to become reality
- want to achieve sustainable solutions to problems and have strategies for being
- creative, innovative and overcoming difficulties by employing their knowledge in a flexible manner
- be numerate and highly computer literate, and capable of attention to detail be cost and valueconscious, and aware of the social, cultural, environmental, health and safety, and wider professional responsibilities they should display
- appreciate the international dimension to engineering, commerce and communication
- be able to formulate and operate within appropriate codes of conduct when faced with an ethical issue
- be professional in their outlook, capable of team working, effective communicators, and able to exercise responsibility.

**A graduate must develop a habit of mind to cope with the changes and uncertainty ahead.**

**INTERNATIONAL ENGINEERING**

These characteristics of an engineering graduate are universal because engineering is a global profession. It is the impact of the global economy underpinned by transport and communications systems and supported by international education that has promoted the mobility of engineers. This requires the mutual recognition of graduate attributes and professional competencies, an aim of the International Engineering Alliance, a body that promotes the recognition of the development of engineers. Applying international standards of engineering education encourages mobility of engineers and publicly demonstrates the competency of engineers reassuring society at a time of immense change.

**Engineering education is also a global activity but engaging in that activity means delivering graduates with attributes that are internationally recognised.**

This underpins the Accords developed by the International Engineering Alliance – the Washington Accord for professional engineers; the Sydney Accord for engineering technologists; and the Dublin Accord for engineering technicians. I will focus on the Washington Accord, the focus of this project.

There are eighteen signatories will a further six with provisional status. These include the UK, USA, Canada, and Australia; but more relevant to you, Singapore, Sri Lanka, and the Philippines because of the engineering challenges they face. These countries have a greater population than Mauritius but given the government's international aspirations it may be prudent to look at the governance of their engineering professions.

The Washington Accord is a multi-lateral agreement within the International Engineering Alliance that seeks to: -

- Improve standards and mobility

# Institution of Engineers Mauritius

**Report on a Pilot Project on**
**the Accreditation of Engineering Degree Programme**

## Institution of Engineers Mauritius- Presentation of Prof Barry G Clarke

- Define standards of education and professional competence
- Assess engineering education accreditation and evaluate competence

This is similar to the process to become a registered engineer in Mauritius. All candidates must have completed a satisfactory period of engineering training and satisfy the competence standards set by CRPE. Applicants must show that they have a satisfactory academic base, have undergone approved professional training, and, at interview, must demonstrate their engineering competence against specific criteria.

The purpose of this project is to create a mechanism that can publicly demonstrate a satisfactory academic base that is recognised internationally.

The Washington Accord Graduate Attribute Profile has 12 elements, supported by a Knowledge Profile and a definition of the Level of Problem Solving: -

- Engineering knowledge - Apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialisation to the solution of complex engineering problems.
- Problem analysis - Identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences
- Design/development of solutions - Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health, and safety, cultural, societal and environmental considerations.
- Investigation - Conduct investigations of complex problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.
- Modern tool usage - Create, select and apply appropriate techniques, resources and modern engineering and IT tools, including prediction and modelling, to complex engineering problems, with an understanding of the limitations.
- The engineer and society - Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solutions to complex engineering problems.
- Environment and sustainability - Understand and evaluate the sustainability and impact of professional engineering work in the solution of complex engineering problems in societal and environmental contexts.
- Ethics - Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
- Individual and teamwork - Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.
- Communication - Communicate effectively on complex engineering activities with the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations and give and receive clear instructions.
- Project management and finance - Demonstrate knowledge and understanding of engineering management principles and economic decision-making and apply these to one’s own work as a member and leader in a team, to manage projects and in multi-disciplinary environments.

# Institution of Engineers Mauritius

**Report on a Pilot Project on**
**the Accreditation of Engineering Degree Programme**

**Institution of Engineers Mauritius- Presentation of Prof Barry G Clarke**

- Life-long learning - Recognise the need for, and have the preparation and ability to engage in, independent and life-long learning in the broadest context of technological change.

Knowledge profile

- Systematic, theory-based understanding of the natural sciences applicable to the discipline.
- Conceptually-based mathematics, numerical analysis, statistics and formal aspects of computer and information science to support analysis and modelling applicable to the discipline.
- A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.
- Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.
- Knowledge that supports engineering design in a practice area.
- Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.
- Comprehension of the role of engineering in society and identified issues in engineering practice in the discipline: ethics and the professional responsibility of an engineer to public safety; and the impacts of engineering activity – economic, social, cultural, environmental and sustainability.
- Engagement with selected knowledge in the research literature of the discipline.

Complex engineering problems have a range of attributes. At least some of the following may be encountered within a professional engineering education programme:

- In-depth engineering knowledge to allow a fundamentals-based, first principles analytical approach.
- Involve wide-ranging or conflicting technical, engineering and other issues.
- Have no obvious solution and require abstract thinking and originality in analysis to formulate suitable models.
- Involve infrequently encountered issues.
- Outside problems encompassed by standards and codes of practice for professional engineering.
- Involve diverse groups of stakeholders with widely varying needs.
- High level problems including many component parts or sub-problems.

The attributes of complex engineering activities, some of which might reasonably be encountered by a professional engineering undergraduate:

- Involve the use of diverse resources (and for this purpose resources include people, money, equipment, materials, information and technologies).
- Require resolution of significant problems arising from interactions between wide-ranging or conflicting technical, engineering or other issues.
- Involve creative use of engineering principles and research-based knowledge in novel ways.
- Consequences to society and the environment.
- Can extend beyond previous experiences by applying principles-based approaches.

# Institution of Engineers Mauritius

**Report on a Pilot Project on**
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A recent report by RAEng concluded that

- Engineering is a very broad discipline; from nano-structures to mega-structures, from advances in

nanotechnology to major tunnelling projects, and applications as diverse as cancer fighting drug delivery systems to the next generation smartphone technology

- There are number and diverse highly skilled jobs associated with engineering across the whole of the economy
- There are many of companies dependent on engineering and engineers for their success
- The rapidly and continually changing nature of engineering industries and the structure of the sector in the 21st century
- The importance of continuing to improve the image of engineers and engineering and promoting the key role they play in our country's health, wealth and happiness
- The importance of college and university education to both deliver core skills required by the main engineering disciplines and to cope with the increasing inter-disciplinarity of the real world and the needs of employers

**EDUCATION AND TRAINING**

These are three stages to the formation of a professional engineer: -

**education - training and experience – practice**

This is similar to the process to become a registered engineer in Mauritius. All candidates must have completed a satisfactory period of engineering training and satisfy the competence standards set by CRPE. Applicants must show that they have a satisfactory academic base, have undergone approved professional training, and, at interview, must demonstrate their engineering competence against specific criteria.

The purpose of this project is to create a mechanism that can publicly demonstrate a satisfactory academic base that is recognised internationally. This is accreditation.

**Accreditation is a means of publically demonstrating that a degree programme will deliver the learning outcomes to ensure that graduates have the attributes to enter industry**

Accreditation has value for employers: -

- Leaders from industry, working with academic colleagues help to ensure that the educational base for professional engineers meets the needs of industry since the degree programmes are compared with an internationally agreed set of standards set in consultation with industry.
- The civil engineering benchmarks covering general and specific skills are known.
- The internationally audited process leads to continuous improvement of engineering degrees though sharing best practice and engagement with industry.

Accreditation has value for students:

- The process of becoming professionally qualified is more straightforward for those with an accredited degree because they have clearly achieved the internationally recognised standards of knowledge and understanding;
- The process of setting the standards and undertaking accreditation means that graduates of accredited engineering programmes meet the needs of industry, since it is the profession which includes practising engineers and academics that set the standards and carry out the accreditation process; i.e. engineering accreditation is self-regulatory.

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**Report on a Pilot Project on**
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## Institution of Engineers Mauritius- Presentation of Prof Barry G Clarke

- The accreditation process is of international value because IEM will be called upon to accredit degrees at overseas institutions.

Most importantly, accreditation has value to society because: -

- It is undertaken under licence by trained members of the IEM and is transparent.
- It ensures that the engineering programmes prepare graduates with knowledge and skills to address future challenges.
- It helps society realise the relevance and importance of engineering and the role engineers have in developing a sustainable and resilient future for society.

Engineering education, training and professional development involves individuals (engineers and students), academics, industry and government.

**Collectively they have a duty to society to ensure that engineers are competent and abide by the engineering code of conduct.**

The roles of these bodies are: -

- Students make a commitment to the profession though their studies achieving the attributes of an engineering graduate
- Engineers make a commitment to society by maintaining their professional competence and mentor the next generation of engineers passing on their knowledge and experience
- Academics design education programmes, deliver those programmes and guide and assess students against a set of criteria set by academics and industry working in partnership.
- Government, acting on behalf of society and students, ensure that the education process, including delivery, assessment and standards are fit for purpose. This is achieved through institutional and department audit as it is about procedures and resources.
- Industry set the learning outcomes for the programmes and ensure that the programmes deliver those outcomes. This is achieved through programmes accreditation as it about content.

**CONCLUSIONS**

- Engineers contribute to the health, wealth and wellbeing of society through products, processes and services.
- Engineers have to publically demonstrate they are competent to do that as society places their trust in the engineering community
- Engineers deal with complex systems that operate in the natural environment.
- Changes in that environment, developments in technology and society's aspirations implies that these complex systems have to be adapted throughout their life.
- There are three stages to the formation of an engineer – education, training and experience, and professional practice.
- There is a gateway at the end of the education in the form of graduate attributes; and a gateway at the end of training and experience in the form of registration. Professional practice which includes continuing education is a matter of the professional code conduct of engineers.
- The first two stages involved a partnership between students, engineers, academics, industry and government.

# Institution of Engineers Mauritius

**Report on a Pilot Project on**
**the Accreditation of Engineering Degree Programme**

## Institution of Engineers Mauritius- Presentation of Prof Barry G Clarke

Audits are used by government to ensure that engineering programs are properly resourced so that they can be delivered and assessed to an agreed standard.

Accreditation is used to ensure that education programmes meet the learning outcomes set by industry and academics.

There are three benefits to accrediting to international standards: -

- Engineers have to have a habit of mind that allows them to cope with change and uncertainty and that habit of mind is founded on their education.
- Accrediting to international standards facilitate the mobility of engineers as they operate as a global profession working to international standards modified by local criteria.
- Tertiary education is a global activity therefore, to be viable, has to deliver programmes that comply with international standards.

**NSTITUTION OF ENGINEERS (MAURITIUS)**

**in collaboration with Engineers Against Poverty**
**and with support from the Royal Academy of Engineering (UK)**

**Africa Catalyst 16/17: IEM Project on Building Engineering Capacity Through Accreditation of Engineering Education**

**Training of Evaluators**
**Programme for Week 22nd - 26th May 2017**

**Resource Persons: Prof. Andrew Downton & Prof. Sean Wellington (IET Accreditors)**

- **Monday 22nd May: 16:30 – 19.30 (Venue: Pro-Five Ltd, The Axis, GF, 26 Bank Street, Cybercity, Ebene)**

  *An initial introductory evening focussing on Washington Accord mapping to a specific engineering institution's accreditation process and criteria (using both the IET and the UK Engineering Accreditation Board models for this), and with discussion on exactly how this might be followed through in Mauritius.*

- **Tuesday 23rd May: 9:00 – 16:30 (Venue: Voila Hotel, Bagatelle)**

  *A first complete pass of the training material covering both the accreditation criteria and processes for applying them, and the organisational logistics and infrastructure to deliver an accreditation service efficiently and robustly.*

***Note: Afternoon/evening sessions on Wednesday, Thursday and Friday, detailed below would be mainly hands-on simulations of different aspects of the accreditation process using anonymised evidence from IET's UK 'University of Education' mock accreditation database.***

- **Wednesday 24th May: 16:30 – 19.30 (Venue: Pro-Five Ltd, Ebene)**

  *Initial accreditation data review and identification of follow-up issues for the visit.*

- **Thursday 25th May: 10:00-12:00 (Venue: ELT2, Faculty of Engineering, University of Mauritius)**

  *Formative and Summative Assessment of Learning Outcomes in engineering programmmes*

- **Thursday 25th May**: **16:30-19:30 (Venue: Pro-Five Ltd, Ebene)**

  *Simulating various aspects of an actual accreditation visit. (This would include simulating some of the meetings that take place with academic department staff and with an institution's industry partners during an actual visit**. It is proposed to invite some of the academic trainees to impersonate a department being accredited, and respond to questions from the 'accreditation panel' of other trainees; industrial trainees could similarly impersonate the department's industry partners and field questions from the remaining trainees, so that most trainees would experience both asking and answering accreditation questions. In each case, Prof Wellington and Downton would each join one side, and either help moderate or interpret the questions on one side and responses on the other.)***

- **Friday 26th May: 16:30-19:30 (Venue: Pro-Five Ltd, Ebene)**

  *Looking at how an accreditation report and action plan is finalised after a visit and the cycle of follow-up with the institution that would then follow, and then a final review of all the material covered during the week and key learning points.*

**Note: Only participants attending at least 80% of the Training Sessions will be issued a Certificate of Attendance**

# Institution of Engineers Mauritius

**Report on a Pilot Project on**
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## Table of Contents- Draft Governance Structure Document

## Institution of Engineers Mauritius- Table of Contents (Draft Governance Structure of EAB)

## DRAFT GOVERNANCE STRUCTURE- TABLE of CONTENTS

# Institution of Engineers Mauritius

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**ANNEX-16**

# Institution of Engineers Mauritius

**Report on a Pilot Project on**
**the Accreditation of Engineering Degree Programme**

IEM-Consultative Group on Review of Draft Governance Manual

| **Institution of Engineers Mauritius- Members of the Consultative Group** | | |
|---|---|---|
| | | |
| **Members of the Consultative Consulting Group (Reviewing Draft Governance Manual)** | | |
| | | |
| **Member** | **Institution** | **Status** |
| Armoogum, Dr Vinay | University of Technology | Head of School |
| Bhujun, Kiran | Ministry of Education, Tertiary Education and Scientific Research | Director |
| Chan Chim Yuk, Andre (Dr) | Self Employed | Geo-Technical Engineer |
| Daliah, Deven | ProFive Consulting Engineers | Consultant |
| Demka, Mangeshkumar | University des Mascareignes | Dean of Faculty of Engineering |
| Desai, Jayesh | Desai & Associates Ltd-Consulting Engineers | Project WG Member |
| Dhondee, Donald | IEM | Member |
| Fayolle, J R | Council of Registered Professional Engineers | Past Chairperson |
| Heerasing | University of Technology | Lecturer |
| Hurreeram, D.K. | University of Mauritius | Assoc Professor |
| Kinnoo, Sarupanand | IEM/AeSM | Member |
| Latchoomun, L.N | Universite des Mascareignes | Lecturer |
| Manohar B.S | JSS Academy of Technical Education | Head of School |
| Manon, Noel | | |
| Meslin, Prof.Frederic | Centrales de Nantes | Head |
| Mohonee, S K | Pro-Five | IEM Member |
| Nawaz Hossenbaccus, Shah Nawaz | IET (Mauritius) | Member |
| Nowbuth, Dr (Mrs) Manta | University of Mauritius | Dean faculty of Ocean Studies |
| Peermamode, Aboo Bakar | Mauritius Telecom/IEM | Senior Engineer |
| Prayag PDSM, Raj H | Institution of Engineers Mauritius | President |
| Proag, Dr Virendra | University of Mauritius | Associate Professor |
| Ramnarain, Dr Vivek Gupta | Tertiary Education Commission | Ag Head Quality Assurance and Accreditation |
| Rughooputh, Reshma | University of Rughooputh | Lecturer |
| Santaram, Venkanah | University of Mauritius | Assoc Professor |
| Soobarah, Jagadish | Aeronautical Society of Mauritius | V/President |
| Takoory, Yashveer | Mauritius Telecom | Engineer |

# Institution of Engineers Mauritius

**Report on a Pilot Project on**
**the Accreditation of Engineering Degree Programme**

**Institution of Engineers Mauritius – Mid-Term Report (on GCRF Africa Catalyst Project)**

**GCRF Africa Catalyst Report**

***Institution of Engineers MAURITIUS (IEM)***

**in partnership with Engineers Against Poverty (UK)**

## *Please include a brief problem statement, outlining the overall objectives of the project.*

In the absence of a local set up for the accreditation of engineering degree programmes, Mauritian Universities cannot demonstrate to their stakeholders that any of their programmes conforms to an internationally recognised standard, nor that the education imparted to their engineering graduates prepares them to face any of the global challenges or even any which threaten the very existence of small islands states like Mauritius itself. IEM concurs with the international engineering profession in that accreditation to Washington Accord standard holds the key to the Mauritian engineering education and the profession. Through this project (supported by the RAEng) IEM aims to create an environment conducive to ushering engineering accreditation, and to enlist and train a cohort of academics and engineers on programme accreditation, who will constitute a core group of professionals who would help take the Project to its next logical phase, i.e seek admission of Washington Accord.

# Project Progress

***Please outline what activities you have carried out to date for this reporting period.***

1. Set up a ten-member **Working Group (WG)** for project implementation; Recruited a Secretary for the Project; Held 11 weekly meetings, to-date to monitor progress, keeping in mind our contractual obligations.
2. **Communication** with stakeholders; these concerned: the RAEng various initiatives and its outreach in all areas of the economy which depend on research and engineering; the GCRF Arica catalyst Scheme and its objectives; RAEng support to IEM; the intent and scope of IEM's project. Invitation to collaborate with IEM and participate in projected events. Related documents were published on IEM's website. **Invited engineers and academics** to register themselves for projected training /briefing sessions.
3. **Launched of Project** on 23 Jan with the President of the Republic of Mauritius (HE Dr Mrs Gurib-Fakim G.O.S.K) delivering the inaugural address. It was an opportunity to announce the scope and intent of project and perceived benefits of engineering accreditation for the nation. Prof Chris Atkin (President of RAeS (UK) also welcomed IEM's initiative.
4. **Conference on 14 Feb 2017: P**rof. Barry G Clarke CEng, FICE, FGS of Prof of Civil Engg at Leeds University, spoke on the theme ***Creating awareness among stakeholders on the implication and benefits of Accreditation of Engineering Degree programmes,*** and on the need for Mauritius to adopt Washington Accord standard. The Permanent Secretary of the Ministry of Education, etc, saw the project as complementary to Government's own education objectives. Other speakers spoke related issues, each emphasizing need for early introduction of engineering accreditation. Fortyfive (45) persons from various sectors, including the Universities, Government and the private sector, employers, and students' representatives attended the conference. The event concluded with panel discussions chaired by Prof Barry Clarke, who provided answers to questions from the audience. Copy of the Conference synopsis attached, Prof Clarke's mission report to follow when received. [***not included here***]

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5. **Post Conference Meetings with stakeholders:** Separate Meetings were held with the various stakeholders invited to the Conference to listen to their queries, gather feedback, offer explanation and record their support.

6. **Other Presentations**: (i) by IEM to members of IEM on Africa Catalyst Scheme leading to IEM obtaining a grant, (ii) by Prof Clarke to Univ, of Mauritius Students and Faculty members on 15 Feb, followed by another one to the Engineering profession on accreditation.

8. **Document review sessions:** Meetings held to plan and agree on scope of the Review, organise resource persons, agree on reference sources and work schedule; decision to hold 9 sessions (out of 14 budgeted) till end of March, (starting 14th March).

## Challenges

***Have any activities been challenging or not achieved? Have there been any external challenges affecting the project management?***

1. **Major challenge:** to demonstrate that IEM was representative of the engineering profession and satisfied the exigencies of Washington Accord as having potential for undertaking engineering degree accreditation.
2. **No Institutional Conflicts**: to convince concerned parties that there was no conflict between the statutory functions of the Tertiary Education Commission (TEC), which accredits private Universities, the Council of Registered Professional Engineers (CRPE), which does no accreditation, and the projected functions of the IEM/Engineering Accreditation Board.
   The Working Group held a number of explanatory/discussion meetings prior to and during Prof Clarke's mission, with senior officials of the Ministry of Education, TEC and CRPE on the IEM long-term aim of becoming a signatory of the Washington Accord. IEM is fully satisfied that it was successful in clearing all doubts that these authorities might have initially and in gaining their full support

## Lessons Learnt

***What are the main lessons learnt in this reporting period? How will you incorporate those lessons in the next project phase?***

1. **Logistics and Resource related lessons**: **Improve briefing mechanism** for volunteers prior to enlisting their support; **Need to identify discrete components of each event/activity** and delegate responsibilities and tasks with necessary authority; Designate a trouble-shooter with authority for all unlikely situations; **Maximise use of electronic communication** means to avoid physical presence unless the latter is necessary; **Avoid last minute decisions based on impulse** and on belief of what would be nice as opposite to what should be right.
2. We consider that the success achieved during this reporting period was underpinned by
   - Strong leadership,
   - Good planning of meetings, tasks and activities;
   - Effective communication amongst WG members and with stakeholders.

The WG will continue with its planned activities with the same rigour and no impediment is foreseen that warrants major changes in the approach to meet the objectives set for this project.

## Sustainability

# Institution of Engineers Mauritius

**Report on a Pilot Project on**
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## Institution of Engineers Mauritius – Mid-Term Report (on GCRF Africa Catalyst Project)

***How has the implementation of the pilot project been linked to ongoing activities, either by you or other organisations?***

IEM can affirm that (1) **Government** (Ministry of Education) and Higher Educational Authorities**; (**2) **Tertiary educational establishments** including Univ. of Mauritius**; (**3) **The Council of Registered Professional Engineers** (CRPE), and (4) **Other organisations** such as the Mauritius Research Council, the

Board of Investment and other Professional Engineering**,** all view the project as complementary to their own individual or national efforts and/or statutory obligations respectively. It is a boost to their own efforts at improvement of the education quality on the path to international recognition or economic growth.

***How will the project be maintained if/when funds from GCRF Africa Catalyst is no longer available? Have you identified any alternative sources of funding?***

IEM is committed to take the project to the next stage, which means seeking full membership of Washington Accord. Such an outcome may take about 4 years, even under the most favourable circumstances, thus not permitting IEM to charge for accreditation services prior to that. IEM considers that even after that stage it would have to depend on external support to meet eventual obligations under the Washington Accord Rules. IEM is still exploring other sources of funding to supplement its own contribution to the cause of accreditation. IEM is hopeful that given support already expressed by the authorities and their acceptance of the national outreach of the project, the authorities will be favourably disposed to provide support.

***Can the project be scaled up and/or replicated? Where/How?***

1. It can be scaled up and should certainly be. The second and **Final Phase** should involve making an application for **provisional membership** to the Washington Accord. IEM will require assistance to **secure the services of at least two Nominators** (other Washington Accord members) to help with the development of its manuals and relevant document on accreditation, as well as the scrutiny of its proposed accreditation procedures. Thereafter it will require the **services of two Mentors** for vetting the Accreditation process and reporting on two actual accreditation assignments done by IEM.

2. IEM considers that the project can be replicated in almost every Sub-saharan country which does not yet have an accreditation system in place. Perhaps the Sub-saharan nations could agree to establishment of Regional (International) Engineering Accreditation Centres) to serve the respective Regions

| Target activities (for example - held workshop, developed training materials) | Number of activities completed in past 3 months/and planned for remainder of pilot | Outputs | Outcome | Expected impact |
|---|---|---|---|---|
| **Programmed two awareness and** | two conferences | stakeholders became aware of what it was | Attendees are knowledgable about the | |

# Institution of Engineers Mauritius

**Report on a Pilot Project on**
**the Accreditation of Engineering Degree Programme**

## Institution of Engineers Mauritius – Mid-Term Report (on GCRF Africa Catalyst Project)

| | | | | |
|---|---|---|---|---|
| **sensitizing conferences** | done; no more planned | about that was being advocated, | likely impact of engineering accreditation. | |
| **Presentations to students and engineers** | two done; others not planned or envisaged at this time, | Audience was informed on implications of accreditation. | Support expressed | Welcome establishment of engineering programme accreditation |
| **Meeting with Focus groups** | Ten meetings (one to one presentations) done; Expected two further briefing sessions with Government Ministers responsible for engineering education and registration of engineers | IEM expects them to confirm support already expressed at ad-hoc meetings. | IEM expects Official statement or public statement or declaration | Desirable: approval of institutional support to IEM/Accreditation board. |
| **Workshops/Training on review of Accreditation Documentation of selected Washington Accord and Training of Evaluators** | Only two sessions on Documentation done and Training of Evaluators not yet started. Further 12 Document review sessions and estimated 10 Evaluator training sessions still to be carried out. | Positive response received from 29 candidates- and 25 attended first review session on 14 February. | On completion- Trainees will have acquired knowledge, understanding of engineering accreditation to Washington Accord and gained ability to undertake mock accreditation assignments. | A cohort of academics and engineers will be available in Mauritius for setting up and administering an autonomous accreditation body under the aegis of IEM. |
| **Developing the governance structure of an eventual accreditation board** | Not yet commenced. Activity planned for End of May/Early June. | No specific number budgeted, but anticipate around 15, representative of the professional engineering institutions and faculties of Engineering. | process should create an understanding of the functions of an accreditation body for engineering. | Confidence built in the accreditation set up as well as in its capacity and competence |

| Who will benefit from your pilot programme? (graduates, professional engineers, institutions, policy makers etc.) | How many have benefited to date through pilot project, how many will benefit by end of project? | How measured/ verified? |
|---|---|---|
| Awareness conferences intended for stakeholders (invitees) from sectors | To date approximately 90 conference attendees, 50 engineers and academics and | Certificates will be issued only to professionals attending the Documentation Review |

| | | |
|---|---|---|
| concerned with education, training, development and employment of engineers of public; focus group meetings were intended for decision takers; whereas presentations were made to engineering students, engineers and academics, as well as to IEM members. | some 200 students are informed of the project and its benefits, and relevance,<br>By the end of the project, at least 25 (academics and engineers) will have acquired knowledge and understanding of accreditation criteria and procedures. | sessions as well as the Evaluator Training sessions, subject to criteria to be approved for the purpose. |

| Key Indicators (from application form) | Current Status | Target (from application form) |
|---|---|---|
| **No of conferences** | One Inaugural launch, One Conference | 2 (one with 45 stakeholders) |
| **Focus group Meetings** | 10 | 8 (4 with authorities) |
| **Meetings with Govt Ministers and Senior Executives** | 2 (but not with Ministers-yet) | 3 (concerned with education and employment of engineers) |
| **Information Sessions (documentation Review)** | 2 (by Friday 17th march); 6 more by 31 march | 14 sessions (1 to ½ hour each) |
| **Documentation Review - attendees** | 29 responses -25 for first session | 35 |
| **Training of Evaluators-days** | proposed for May 2017 | 5 days |
| **Training of Evaluators (numbers)** | Proposed for May 2017 | 25 (engineers and academics) |
| **Drafting Governance Structure of Accreditation Agency, Considerations of future options, Completion Report** | Proposed for End may/June2017 | 10 (one-hour evening sessions) |
| **Expectations from Authorities** | Support expressed by concerned authorities | Expression of support or approval |
| **Notification of Policy Decisions** | Decision not yet announced; still early for such outcome | Approval of setting up of accreditation agency |
| **Request from Universities to accredit their engineering degree programmes** | Too early to expect request, but interest expressed during focus group meetings. | IEM gains provisional membership of Washington Accord |

# Partnerships

***Which stakeholders have been involved in this project period and in what capacity?*** *:*

1. **Organisational**: Executive Council of IEM; Aeronautical Society of Mauritius, the Institution of Engineering and Technology (Mauritius Section);

2. **Public Support**: H.E the President of the Republic of Mauritius Dr Mrs A. Gurib-Fakim GOSK, Permanent Secretary Ministry of Education, Tertiary Education and Scientific Research;

3. **Collaborative**: Director Tertiary Education (Ministry of Eductn); Selected Consulting Engineers;

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**Institution of Engineers Mauritius – Mid-Term Report (on GCRF Africa Catalyst Project)**

4. **Participative**: Faculty of Engineering UoM, the Council of Registered Professional Engineers, Director Tertiary Education Commission, Faculty of Engineering, University of Technology, private Universities, etc.

***How have your UK partners been involved in the project to date? What role will they play for the remainder of the project? Has a UK partner been beneficial?***

Yes, a **first intervention** to sensitizing stakeholders on benefits and implications of accreditation took place during the week 13th to 17th February. Second intervention by two Experts are expected for training of Evaluators in May 2017.

***If you were scaling up the project, who would you need to work with?***

Individuals with experience in programme accreditation from Washington Accord member organisations, designated by the Washington Accord

## Feedback

***Do you have any direct feedback from partners, beneficiaries or other stakeholders?***

A feedback questionnaire was designed for the Conference held on 14 February. There were 25 responses out of a total of 45 participants. A summary of the feedback is attached[not included here]. It can be found that the Conference was effective in achieving its objectives of creating awareness on the IEM initiatives, the role and benefits of engineering accreditation, on the importance for IEM to become a signatory of the Washington Accord and on the interest to participate in future activities of IEM on accreditation.

In addition, during the post-Conference meetings held in the presence of Prof Clarke, there was unanimous support from the Ministry of Education, the Tertiary Education Commission, the Council of Registered Professional Engineers, the three public and one private universities offering engineering programmes in Mauritius.

## Media

***Please list any media attention your project has had in this reporting period. If possible, please provide links.***

The official Launch Ceremony held on 23 January was broadcast live on the internet. The whole Conference was video-taped for posting on the IEM website. All activities and information pertaining to the Africa Catalyst Project can also be found on the website www.iemauritus.com.

It was also available on the RAEnNg website- see link: http://www.raeng.org.uk/grants-and-prizes/international-research-and-collaborations/africa-catalyst/current-and-recent-awards

The Mauritius Broadcasting Corporation TV had interviewed Prof. B. Clarke, the IEM president Mr Raj Prayag, and Dr Andre Chan Chim Yuk (Working Group Member) and the interviews were telecast between 19H00 and 19h30 a few days after the Conference held on 14 Feb 2017

# Institution of Engineers Mauritius

**Report on a Pilot Project on**
**the Accreditation of Engineering Degree Programme**

**Institution of Engineers Mauritius- Africa Catalyst-Completion Report**

# GCRF Africa Catalyst
# Completion Report
# in partnership with Engineers Against Poverty

**Please include a brief problem statement, outlining the overall objectives of the project.**

In the absence of any local agency for the accreditation of engineering degree programmes against an international benchmark such as represented by the Washington Accord (WA), the Institution of Engineers Mauritius (IEM) decided it will take on the responsibility to set up an engineering accreditation framework that will meet the standards of WA. This requires a sufficiently trained number of professionals with the necessary knowledge and skills to put such a framework in place. The approval of IEM's Pilot Project under the GCRF Africa Catalyst Scheme made it possible to train a pool of professional engineers and engineering faculty staff on the Washington Accord Accreditation Criteria, Standards and Procedures, and the methods of Application and Assessment of WA requirements for engineering degree programmes. The completion of the project has ensured, inter-alia, that a first cohort of engineers and academics with adequate competence to serve as Evaluators and Team Chairs is available in Mauritius for undertaking the accreditation of engineering degree programmes. They constitute a critical asset for establishing the accreditation system.

## Project Progress

***Please outline what activities you have carried out to date for this reporting period***.

The training activities associated with the creation of a first pool of Evaluators were carried out in two stages.

**The First stage** consisted of a Documentation Review Exercise which was spread over 14 evening sessions of 2 hours each. The first of these Review sessions started on 7th March 2017, while the last (14th) session was held on 11th May 2017. The presentations were delivered by members of the Working Group who are experienced engineers or academics and, in addition, were knowledgeable about Washington Accord accreditation. PowerPoint presentations (13) were held at the IEM House and the Final Session (lasting 3 hours) in the Conference Room of Voila Hotel (at Bagatelle). There were opportunities for Questions and Answers in each session.

The programme was set off with a presentation of the "Best Practices in the Accreditation of Engineering Programmes", a joint publication of International Engineering Alliance (IEA) and European Network for Engineering Education (ENAEE), and was followed by the accreditation related manuals and procedures of Engineers Canada; the Engineering Council of South Africa (ECSA); Engineering Accreditation Board of the Institution of Engineers of Singapore; Institution of Engineers New Zealand; the Engineering Council UK, ending with the Rules and Procedures of Washington Accord.

The Final session was an opportunity for selected participants to make presentations on endeavours at enhancing engineering education standard within their own organisations, and what they perceived as being the issues with introduction of Washington type accreditation. Participants included academic staff from the University of Mauritius, University of Technology of Mauritius, Université des Mascareignes, and Ecole Centrale de Nantes (Mauritius Campus).

# Institution of Engineers Mauritius

**Report on a Pilot Project on**
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**The Second Stage of training** was held over six 3-hour sessions during the week 22nd to 26th May 2017. The resource persons were Prof Andrew Downton & Prof Sean Wellington who were selected in consultation with our UK partner, EAP. Prof Downton and Prof Wellington are eminent personalities in engineering accreditation. Prof Wellington is the Chair of IET's (Institution of Engineering & Technology, UK) Academic Accreditation Committee and delivers their accreditor training in the UK. He has chaired many UK and International accreditation visits. Prof Downton is a member of IET's Academic Accreditation Committee and also a very experienced IET Chair and Panel member for UK and international visits. A Self-explanatory programme indicative of the deliverables of the training sessions is attached. [See ANNEX-D] [***not included here***]

**The Final Activity** under the Pilot project has been the development of a Draft Governance Structure for an Engineering Accreditation Board (EAB) for consideration and approval by IEM, and subsequently, if it deems appropriate, for amending the Constitution of the Institution, as a first and necessary step to establish the EAB, that will, as soon as its Board is constituted, start working towards submitting an eventual application for provisional membership of Washington Accord. A concluding action, in addition to submission of this Completion Report, is a Report by the Working Group on the Pilot Project Implemented by IEM with the support of the Royal Academy of Engineering for the information of Stakeholders

## Challenges

***Have any activities been challenging or not achieved the planned result? Have there been any external challenges affecting the project management? The main challenges were:***

1. To recruit the targeted number (25) of potential evaluators with the right profile for the future responsibilities that they would be tasked with. Finally, the participation of 21 was deemed to be satisfactory for them to be considered as having acquired adequate knowledge to participate in accreditation duties.
2. The training was intensive and because the majority of the trainees are senior professionals, some had difficulties to sustain their attendance continuously at the rate of 2 evening sessions per week for 7 to 8 weeks during the Documentation Review and 4 successive evening sessions and one full day session over one week during the Evaluators Training.
3. Obtaining collaboration of non-participating persons who are likely to influence the future environment

## Lessons Learnt

***What are the main lessons learnt during the pilot project?***

The nature of the project, including its being both funds-limited and time-bound, and required to operate within the contractual confines of the Academy-IEM Contract AC1617, dictated a quick change in implementation strategy after a slow take-off. This being an academic project, the Working Group sought and obtained an environment which could serve as a model to others embarking on similar projects:

1. A quasi-total autonomy of operation in the implementation of the several activities under the project;

2. Access to resources and logistics to ensure hassle free delivery following issuance of instructions, e.g. use of premises and access to staff and facilities, meeting obligations arising from operations;

3. A fair distribution and sharing of workload among volunteers;

4. A dedicated Working Team driven by the members' belief in the proclaimed objective of the project and their personal desire to be part of a team of "founders";

5. Support from a partner, e.g. EAP, being accessible at all reasonable times, being an equal partner receptive and understanding of our requirements, and being fully and promptly responsive and supportive, despite the separation of time zone, continent, and the thousands of miles;

6. Understanding the profile of participants and adapting to the extent permissible and feasible, to their official/business obligations when deciding the time, place and duration of the activities for ensuring greater participation, and attaining the project objectives.

## Sustainability

How has the implementation of the pilot project been linked to ongoing activities, either by you or other organisations? Positively:

(i) University of Mauritius (UoM) has requested Engineering Council of South Africa (ECSA) to accredit one or more of its engineering programmes. The setting up of an Engineering Accreditation Board will create an accessible local agency delivering an accreditation service to the same standard;

(ii) The Council of Registered Professional Engineers (CRPE) (i.e. the regulator for engineering practice) has agreed to the principle that a Washington Accord accredited programme satisfies the educational requirements for engineering practice, such that there will be no issue when IEM obtains full membership of Washington Accord;

(iii) The Tertiary Education Commission (TEC) which, under the Education Act, as amended in 2005, has legal responsibility for accrediting programmes of private Universities established in Mauritius; it is collaborating in this project and has agreed that the project's ultimate goal consolidates the TEC's own objectives;

(iv) Government (the Ministry of Education, Scientific Research and Tertiary Education), considers the project consolidates its own efforts at transforming Mauritius into an Education Hub for the Region.

***Will the project be maintained once this pilot stage is complete? Have you identified any alternative sources of funding?***

This Institution (IEM) is committed to maintain and to further the project to signatory status of Washington Accord, likely to be attained by 2022. Alternative sources of funding (similar to what obtains overseas) have been identified, but not formally discussed with stakeholders, whose expressed support does not exclude funding. The Institution is confident that the national outreach of the project will attract funding support until it can become self-supporting. IEM is also hopeful of a prospective Stage-2 developing under the GCRF Africa Catalyst Scheme, and being offered an opportunity to participate in that Scheme

## Partnerships

# Institution of Engineers Mauritius

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Which stakeholders have been involved in this project and in what capacity? (i) The Authorities (Ministry of Education, Tertiary Education Commission, Council of Registered Professional Engineers) have collaborated as well as expressed support.

(ii) Professional Engineering Institutions (Aeronautical Society of Mauritius, IET-Mauritius) are collaborating and participating with IEM

(iii) University of Mauritius, University of Technology of Mauritius, Université des Mascareignes, and some private Universities are participating and collaborating, and Mauritius Research Council.

(iv) Individual members from the academia and practising engineers are participating (as trainees) as well as supporting the project.

***How have your UK partners been involved in the project? Has a UK partner been beneficial?***

The UK Partner is Engineers Against Poverty (London). They have been of great value and have been instrumental in identifying and procuring the services of the three Experts who have intervened during the launch Conference/Seminar and the training activities carried out under the project and one Expert (Associate of UK Partner) with reviewing the Draft Governance Structure developed during the concluding activity

## Feedback/Case studies

***Do you have any direct feedback from partners, beneficiaries or other stakeholders? Please provide at least one case study and attach a photo if possible/suitable and please confirm with the candidate if the Academy can use this externally to market the programme.***

There was a good mix of participants with more or less equal numbers of engineers and academics. At the end of the Documentation Review sessions, the attached feedback form (ANNEX-A) [***not included here***] was emailed to the participants. Feedbacks were obtained from only 8 participants. The overall level of satisfaction was good to very good. The increase in level of understanding of accreditation criteria, standards and procedures was significant. At the end of the Evaluators Training, the attached feedback form (ANNEX-B) [***not included here***] was filled in by 20 participants (12 engineers and 9 academics). They strongly agree or agree that the training met their expectations in terms of content, pace of learning and knowledge gained. Useful indications of the main learning points were made. Other comments made indicate that there is a keen interest to get involved in the future phases of the IEM accreditation project, which is being viewed as a national project. There are suggestions that IEM should seek the collaboration of other signatories of the Washington Accord so that local evaluators can gain overseas experience in carrying out engineering accreditation.

Presentations by representatives of Academia (include Private Universities) considered the details about present initiatives to update their standards and their internal faculty problems were sensitive matters so we don't have any of that for uploading. However, a Presentation on the Washington Requirements for compliance by prospective accreditation agencies desiring to seek admission into the Accord is being despatched separately in view of its size as ANNEX-E (not uploaded) [***not included here***]. Sample photographs in a Zip file IEM-Pilot-PROJECT.Zip [***not included here***]

## Media

***Please list any media attention your project has. If possible, please provide links.***

# Institution of Engineers Mauritius

## Report on a Pilot Project on the Accreditation of Engineering Degree Programme

For the awareness campaign, there was ample coverage by the media, including the national TV. The official Launch Ceremony held on 23 January was broadcast live on the internet. The whole conference held on 14 Feb was video-taped for posting on the IEM website. All activities and information pertaining to the Africa Catalyst Project can also be found on the website www.iemauritus.com. It was also available on the RAEng website- see link: http://www.raeng.org.uk/grants-and-prizes/international-research-and-collaborations/africacatalyst/current-and-recent-awards

Interviews on the project were broadcast by the Mauritius Broadcasting Corporation TV a few days after the Conference held on 14 Feb 2017. Activities organized for the second quarter from April to June 2017 are posted on IEM website. Press coverage was not sought given the technical nature of the activities. However, a media briefing is proposed after completion of the project and finalization of the project report

| Target activities (for example - held workshop, developed training materials) | Number of activities completed | Outputs | Outcome | Expected impact |
|---|---|---|---|---|
| **Documentation Review:** 14 sessions (1 to 1.5 hours) by local resource persons | All 14 sessions of 2 hours' duration were held from 7 March to 11 May 2017 | 13 academics and 13 professional engineers from industry have attended these sessions. | The participants have acquired sufficient understanding and knowledge of WA accreditation requirements and how the 5 selected WA signatories have implemented these requirements. | The participants have gained more or less the same level of understanding of WA requirements as a preparation for the following activities associated with the Training of Evaluators. |
| **Training of Evaluators:** 5 days for 2 overseas resource persons from UK Partner.<br><br>Targeted number of trainees: 25 | (i) 6 training sessions spanning over 22 to 26 May 2017 were held.<br>(ii) a 2-hour presentation on "Formative and summative assessment of learning outcomes in engineering programmes" was held for academia at University of Mauritius.<br>(iii) 4 members of the Working Group attended, as observers, an Evaluation Board meeting conducted by the resource persons (through video conferencing) for considering reports from their own accreditation teams. | 8 academics, 12 engineers from industry and 1 representative from higher education authority have attended the training sessions. The participants included two members from the Regulatory Body for engineering practice. | A first cohort of engineers and academics has acquired sufficient knowledge and competence to interpret and implement accreditation standards and procedures. They can with further training become qualified evaluators. | Sufficient local resource persons have been trained to set up the Engineering Accreditation Board and participate in accreditation assignments. |
| **Develop Governance Structure for an Engineering Accreditation Board (EAB)**<br><br>10 (one-hour) working sessions were planned | (i) The development of the draft document was handled through exchange of emails among the Working Group members and was followed by 2 formal review/discussion sessions (sessions of 3-hour each) with a consultative committee (comprising the attendees of the training sessions) to consider/amend and approve the draft document.<br>(ii) Peer review of document by UK Partner. | There is consensus in the Consultative Committee, which represents the main stakeholders, on the structure, composition, function and operation of a proposed accreditation body.<br><br>It is worth noting that there was also a favourable feedback from the UK Partner. | A comprehensive document for setting up the Board and its governance structure is now available for comments through a wider circulation to the authorities and the stakeholders concerned with the education, training, professional development and employment of engineers. | IEM will have a document to take the project forward, that is to set up the EAB in preparation to satisfy the requirements for an application for membership of the WA. |

# Institution of Engineers Mauritius

## Report on a Pilot Project on the Accreditation of Engineering Degree Programme

| Who has benefitted from your pilot project? (graduates, professional engineers, institutions, policy makers etc.) | How many have benefited through the pilot project? | How measured/ verified? |
|---|---|---|
| The direct beneficiaries of the project are the individual participants in the training sessions who are now knowledgeable about engineering degree programme accreditation to WA standards.<br><br>The academics are now aware of the accreditation requirements and what must be done to align their programmes accordingly to the expected international standards.<br><br>The institutional beneficiaries are the PEIs who will drive the accreditation process through the EAB.<br><br>The policy makers are now more informed on the role of engineering accreditation and recognise that it will contribute towards their objectives of developing Mauritius as an Education Hub in the region. | The participants, their institutions and the regulatory authorities are the direct beneficiaries. | The sustained attendance of participants in the working/training sessions is an indication of the interest created by the project among the stakeholders.<br><br>Participant feedbacks were obtained for the Documentation Review and the Training of Evaluators.<br><br>Separate certificates of attendance will be issued to participants of the Documentation Review and the Training of Evaluators. Templates of the respective certificate are attached (**Annex C1 & C2**). |

**ANNEX-19**

# Institution of Engineers Mauritius-
# GCRF Africa Catalyst project (Completion Report-Summary of Financials)

| Africa Catalyst - Financial Reporting Template | | | | | | | Budget | Actual | Variance | Budget | Actual | Variance | *4 | *5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Items | Unit Description | Unit Cost | Quantity | Total Cost | Requested from RAEng | Other Income* | Q1 (Dec-March) | Q1 (Dec-March) | Q1 (Dec-March) | Q2 (April-June)*2 | Q2 (April-July)*2 | Q2(April-July) Actual Less Budget*2 | Total Actuals on Project | Balance (RAEng Funs=ds) |
| Revenue Costs | | £ | | £ | £ | £ | £ | £ | £ | £ | £ | £ | | |
| 1. UK Partner (3 Experts) | Fees | 550 | 21-days | 11550 | 11550 | - | 3300 | 3990.55 | 690.55 | 8250 | 6400 | -1850 | 10390.55 | 1159.45 |
| 2&3 Travel Budget Items (Item 2 & Item 3) now combined | Return Air-ticket | 1000 | 3 | 3000 | 3000 | - | 1000 | 940 | -60 | 2,000 | 2000 | 0 | 2940 | 60 |
| 4. Hotel Accommodation | Daily rate | 85 | 15-days | 1275 | 1275 | - | 425 | 418 | -7 | 850 | 920.2 | 70.2 | 1338.2 | -63.2 |
| 5. Local Transportation (car hire) | Daily Rate | 33 | 10-days | 330 | 0 | 330 | 164 | 137.55 | -26.45 | 166 | 183.4 | 17.4 | 320.95 | -320.95 |
| 6. Secretarial Support | Monthly rate | 560 | 6-months | 3360 | 1350 | 2010 | 1680 | 1266.64 | -413.36 | 1680 | 2088.49 | 408.49 | 3355.13 | -2005.13 |
| 7. Conference Room for Project launch | Hire-Charge (per attendee) | 35 | 45 | 1575 | 1575 | - | 1575 | 1576.73 | 1.73 | - | 0 | 0 | 1576.73 | -1.73 |
| 8. Training (Documentation Review) | Hire-Charge | 1225 | 14 | 17150 | 14625 | 2525 | 17150 | 8575 | -8575 | - | 7878.31 | 7878.31 | 16453.31 | -1828.31 |
| 9. Training of Evaluators | Hire Charge-daily | 875 | 3-full days | 2625 | 2625 | - | - | 0 | 0 | 2625 | 2414.25 | -210.75 | 2414.25 | 210.75 |
| 10. Stationery, phocopy , etc., | Consumables | Sum | Lot | 2000 | 0 | 2000 | 830 | 298.03 | -531.97 | 1170 | 343.88 | -826.12 | 641.91 | -641.91 |
| 11.Invitation-Regist'n-Advert- etc. | Awareness & Publicity | Sum | Lot | 4000 | 2500 | 1500 | 3500 | 4234.41 | 734.41 | 500 | 0 | -500 | 4234.41 | -1734.41 |
| 12.Drafting Governance Structure of EAB, Post Completion Report and validation. | Project Closure | Sum | Lot | 1500 | 1500 | - | - | 0 | 0 | 1500 | 1524.43 | 24.43 | 1524.43 | -24.43 |
| | | | | | | | | | | | | | | |
| Capital Costs | | | | | | | | | | | | | 45189.87 | |
| *No Expenditure* | | | | | | | | | | REFUND to RAEng Sum of Positives in Column Q | | | | 1430.2 |
| Total | | | | 48365 | 40000 | 8365 | 29624 | 21436.91 | -8187.09 | 18741 | 23752.96 | 5011.96 | Total Negatives | -6620.07 |
| *Please state in notes where/whom this is coming from | | | | | Check sum (Actual) | | 45,190 | | | -3,175 | | | | |

**Working Group's Notes**: (1). This is an amended format to suit a A4 size page. (2). Two columns of the original XCEL table being the Notes on the Variances have been "hidden" for the same reason. (3). When reading the column to the extreme right, all positive figures would represent unutilised Academy funds for which instructions are awaited, while negative amounts would be expenditure funded by IEM.

# Institution of Engineers Mauritius

**Report on a Pilot Project on**
**the Accreditation of Engineering Degree Programme**

**Washington Accord Admission Requirements**

## Rules and Procedures –International Engineering Alliance

## Section B- Schedule B1 and B2 (3rd June 2016)

**Note from Working Group:**

Schedule B1 and B2 from Section B of the **International Engineering Alliance** (IEA) Rules and Procedures which apply equally to **Washington Accord** (for professional engineering practice), **Sydney Accord** (for Technologists) and **Dublin Accord** (for Technician). IEM and the Working Group have not at this stage concerned themselves with the accreditation of programmes for technologists or technicians.

Readers are advised to access the website of International Engineering Alliance to take cognizance of what characteristics differentiate the Graduates Profile for Washington Accord (professional engineers) from the profiles of the two other practitioners.

The relevant IEA document is the **Graduate Attributes and Professional Competencies; Version 3: 21 June 2013. Please access:** the IEA website: http://www.ieagreements.org.

The respective practices differ in their Range of Problem solving and Range of Engineering Activities. The IEA have also identified the differing Knowledge profiles and Graduate Attributes Profile for each. Further, IEA also identifies the Professional Competency Profiles that are applicable within each Accord): These are the minima in terms of standard of competence a person must demonstrate that he/she is able to practice competently in his/her practice area to the standard expected of a reasonable Professional Engineer/Engineering Technologist/Engineering Technician. As an example, we mention the following differentiating attributes- the practice of the professional engineer involves complex problems- that is uncertain parameters, for the technologists the problems would be broadly defined, whereas for the technicians we speak of well-defined problems. The Graduates profile to which Professor Barry Clarke's presentation refers are those that apply to the engineering graduate.

However, whether an accrediting agency seeks admission into one accord or another, the Nominators and Reviewers designated by the Secretariat of the IEA would wish to see and ascertain, that the applicant organisation satisfies the following requirements, before considering any application for admission firstly into Provisional Membership and subsequently as "signatory". Mentors have a major role to play in getting applicants to prepare for admission, in our case to be "Washington Accord ready".

# Institution of Engineers Mauritius

**Report on a Pilot Project on**
**the Accreditation of Engineering Degree Programme**

**Washington Accord Admission Requirements**

## Schedule B1

### Schedule B1: Criteria for Admission to Provisional Signatory Status in an Accord

An accrediting agency must satisfy the following requirements to be admitted to provisional status in an Accord:

1. The accrediting agency has the following characteristics:
   - **a) Is non-governmental**;
   - b) Is legally incorporated in its home jurisdiction;
   - **c) Is the uncontested accreditation agency of the engineering community in the jurisdiction; or,**
     **if circumstances in the jurisdiction allows multiple accreditation agencies, the applicant must be the prominent authority in accreditation of programmes**;
   - d) Is a statutory or professionally recognised authority to accredit programs satisfying academic requirements for admission to practicing status (e.g. licensing, registration) in a jurisdiction;
   - e) Accredits programmes at institutions that have legal authority to confer higher education degrees qualifications;
   - f) Has policies to set, approve, evaluate and execute accreditation criteria and procedures;
   - **g) Is independent of the educational providers delivering accredited programmes in its jurisdiction**;
   - **h) Has autonomy to make accreditation decisions independent of stakeholder influence**.

2. The accrediting agency has an operational accreditation system with documented procedures and practices conforming to the following principles:
   - a) The accreditation criteria and procedures are documented, publicized, and applied in accordance with set policies;
   - b) The system accredits programmes or coordinated groups of individually identified programmes;
   - c) Programme assessors are academic and industry peer reviewers;
   - d) There are mechanisms and documentation for training the programme assessors;
   - e) Programme evaluation requires a self-evaluation and site visit;
   - f) Periodic re-evaluation is required to maintain accreditation**;**
   - **g) Individual program evaluation is conducted in confidence**;
   - **h) Mechanisms for addressing conflict of interest at all stages of the process exist**;
   - i) A list of accredited programmes is published;
   - j) An appeal process exists.

3. The accreditation agency's criteria for accreditation include requirements for:
   - a) Programme outcomes that are consistent with the purpose of the programme
   - b) A curriculum providing a broad basis for engineering practice;
   - c) A suitable environment to deliver the programme;
   - d) Adequate leadership for the programme;
   - ***e) Suitably qualified engineering practitioners teaching in the programme;***

f) Appropriate entry and progression standards; and
g) Adequate human, physical and financial resources for the programme.

Note: Programme outcomes in item 3a are not expected to conform fully to the Graduate Attribute exemplars at this stage.

## Schedule B2

**Schedule B2: Criteria for Admission to and Maintenance of Signatory Status in an Accord**

The criteria defined in this schedule apply in the following cases:

1. A provisional signatory under consideration for admission as signatory to an Accord; or
2. A signatory undergoing periodic monitoring.

Accreditation agencies under review must:

1. Continue to satisfy the requirements defined in Schedule B1; and
2. Satisfy criteria 4, 5 and 6 below:

4. The agency's accreditation system and processes conform to the Accord accepted practice as exemplified by:
   a) High standards of professionalism, ethics and objectivity;
   b) All involved in programme evaluation are competent in the agency's accreditation system, and are of high standing as educators or practitioners in the profession;
   c) The defined evaluation standards and processes are applied consistently and fairly;
   d) The accreditation report records and justifies accreditation recommendations in sufficient detail to support decision-making and clearly differentiates recommendations from requirements.
   ***e) The decision-making body demonstrates capacity to make difficult decisions in a way likely to be beneficial to the engineering community in the longer term.***

5. The graduate outcomes standard applied for accreditation is substantially equivalent to the Accord as exemplified by the Graduate Attribute exemplars as reflected in:
   a) The agency's documented programme outcome standard;
   b) The standard required of accredited programs in practice.

6. The agency and its accreditation system are sustainable and adequately managed as indicated by:
   a) Data from institutions offering educational programs that have sought accreditation in the jurisdiction;
   b) Data regarding programs that have sought accreditation in the jurisdiction;
   c) The extent to which programs have gone through a full accreditation cycle and been re-evaluated;

# Institution of Engineers Mauritius

**Report on a Pilot Project on**
**the Accreditation of Engineering Degree Programme**

## Washington Accord Admission Requirements

d) The depth of considerations observed during the accreditation visit and decision-making meeting enabling appropriate accreditation outcomes to be achieved for a range of evidence of programme quality;
e) Mechanisms for the periodic review of accreditation policies, criteria and procedures;
f) The depth of training of programme assessors;
***g) The accreditation programme is led by personnel with appropriate expertise in engineering education, engineering practice and educational quality assurance***
h) Separation of policy making from accreditation decision making
i) Mechanism exists to make consistent accreditation decisions sustainably;
***j) The agency's history of involvement (if any) with other Education Accords under the International Engineering Alliance with evidence of general, consistent conformance with published accreditation policies and procedures***.

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# PHOTO GALLERY

## IEM Accreditation Project Photos

Launch

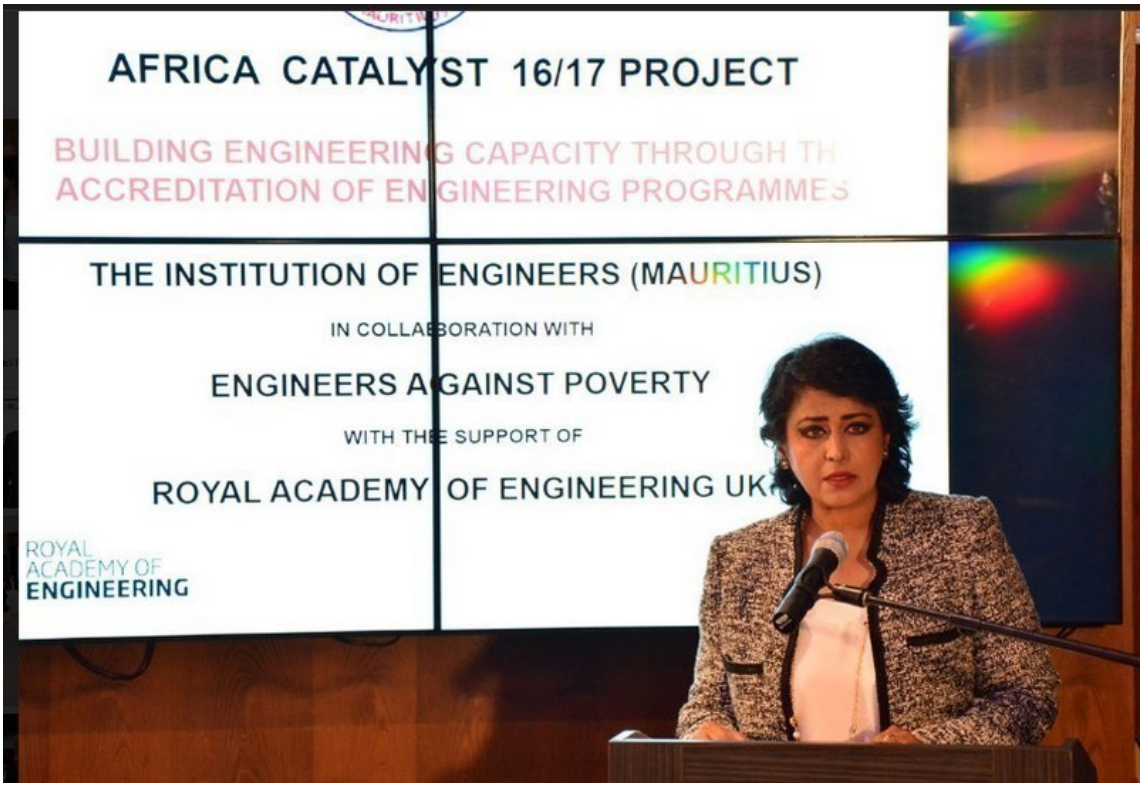
Conference

Document Review Sessions

Training of Accreditors

**PHOTO GALLERY-Launch P1**

**Capacity Building through Accreditation of Engineering programmes.**
**Voila Hotel- Bagatelle- Mauritius 23 January 2017.**




**Above:** H.E (Dr (Mrs) Ameenah Gurib Fakim President of the Republic of Mauritius at the Project ***Launch***.

**Below:** Prof Chris Atkin FRAeS, President of Royal Aeronautical Society (UK) as Guest Speaker.

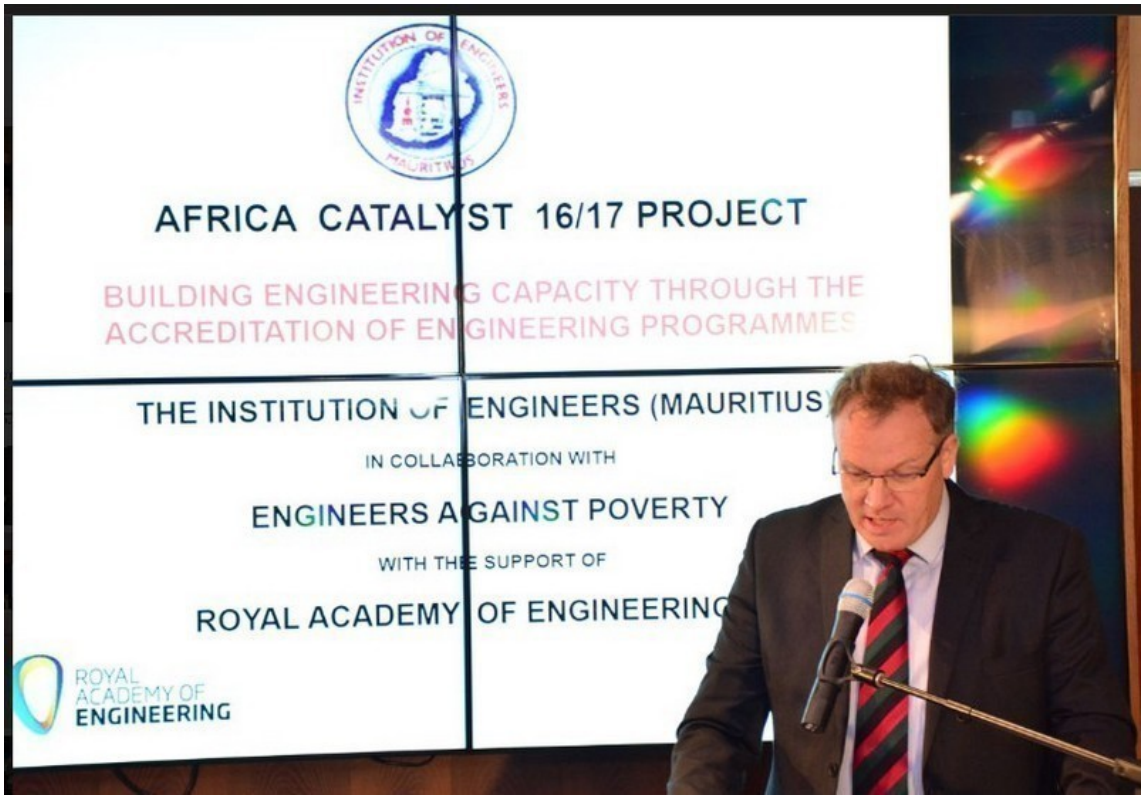


**PHOTO GALLERY-Launch P2**

**Capacity Building through Accreditation of Engineering programmes. Voila Hotel- Bagatelle- Mauritius 25 January 2017.**

**ABOVE**: H.E Dr (Mrs) Ameenah Gurib Fakim, the President of the Republic being introduced to Mr Aboo Bakar Peermamode IEM Secretary.

BELOW: Mrs Nadia Seesaram, Past President of IEM, offers a bouquet to Her Excellency.

**PHOTO GALLERY-Launch P3**

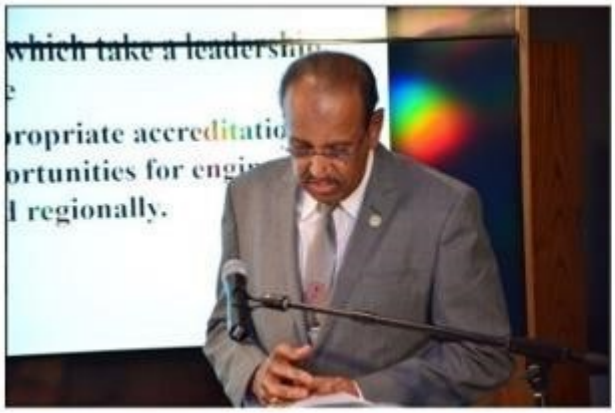
**Capacity Building through Accreditation of Engineering programmes. Voila Hotel- Bagatelle- Mauritius 25 January 2017.**

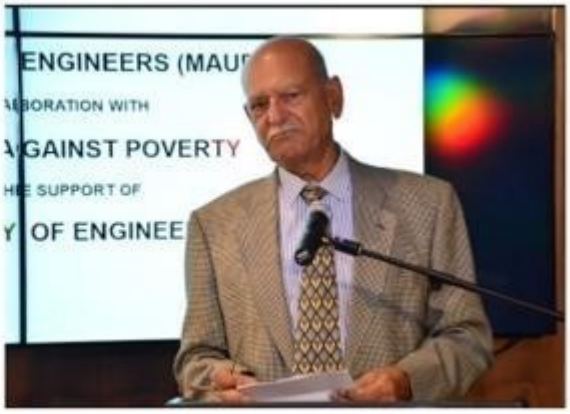

**ABOVE**: Guests and Speakers waiting for Team Leader of Working Group to end his Vote of Thanks.

**BELOW:** Prof Chris Atkin President of RAeS, Prof Sid Nair Exec Director of Tertiary Education Commission, Dr Rosunee Dean Faculty of Engineering (UoM), Jayesh Desai Past President IEM discuss the recipe of "that stuff. "

**PHOTO GALLERY-Launch P4**

**Capacity Building through Accreditation of Engineering programmes. Voila Hotel- Bagatelle- Mauritius 23 January 2017.**




ABOVE Left: Raj H Prayag PDSM, IEM President Right: J. Soobarah Team Leader Working Group

Seated L to R: Prof Chris Atkin President RAeS, Raj H Prayag PDSM, (IEM President), Her Excellency Dr (Mrs) Gurib Fakim President of Republic of Mauritius, Jagadish Soobarah Team Leader W/Group


LEFT: G Parsan V President IEM ; Right: Signature of MOU b/w IEM and AeSM; Standing Lto R: Prof Serge Riviere AeSM Member, Captain R Twomey AeSM President, Raj H Prayag IEM President

**PHOTO GALLERY-Conference P1**

**Capacity Building through Accreditation of Engineering programmes. Voila Hotel- Bagatelle- Mauritius 14 February 2017.**


**ABOVE:** Prof Barry G Clarke during Q & A Session at Conference /Seminar on Pilot Project

**BELOW**: Permanent Secretary Ministry of H.R, Education, Tertiary Education & Scientific Research reading Message of Hon Minister during Conference/Seminar Event on 14 February 2017.

## PHOTO GALLERY-Conference P2

**Capacity Building through Accreditation of Engineering programmes. Voila Hotel- Bagatelle- Mauritius 14 February 2017.**


**Above**: IEM President Raj H Prayag PDSM addressing audience at Conference on Accreditation of Engineering Degree programmes at Voila Hotel, Bagatelle, Mauritius.

**Below**: A view of the audience at the Conference on Accreditation of Engineering Degree Programmes to sensitive stakeholders about implications and benefits of accreditation.

## PHOTO GALLERY-Conference P3

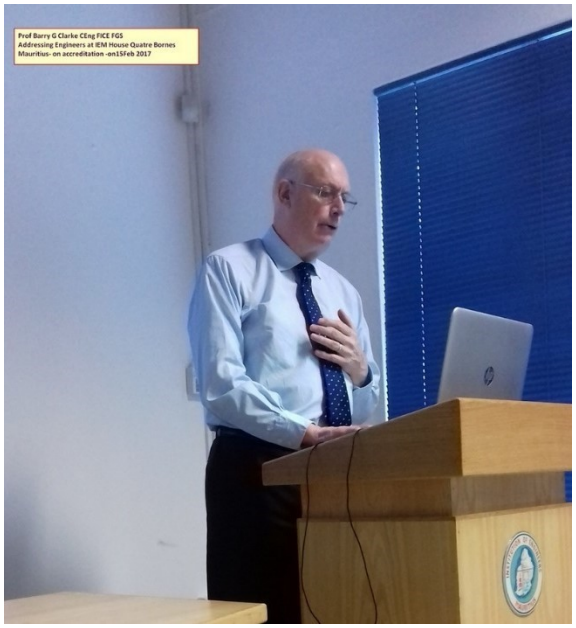
**Capacity Building through Accreditation of Engineering programmes. Voila Hotel- Bagatelle- Mauritius 14 February 2017.**

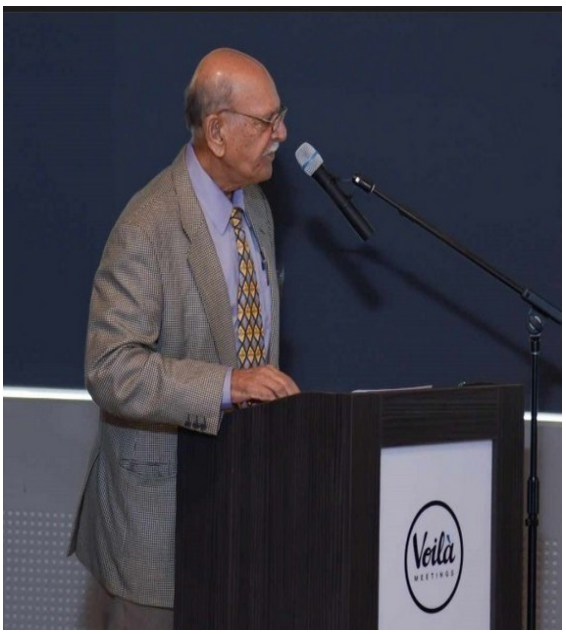
**ABOVE**: Jean R Fayolle, Chairman CRPE

R. H. Gungoosingh – Consulting Engineer

**BELOW**: Dr Andre Chan Chim Yuk Geotech Engineer

Prof. Sid Nair Exec Director TEC




Prof. Barry C Clarke at IEM House Q.Bornes

Jagadish Soobarah Team Leader Working Group

Project Implemented with the Support of Royal Academy of Engineering under GCRF Africa catalyst

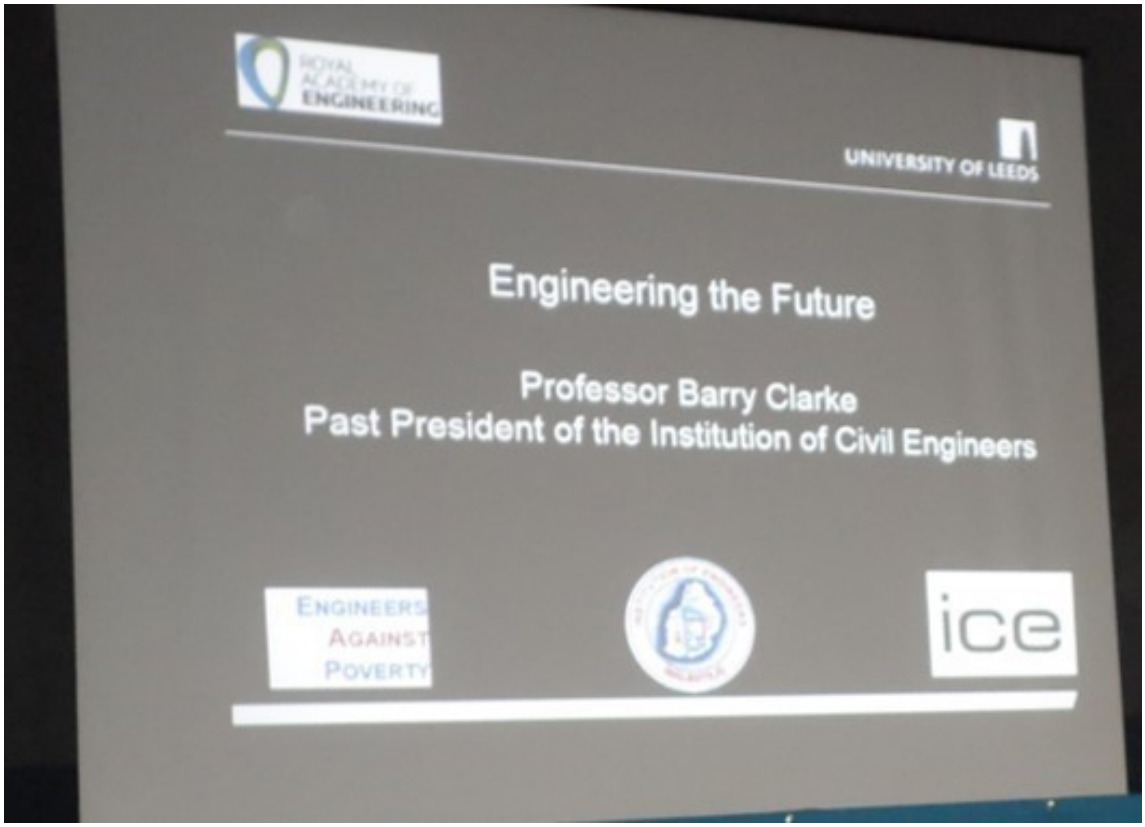
**PHOTO GALLERY-Conference P4**

**Capacity Building through Accreditation of Engineering programmes. Voila Hotel- Bagatelle- Mauritius 14 February 2017.**

Conference Debrief on 17th February 2017. Prof. Barry G Clarke with Working Group on Accreditation. Seated L to R: Dr Andre C C Yuk, D. Dhondee (with back to viewer), Raj H Prayag IEM President, Prof Barry G Clarke, and Jayesh Desai Past President.

Seated L to R: Donald Dhondee, Dr Andre C C Yuk, and Raj H Prayag PDSM, IEM President, with Prof Barry G Clarke CEng FICE FGS, of Leeds University (UK)

**Capacity Building through Accreditation of Engineering programmes.**
**Professor Barry G Clarke with Staff and Engineering Students at University of Mauritius 16 February 2017.**




**Capacity Building through Accreditation of Engineering programmes. Professor Barry G Clarke with Staff and Engineering Students at University of Mauritius 16 February 2017.**

View of Left and Right Sides of Audience in Lecture Room

Seated in Front Row (Below): Prof T Ramjeeawon Head of Dept of Civil Engineering at UoM

**Capacity Building through Accreditation of Engineering programmes. Voila Hotel- Bagatelle- Mauritius 23 January 2017.**

Dr Andre Chan Chim Yuk (member of Working Group) presenting the CCSA Accreditation Procedures

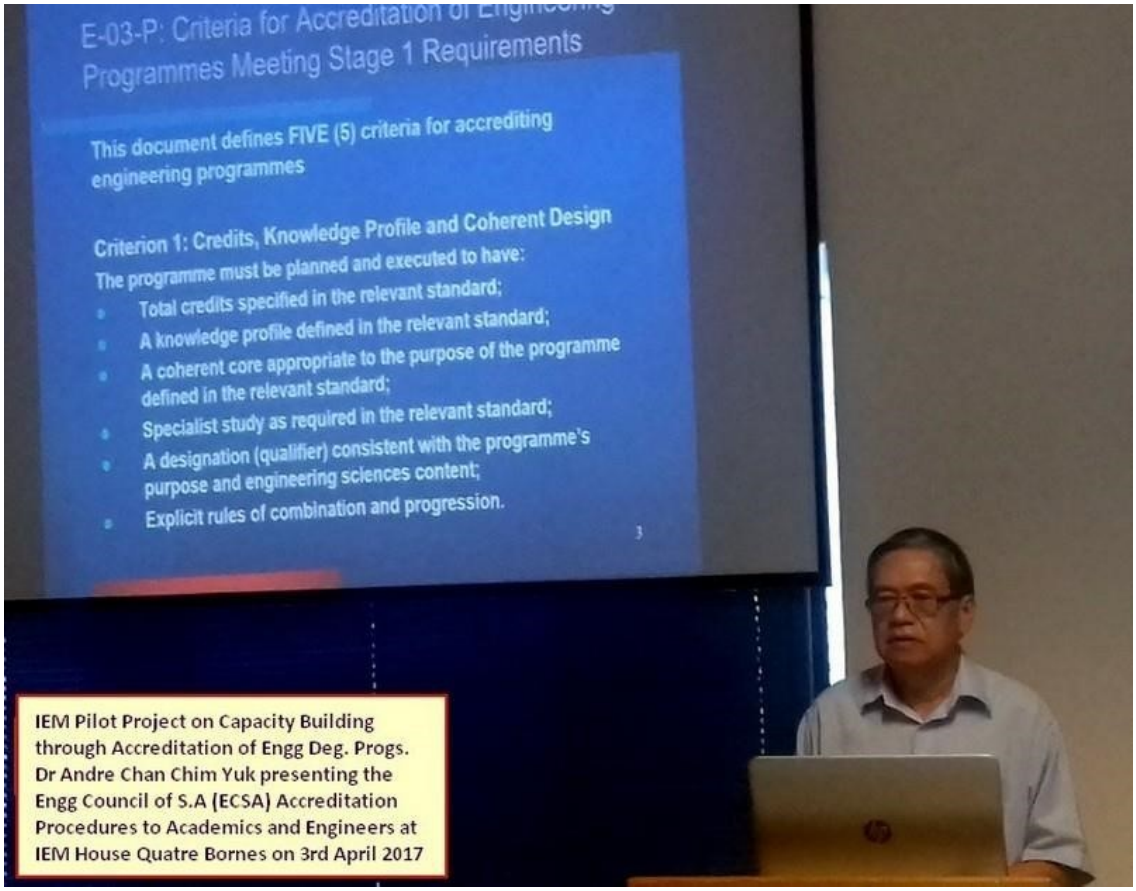


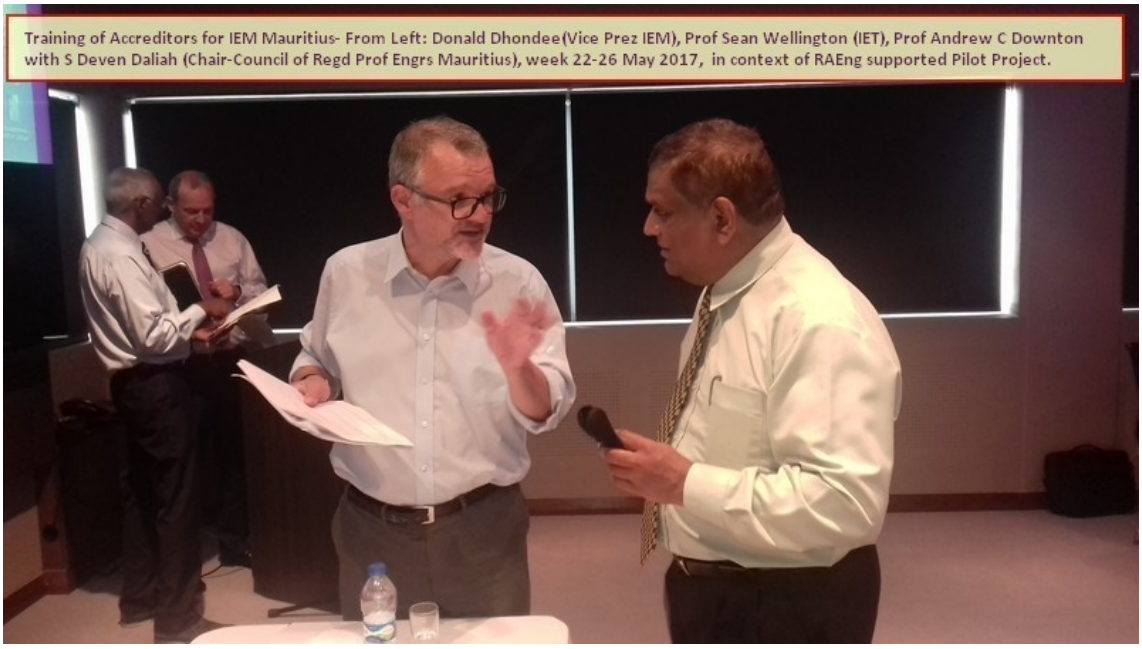
**PHOTO GALLERY-Evaluator-Training P1**

**Capacity Building through Accreditation of Engineering programmes.**
**ProFive Offices-Ebene - Mauritius 22-26 May 2017.**


**ABOVE**: Prof Sean Wellington (Chair of IET Accreditation Committee Committee)
**BELOW:** Prof Andrew C Downton, member (IET Accreditation Committee and Chair of IET Accreditation Panels for Electrical /Electronic Engineering Degrees.

## PHOTO GALLERY-Evaluator-Training P2

**Capacity Building through Accreditation of Engineering programmes.**
**ProFive Offices-Ebene - Mauritius 22-26 May 2017.**



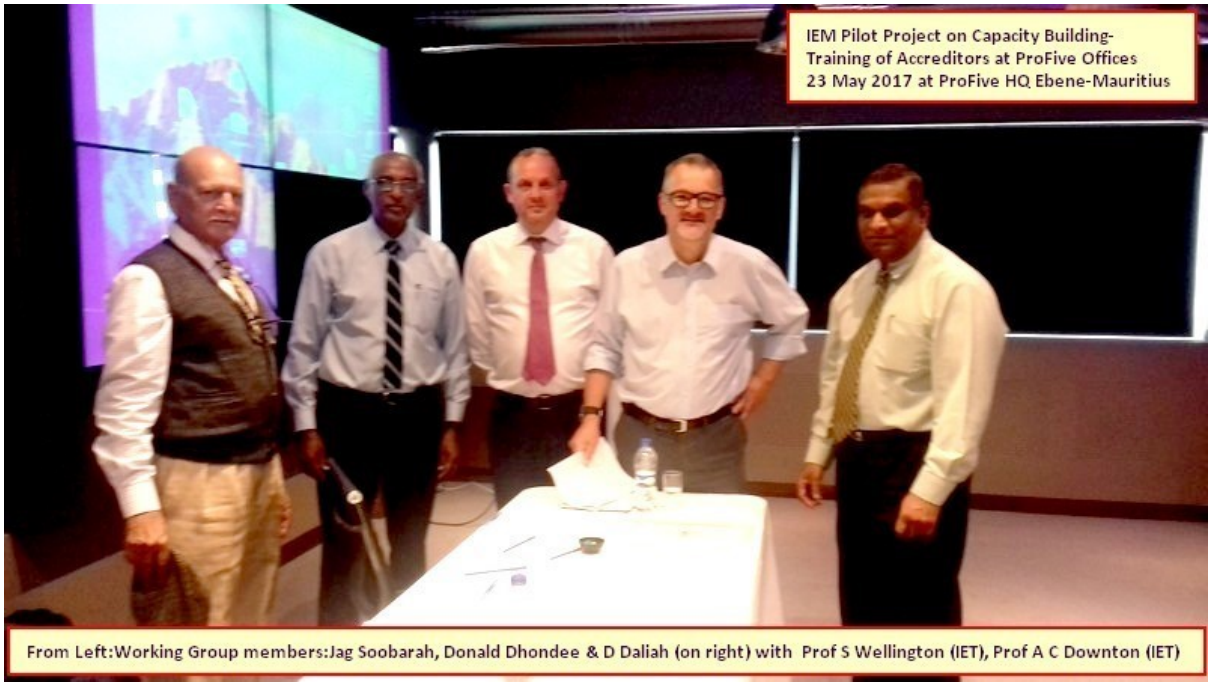

**ABOVE**: In the background: Donald Dhondee with Prof Sean Wellington; In the foreground: Deven Daliah of ProFive with Prof Andrew C Downton.

Below-Training Session on.


Seated L to R: Dr (Mrs) Manta Nowbuth (Assoc Prof UoM), Mrs Reshma Rughooputh (Lecturer); B S Manohar (JSS Academy of Tech Education), Dr Andre C C Yuk (member IEM), Mr S Venkamah (Assoc Prof UoM), Dr Dinesh Hurreeram (Associate prof UoM), Prof Sean Wellington (IET Accreditation).

## PHOTO GALLERY-Evaluator-Training P3

**Capacity Building through Accreditation of Engineering programmes.**
**ProFive Offices-Ebene - Mauritius 22-26 May 2017.**




From Left to Right: Jag Soobarah, Donald Dhondee, Prof S Wellington, Prof Andrew Downton, Deven Daliah

**Below**: B S Manohar (JSS Academy), Frederic Meslin (Ecole Centrale des Nantes), Prof Sean Wellington, Deven Daliah (ProFive Consulting), and Indraparsad Lachmansingh (CRPE Member)

**PHOTO GALLERY-Evaluator-Training P4**

**Capacity Building through Accreditation of Engineering programmes. ProFive Offices-Ebene - Mauritius 22-26 May 2017**


ABOVE: Donald Dhondee (Member IEM, Working Group) with Prof Sean Wellington
BELOW: Post Debrief- Left to Right: Prof S Wellington (IET), Deven Daliah, Jayesh Desai, Donald Dhondee, and jag Soobarah (Working Group members), with Prof Andrew C Downton (IET)