



IFMBE News

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International Federation for Medical & Biological Engineering

*Encouraging research and the application of knowledge,
disseminating information, and promoting collaboration in the
field of medical, clinical and biological engineering*



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Selection of World Congress Site 2006

Following more than a year of work by the Administrative Council of the IUPESM and its Congress Coordinating Committee, the site for the 2006 World Congress has finally been resolved. Korea was selected by a majority of the delegates to the IUPESM General Assembly. This was a very long and arduous process that created considerable friction and animosity between individuals and groups. Now that the matter is settled, I hope that for the sake of our profession, every member of our organisation will consider this issue to have been concluded so that we can move ahead to other important and pressing issues.

I have decided to summarise the major events that led to re-vote, which was necessitated by the Korea appeal. I hope this will clarify the various actions and decisions by the IUPESM Administrative Council and lay to rest any misunderstandings or misconceptions that have surrounded this affair.

After the vote of the 27 July 2000 General Assembly in favour of the site of Lausanne for the 2006 WC, Korea submitted an appeal to the IUPESM Administrative Council (AC). According to the IUPESM Congress Coordinating Committee (CCC) guidelines, the only appeal permitted is on the basis of procedural errors. Korea's appeal stated that the IUPESM CCC violated its own procedures during the solicitation of bids and during the selection process. This constituted a legitimate appeal and therefore the AC was obligated to act on the appeal, adding it to the agenda of its July 28 meeting that followed shortly after the meeting of the July 27, 2000 General Assembly. After an extensive debate and an examination of facts, which were not available prior to the vote by the General Assembly, the AC concluded that the Korean appeal had sufficient merit to warrant a re-vote and voted to approve it.

Just before the AC were to announce its decision for a re-vote to the Delegates, we received a letter from Robert W. Neilson, General Secretary of the Institute of Physics

and Engineering in Medicine in the UK, questioning the validity of the proceedings during the July 28 meeting of the IUPESM Administrative Council in Chicago. One concern had to do with a motion that was made during the meeting by an individual who was no longer a member of the AC. (This motion was not related to the appeal.) Another concern had to do with an error in recording a vote count. In addition, Dr Neilson challenged the authority of the AC to override the vote of the IUPESM General Assembly and the decision of the AC to go ahead with a re-vote.

Due to the sensitivity of the issue and the ambiguity of the IUPESM statutes, the AC accepted Professor's Neilson's recommendation and made two important decisions:

- The first decision was to rescind ALL motions and votes taken during the AC meeting on July 28 and re-deliberate all issues in a virtual meeting of the AC.
- The second decision was that the General Assembly would have to approve the holding of a re-vote before the re-vote were to take place. The effect of this decision was to shift the responsibility for approving the appeal by Korea from the AC to the General Assembly.

The Council discussed this matter during a lengthy virtual meeting that was completed at the end of March 2001. The motion to recommend to the General Assembly that the appeal by Korea be approved passed with the following votes: 7 Council members voting to approve the motion, none against the motion, and 2 abstentions.

As a result of the AC discussion during its virtual meeting, there was an opportunity to examine in great detail the submission process for all the proposals to host the 2006 WC. Consequently, many procedural errors were discovered in addition to the procedural errors that were named in the appeal by Korea. None of these errors were the fault of the prospective hosts and this statement has been articulated repeatedly in every communication to the voting members of both organisations. Nevertheless, while these errors, made by the previous CCC, were clearly unintentional, they seriously affected the review and voting process prior to the 27 July 2000 vote by the



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General Assembly. These errors provided added support to the decision by the AC recommending a re-vote for the site selection.

The most important procedural errors that were brought to light as we investigated the sequence of events before the General Assembly meeting included:

- Repeated changes to deadlines that were made by the previous Congress Coordinating Committee (CCC);
- The failure to consult the Administrative Council for approval of these changes;
- Errors in handling conflicting proposals;
- The lack of critical review by the CCC of the proposal from the European Consortium due to the very late submission of their final document.

In the event of missing or unclear information, the CCC follows a standard procedure in which they request clarification from the prospective host. This was done for the proposals from Hong Kong, Israel and Korea. However, due to the late submission of the final joint proposal from the European Consortium, the members of the CCC never reviewed their proposal. The CCC was, therefore, unable to clarify certain extremely important issues related to this proposal before it was presented to the General Assembly for a vote. (The European Consortium later clarified these items during the re-voting process.)

As a result of its extensive discussions and deliberations during the virtual meeting, the AC, therefore, recommended that the General Assembly approve the appeal by Korea and hold a re-vote to consider the 2006 World Congress site. The delegates were asked to vote on the following motion:

“To rescind the decision of the 27 July 2000 General Assembly and approve the recommendation of the IUPESM Administrative Council for a re-vote on the site selection for the 2006 World Congress”.

Delegates were then given 2 weeks to provide comments and opinions for or against this motion. Comments that were received by the AC were forwarded to all the delegates for consideration before the vote on this

motion was taken. As you all know, the delegates voted overwhelmingly to approve the motion proposed by the Council and to hold a re-vote for the site.

Each potential host was then asked to complete a short questionnaire. The completed questionnaires were sent to all delegates so that they could compare the information and make an informed decision. In addition, the information was posted on the IUPESM web site. A 3-week discussion period was announced and delegates were asked for comments and opinions. Comments received from the delegates were posted on the same web site. Delegates were urged to carefully read the material on the web before casting their vote for the 2006 Congress venue.

On September 17, just before the ballots for the re-vote were sent out, the European Consortium withdrew its bid for the 2006 Congress. Among the reasons given by the Consortium for its withdrawal was the important statement that “...in order to prevent any further deterioration in international relations within the Medical Physics and Clinical Engineering community, we are withdrawing our bid to hold the 2006 congress.”.

I responded by stating: “I deeply regret that the Consortium had to make this difficult decision, particularly in light of the considerable efforts all of you made in getting 3 countries to work together, in the preparation of the bid and the ensuing discussions. I would like, however, to applaud the organisers of the European bid for recognising the danger of divisiveness that this issue could have brought to our profession and rising to the cause of uniting the IUPESM community.”

Following the withdrawal of the European Consortium, there remained 3 prospective hosts: Hong Kong, Korea and Israel. The results of the re-vote gave the 2006 World Congress to Korea.

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Meeting Report

Administrative Council in Pula, Croatia, 10-11 June 2001

When you receive information about a meeting site that is more or less unknown, you start to look for it on the map. Sometimes it is hard to find it when you do not even know which part of the country it is in. This is what happened to me when I was looking for Pula in Croatia (perhaps I did not listen to the presentation carefully enough). You also start to wonder how to get there. Then you plan the trip – how to get there and how much it will cost. Nevertheless, with some help from the local organisers and travel agencies, you manage. My journey to Pula turned out to be a very smooth one and not very expensive.

You never can tell what it will be like when you arrive in a new place you have never visited before. It is this that makes participation at different meetings so exciting. Pula has an interesting culture and enjoys beautiful surrounding scenery. This created a good background to the Administrative Council meeting that we had two days before MEDICON'01. The help and support from Ratko Magjarevic and his co-workers ensured the success of the AC meeting.

Almost all members of the AC attended the meeting in Pula, as well as five invited persons representing different committees, working groups and organisations. This gave us a good opportunity to discuss several important issues during the meeting. The complete minutes have been posted on the IFMBE web site (www.ifmbe.org). When I write complete, I mean a document containing 100 pages altogether. This PDF document contains 29 appendices describing officers' reports and activities of the committees and working groups. Still, I would like to take this opportunity to highlight some issues discussed at the meeting.

The structure of the membership fees had already been discussed at the AC meeting in Evanston in USA last year. At this meeting, the AC decided on the structure and the fee, which have been unchanged for almost 10 years. The AC also discussed about more

activities within IFBME, which need financing. Therefore, the AC felt that both a new structure and a new fee were justified. Information was sent to the national secretaries in April for comments, but only two replies were received. The members of the AC also noticed that information about the benefits of IFMBE membership given to the members must be increased.

We have decided that membership fees should from now on be paid in US dollars rather than in pounds sterling, since it is easier to know the exchange rate between different currencies and US dollars. The calculation of the new membership fee corresponds to the calculation of the number of delegates that every member society has in the General Assembly. The table below shows the new structure.

<u>Number of members</u>	<u>Fee [\$] per member</u>
0 - 31	\$2.00
32 - 316	\$1.75
317 - 3162	\$1.00
> 3163	\$0.50

The increase in the membership fee is 100% for most of the Societies since before the fee was £0.75 for each member in a Society up to 500 members. £0.75 is about \$1.00.

The AC is very much aware that some of the new Societies have difficulties paying the membership fee since they have not yet started functioning properly and earning money. Therefore, Jean-Pierre Morucci proposed that a new Member Society from an underdeveloped country could request to be excused from paying the membership fee during the first three years of their membership. The request should be sent to the AC for approval. These two motions were approved unanimously.

According to the IFMBE Constitution, Article 9, the Secretary General can submit proposals to the General Assembly by mail.



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These proposals can deal with introduction, deletion, or amendment of articles of the Constitution or of Byelaws and they may be proposed by the Administrative Council, or in writing, by at least ten per cent of the voting members at a meeting of the General Assembly. The closing date for such ballots shall be set at not less than sixty (60) days after mailing. The reason for such a long time was to allow regular mail to reach the delegate and have it returned by regular mail to the Secretary General for the count. Since discussion and votes can now be handled by email, there is no need to wait 60 days. Jos Spaan proposed that the closing date for the ballot be reduced to thirty days instead and it was approved unanimously. Since this proposal changes the Constitution, it must be sent to the General Assembly for decision. Therefore, I will send a letter to all delegates and other voting members of the General Assembly. A notification will also be sent to the National Secretaries. This process will be conducted by mail ballot.

The AC also approved a motion proposed by Marc Nyssen concerning the voting procedure. He proposed that IFMBE should begin to conduct voting via a secure web server and associated technology within one year. The Secretary General will propose an implementation. This is completely in accordance with the ideas of developing the IFMBE web to become more effective in services to the membership.

The members of the web site editorial board were asked prior to the AC meeting to send their ideas of how to develop the web. In addition, some other AC members were asked to come up with ideas for improvement. We also discussed a proposal for a new design, which was available during MEDICON 2001 so that everybody had the chance to give his or her opinion on the web site. Before the new web pages are launched, we still need to add some functions for interactive services, such as updating the address database. However, new ideas on what the web should contain and how it should look like are always welcome. Therefore, I urge all the members to send me their opinions. Information of the forthcoming

conferences is an example of what we could have posted on our web site. The latest addition on the list of conferences and meetings is the CMBEC 27, which will be held in Ottawa in May 2002.

We also discussed the IFMBE web domain registration during the meeting in Pula. Already in the Officers' meeting in Singapore Mladen Poluta suggested that IFMBE should register several web domains in order to be sure that others cannot take advantage and use them. In April this year, the domains "ifmbe.net" and "ifmbe.com" were registered. There is a possibility to register other domains such as ".biz" or similar, but these are in general so special that there is not such a big risk that others would use them. We could also register domains that are not yet official, just to be sure that we get the registration if and when the domains become official. This was deemed unnecessary for the moment.

The next AC meeting will be held in Reykjavik, Iceland, in connection with the Nordic-Baltic Conference (for more details look at the IFMBE web site). Two of the organisers from Iceland were also in Pula, and we had a very good opportunity to discuss details of the conference, and we look forward to visiting the warm springs in Iceland. I am also sure that memories of our meeting in Pula and the hospitality of our Croatian friends during our stay there will last. I would like to thank Ratko Magjarevic and his co-workers once more for the help we received during our meeting.

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Call for Nominations IFMBE and IUPESM Awards

The IFMBE maintains an awards program to recognise individuals for their contributions to biomedical engineering. There are currently two awards: the Otto Schmitt Award and the Vladimir K. Zworykin Award, named after the IFMBE Founder President Professor V. K. Zworykin. The awards are presented every three years on the occasion of the World Congress on Medical Physics and Biomedical Engineering. The Otto Schmitt Award Committee and the Zworykin Award Committee select the awardees.

In addition to its own awards program, IFMBE participates in the IUPESM awards program. Every three years, IUPESM honours individuals with its Merit Awards, which recognise a medical physicist and a biomedical engineer who have established distinguished careers in medical physics and biomedical engineering, respectively. IFMBE is, through its Merit Awards Committee, responsible for the selection of the biomedical engineer to be awarded.

IUPESM Awards of Merit

The International Union of Physical and Engineering Sciences in Medicine (IUPESM) will confer two Awards of Merit at the Sydney 2003 World Congress. These prestigious awards will recognise a biomedical engineer and a medical physicist who have demonstrated **a distinguished career in biomedical engineering** and medical physics, respectively. The awardees will receive support to attend the Sydney Congress.

The IFMBE has established a subcommittee, chaired by Joachim Nagel, the task of which is to select a biomedical engineer for this award. The subcommittee is seeking nominations from the biomedical engineering community.

The criteria for nominations include: a significant impact on the science and practice of biomedical engineering, major influence on

the development of the profession, and meritorious activities in a national and/or international biomedical engineering organisation.

Otto Schmitt Award

The Otto Schmitt Award is given to a biomedical engineer **for exceptional contributions to the advancement of the field of medical and biological engineering**. Nominees must be members of an IFMBE affiliated organisation. The awardee will receive travel funds to attend the World Congress 2003 in Sydney, where the award will be presented.

The criteria for nominations include innovation, leadership, and seminal contributions to medical and biological engineering.

Vladimir K. Zworykin Award

The Vladimir K. Zworykin Award is given to a biomedical engineer **for outstanding research contributions in the field of medical and biological engineering**. Nominees must be members of an IFMBE affiliated organisation. The awardee will receive travel funds to attend the World Congress 2003 in Sydney, where the award will be presented.

The criteria for nominations include innovation and outstanding research contributions to medical and biological engineering.

Nomination Procedure

The nomination for all three awards consists of a two-step process. Initially, the nominator is asked to submit a single-page write-up (approximately 500 words) with a summary of the individual's qualifications and addressing the criteria for selection. The committee will evaluate the short summary and select three or four individuals to be further considered for each of the awards. The



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nominators of these individuals will then be requested to submit a more detailed nomination and full curriculum vitae for final evaluation.

The award committees urge nominators to keep all nominations confidential and not to contact or inform the nominee of the nomination.

To be considered by the award committees, initial nominations must have been received no later than **31 May 2002**.

As the pool of awardees and the process of requesting nominations is the same for the IUPESM and the IFMBE awards, the Otto Schmidt Award Committee and the Zworykin Award Committee are organised as subcommittees of the IFMBE Merit Awards Committee. Nominations for all awards should be sent to:

Prof. Dr. Joachim Nagel
Department of Biomedical Engineering
University of Stuttgart
Seidenstrasse 36
70174 Stuttgart
Germany
Email: jn@bmt.uni-stuttgart.de

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The online version of *Medical & Biological Engineering & Computing*, the official journal of the International Federation for Medical & Biological Engineering, can be found by simply following the [Federation Journal](#) link from the IFMBE homepage, which can be found at www.ifmbe.org. In addition to a guide to authors, the site now features a browsable index of all papers published in *Medical & Biological Engineering & Computing* in 2000 and 2001. Visit the site now to discover the range of papers published in the course of the last year as well as details of recently published papers. Details about how to submit and subscribe to the journal can be found on the back page of this issue.

Progress Report European Umbrella Organisation

Since the last progress report two months ago three things have happened. First, we have appointed an additional member to the Protem group in accordance with the Vienna decisions. He is Prof. Jan Wojcicki and comes from Poland.

Status with endorsements

21 IFMBE affiliated organisations in Europe have now endorsed the Vienna resolution. These are: Belgium; Czech Republic; Denmark; ESEM; Estonia; Finland; France (SFGBM); Germany; Hungary; IEEE-EMBS; Israel; Poland; Portugal; Romania; Slovakia; Spain; Sweden; Switzerland; The Netherlands; UK; Yugoslavia.

The target set in Vienna was to have a majority by the end of the year. The total number of societies on our Vienna list was 35. For majority we need 18. So, we are now well above the target set in Vienna.

A few of the endorsements have expressed concerns or reservations. Some relate to the financing of this new organisation and express concern that we need to find ways to finance it so that it does not need much funding from its members. This is something that was already expressed in Vienna and the reason for establishing a business plan WG (see later in this report). Some were concerned that the new organisation may not be in competition with existing ones. Again this was discussed and agreed and included into the Vienna resolution. Summarising, it seems that we all share the same concerns. Solving these is another thing and is a task and challenge to us all.

Work assignments for the Protem group

Some of the Protem group members (Hutten, Magjarevic, Nagel, Wojcicki and Saranummi) met in connection with the BME education conference organised by the Eindhoven Technical University at the end of



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October to discuss progress and to decide on work assignments. As a result the following working groups have been established:

- *Constitution and Bylaws*: To suggest an organisational structure for the Alliance, to produce a draft for the C&BL of the Alliance including C&BL for the two initial “conventions” on national societies and European transnational societies, and to suggest a name for the Alliance. Chaired by Joe Barbenel.
- *Business Plan (including relations with European bodies)*: To develop a business plan for the Alliance, to investigate means to finance the activities of the Alliance, to contact European organisations such as COST, ESF and EU in order to establish contacts and to apply for initial funding for the activities, and to make a plan and prepare the First European MBE forum (to take place in connection of the Second EMBEC). Chaired by Niilo Saranummi.
- *Membership*: To create a “database” of candidate societies and organisations in Europe for membership in the Alliance, to initiate contacts with these in collaboration with the Protem group chair, and to carry out a dialogue with these in order to engage them to the process of creating the Alliance and to transmit any problems and issues related to their eventual membership for consideration by the C&BL WG. Chaired by Marcello Bracale.
- *Accreditation and Education*: To be further defined by the WG, but to include two issues “Accreditation” and “European BME Education Platform”, to plan for a meeting in Warsaw, 25 April on Accreditation and Education, and to plan for a workshop or similar to take place at the Second EMBEC. Chaired by Joachim Nagel.
- *Web site*: To provide a suggestion for the general design and layout of the web site, and to set up the web site. Chaired by Enrique Gomez.

A full meeting of the Protem group is now planned for February to discuss the proposals that will be drafted by the above mentioned working groups.

Accreditation of Biomedical Engineering Programs in Europe – Challenge and Opportunity

Introduction

Accreditation of engineering, technology and applied science programs is a well established procedure in many countries, above all the United States, where the American Accreditation Board for Engineering and Technology, ABET, is the famous and often feared institution granting the much desired accreditation. Even in those parts of the world, where no accreditation agencies exist, ABET with its global range of activities provides the service of an accreditation-like evaluation, offering recognition as “substantially equivalent” to an accredited program in the US.

In the United States, a university or college can hardly be nationally renowned or even be accepted as a high quality educational institution without having their programs, mainly the undergraduate programs, accredited. In addition to issues such as the comparability of degrees and qualifications, accreditation is also considered a service to students and their parents who pay the tuition fees, giving them the confidence that the chosen college offers a quality education that is worth spending all that money.

In Europe, the situation is quite different. Here, education is free of cost, and the national governments guarantee the quality not only of primary and secondary education, but also of academic programs. Hardly anybody in Europe paid any attention to the accreditation of academic programs until the recent rapid development of the European Union raised the issue of mobility and the related problems of mutual recognition of degrees. It is the Bologna Declaration that has noticeably focused European attention on harmonising European education and introducing quality control.



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The process started with the Sorbonne declaration in 1998, followed by the Bologna declaration in 1999 and the Prague meeting in 2001. The main players in this development are the universities. Thus, the European University Association (EUA) met in preparation of the Prague summit in Salamanca in March of 2001, and identified six important themes in the creation of the European Higher Education Area:

- 1 Freedom with responsibility: Empowering the universities
- 2 Employability in the European labour market
- 3 Mobility in the European higher education area
- 4 Quality assurance and accreditation
- 5 Compatibility: a common but flexible qualifications framework
- 6 Competitiveness at home and in the world.

Thinking about how to realise the requests for employability, mobility and compatibility, it becomes obvious that the most urgent issue in this context is to generate an agreement on accreditation, since accreditation based upon criteria that are being agreed to throughout Europe is a necessary prerequisite to achieve all the other goals.

Today, more than 150 universities, universities of applied science, polytechnic schools and academies in Europe offer educational programs in biomedical engineering at all academic levels, but with only little international co-ordination of contents and required outcome qualifications. However, continuing globalisation of economies and science calls for harmonisation, not necessarily harmonisation of the educational programs, but harmonisation of qualifications that are connected to the graduation from an academic program. Thus, we need the initiation of European structures for accreditation, warranting the comparability, compatibility and mutual recognition of BME degrees. National quality assessment and accreditation schemes have to be established where they do

not yet exist, and they have to be harmonised, i.e. they need to satisfy those criteria which the European BME community will have to establish on a transnational basis and mutually agree upon.

It is obvious that accreditation not only plays an important role in ensuring transnational mobility for education, training and employment, but that it is also directly related to the issues of health care quality. It offers the additional advantages of providing confidence for the employer that the employee has the necessary education, training and responsible experience, and confidence for the user of the service, meaning the patients, that those providing the service are effective and competent.

Accreditation of biomedical engineering programs also addresses the important European aim of “freedom with responsibility”, meaning that the universities have to take care that the academic programs they offer are competitive and are recognised by employers in order to attract students. Similarly, the students will have to be well informed in order to select where they want to get their education and what that education shall comprise to be employable.

Mobility is just one facet of this process, and the existing degree barriers preventing biomedical engineers from moving freely within Europe need to be lifted. As their contribution to support students to make an informed decision on their choice among academic programs, IFMBE and the newly forming European Alliance for Medical and Biological Engineering are currently establishing a homepage providing all available information to students on BME programs in Europe, comparable with the American BMENet.

At first glance, the easiest way to achieve harmonised accreditation in Europe seems to be to just expand ABET's authority, or to establish ABET-like structures and procedures and apply the American requirements for accreditation. But could we then assure adequate European influence? The main path towards European accreditation must be through the European governmental bodies responsible for education, meaning the



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Bologna group of ministries, the universities, and last but not least the national accreditation councils.

It will still not be that easy to define internationally accepted criteria, minimum requirements and competencies. Difficulties result from the enormous diversity of partially incompatible educational systems in Europe, as well as from the exceptionality of the young, highly dynamic discipline of biomedical engineering which offers a whole range of different qualifications and directions, related to various engineering speciality matters and which, as a part of the so-called life sciences, is reaching far into neighbouring sciences such as medicine, biology and biochemistry. Adding to the problem are the many established programs within the classical engineering disciplines offering specialisation in BME up to different levels of qualification or competency. The last but not the least of the problems that we are facing in contrast to the situation in the US is that European governments will not be willing to give up their authorities and rights to determine academic education.

Outcome-based accreditation

A crucial issue in setting up accreditation procedures has so far been the establishment of minimum requirements and curricula. These have to include educational prerequisites for entering a BME program, course duration, basic and advanced biomedical engineering topics including mandatory and optional subjects, the ratio of lectures/practice/laboratory work and the minimum requirements for the independent work of the student. Due to the diversity and incompatibility of the various national educational systems, such an approach would, however, be obsolete from the beginning, if European harmonisation and mutual recognition of degrees are to be achieved.

As a solution to this problem, accreditation must be outcome or competency based. Instead of imposing curricula, courses, duration and prerequisites to enter the programs, the outcome, i.e. the aptitude of students graduating from these programs will be the factor deciding on accreditation.

Nevertheless, recommendations still need to be established for topics, courses and other contents of educational programs in order to achieve the required outcome. It is this approach to accreditation of academic programs that ABET has recently adopted, too.

Criteria for accreditation

The IFMBE Ad-Hoc Committee on BME representation in Europe, now being replaced by the Protem Committee of the planned European Alliance for Medical and Biological Engineering and Sciences, is currently, in cooperation with the European member societies of IFMBE, evaluating the diversity of existing BME programs and their situation with regard to accreditation throughout Europe. The Committee is preparing a white paper on the accreditation of BME programs in Europe. The Committee has also accepted the challenge to establish recommendations for accreditation criteria to be applied to pure and interdisciplinary BME programs within the new European framework of harmonised one and two cycle educational programs. To be internationally acknowledged, European accreditation has to rely on ambitious, but broadly accepted criteria. Broadly accepted means that all European countries must agree. This definitely is not an easy task.

IFMBE and EAMBES, once reality, will aim at being accepted by the governmental bodies and the universities as the providers of BME expertise on the European level and support their member societies to provide the same services at the national level.

With their recommendations, IFMBE and EAMBES will provide their European member societies, the European universities and other institutions of higher education that offer BME programs a uniform guide to comply with the necessary international harmonisation of higher education, to secure and to further improve the high quality of European BME education, to allow comparability of European BME qualifications and degrees, and thus to contribute to mobility for education, training and employment. The recommendations are intended to directing the attention of



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institutions of higher education and of governmental educational authorities to the essential contents of biomedical engineering education and thus to promoting European competitiveness in this dynamic discipline.

The recommendations need to specify the criteria for accreditation including qualifying programs and degrees, the educational objectives and minimum requirements in terms of outcome competencies, organisational requirements, quality of teaching and teaching material, necessary minimum resources and facilities including the required qualification of the instructors, and the consequences of these criteria for the accreditation process, particularly the involved evaluation procedures.

Accreditation criteria need to be provided for pure BME and mixed, undergraduate as well as graduate or one and two-cycle programs, training and continuing education corresponding to the European "lifelong learning" initiative. Lists of competencies have to be agreed upon that specify the necessary combinations of basic knowledge, basic BME topics, and advanced BME topics. Due to the enormous range of the different working areas in medical and biological engineering and the large variety of professions, each with different requirements regarding competencies, there cannot be a single list of topics with minimum aptitudes in the individual areas of BME, but there must be a whole range of different competency profiles, each of course requiring a specific curriculum, and each being tailored to the particular academic and professional level as well as to the speciality area. It is well understood that the recommendations for the criteria have to leave sufficient flexibility to permit the individual educational institutions to maintain or to develop their specific, local identities.

International harmonisation or at least mutual recognition of degrees between individual countries or within larger areas such as the European Union requires that all parties involved agree upon the competency profiles. Getting to a broad international agreement on competency profiles might be relatively easy for traditional professions, it will, however,

require major efforts and compromises for a discipline like BME which is well established in some countries, but only emerging in others, and that is expanding at an amazing speed.

Conclusion

European BME accreditation is expected to have major beneficial effects on the profession of medical and biological engineering with regard to professional qualification, employability in a global world, collaboration between healthcare providers, industry and universities, and the establishment of international research networks. However, in order to arrive at these desirable effects, co-ordinated and focused actions on national, European and global levels are required.

Traditional European structures of education, research, and research funding, which are strictly national issues, are becoming more and more obsolete in a unified and harmonised Europe where mobility is mandatory, and need to be replaced or at least supplemented by structures providing the compatibility of systems. Future developments are determined right now and that does apply to biomedical engineering, its future development and its significance, too. It is imperative that the European community of biomedical engineers is participating actively in any and all decisions touching their profession, and it has to be ensured that others do not make these decisions without regard to our interests. It must also be ensured that the evolving system includes or at least remains open to those countries, which are not or not yet members of the EU. Therefore, all European societies representing biomedical engineering, medical physics, clinical engineering, medical informatics, artificial organs, biomaterials etc. must address the issues of the European Higher Education Area, and must work together to realise the required changes in a way that is beneficial to our profession and thus to society.

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Call for Contributions

Status Report on Medical and Biological Engineering in Europe

On 27 August 2001, 29 delegates of IFMBE and 22 IFMBE affiliated European societies convened in Vienna and agreed unanimously to a resolution recommending the formation of an IFMBE affiliated European umbrella organisation, as has been reported in the September issue of the IFMBE News. The main objective of the new organisation with the tentative name *European Association for Medical and Biological Engineering and Sciences (EAMBES)* is to promote medical and biological engineering in Europe. Some of the specific tasks identified in Vienna are:

- assisting in the development and strengthening of BME and BME societies,
- assisting, advising and co-ordinating the preparation of guidelines for BME education, training, accreditation, certification and continuing education (lifelong learning),
- liaising with national governments, European governmental agencies and European bodies,
- fostering and co-ordinating the activities of the member organisations,
- participating in the regulation process for medical devices, and
- representing medical and biological engineering at the European level in order to raise the profile of our profession.

Given these ambitious tasks, it is mandatory that we have an exact and up-to-date knowledge on the status of BME in all countries intending to participate in this exciting European initiative. Two important publications relying on this information are currently in preparation: a white paper on the accreditation of BME programs in Europe, and a comprehensive status report on BME in Europe. These publications are not only

needed to support the European societies in their initiative towards founding an umbrella organisation, they are also thought to serve as important publicity material describing the nature, range and status of all aspects of medical and biological engineering to the public as well as to the many governmental, academic and societal organisations and bodies, especially those with an interest in health care, which will be involved in shaping the future of BME in Europe.

We need to finish the White Paper on Accreditation as well as the Status Report on BME in Europe in the near future, as they should be available in time for the inauguration of *EAMBES*. So far, I have received an encouraging number of high-quality contributions and preliminary manuscripts describing the status of BME in the respective countries. If any country or society participating in this initiative would not be represented in the European BME survey, this would be damaging and disappointing both for the umbrella organisation and the concerned country or society. Therefore, I am urging all European BME societies who have not yet done so to identify somebody to work on this very important paper, and to provide me with an article on the status of BME education, societies, industry, and BME accreditation in their countries. Two examples of such contributions, which can serve as templates for the expected papers, can be downloaded from the IFMBE News website as Word documents. See <http://ifmbe-news.iee.org/ifmbe-news/nov2001/status.html>

Joachim H. Nagel
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Meeting Report

Fifty-First Session of the WHO Regional Committee for Europe

Madrid, 10-13 September

IFMBE has official relations with the World Health Organisation. The fifty-first session of the WHO Regional Committee for Europe was held in Madrid, Spain, from 10 to 13 September 2001. The session took place at the Palacio Municipal de Congresos of Madrid.

Ministries of Health represented the 51 members of WHO Europe at the governmental level. Representatives from intergovernmental organisations, the Council of Europe and the European Commission, as well as the United Nations Development Programme and World Bank were invited. Observers from the Holy See and USA and representatives from 25 non-governmental organisations took part in the session.

The programme of the session included traditional reports from Regional Director Marc Danzon and Standing Committees, budget discussions and organisational items.

The focus of the meeting was on the ongoing projects of WHO Europe:

- Poverty and health;
- European Alcohol Action plan, young people and alcohol.

A problem also underlined was that of mental health.

Two different approaches from the WHO Europe members emerged during the discussions. The approach of western and central European countries was sometimes to criticise WHO activity (for example, for a lack of information). The other approach, from the newly independent states from Eastern Europe and Asia, mainly included financial problems and applications. None of the reports or the statements from the member states paid any attention to medical technology or medical and biological engineering (see <http://www.who.dk/RC/RC51/english.htm>).

As an IFMBE representative at this meeting I had the chance to present an oral statement in the framework of p. 6 of the

Agenda “Partnership for Health”. The main partners at this round table discussion were the European Commission, the Council of Europe, the World Bank and the UN Development Programme. The time allowed for the statements was very short (three minutes). In the space of these three minutes I tried to give information about plans of the IFMBE on future development of biomedical engineering in Europe. The main points underlined were

- common objectives of WHO and IFMBE to improve the quality of life of the people of Europe;

- membership of the in ICSU;
- need to promote medical technology in Europe and enhance its potential in competition with USA and Japan;
- aim and objectives of the European Alliance on Biomedical Engineering and Science;
- EABMES structure as an umbrella organisation.

The discussion of statements from non-governmental organisations was excluded “on the floor” by the rules of procedures at this meeting. A remarkable number of questions arose after my announcement in the form of private communications. The idea of co-operation under one umbrella organisation and especially the improvement of the situation with regard to medical technology in Europe in competition with USA and Japan was acceptable to several people from other non-governmental organisations.

The tragic event in New York on the second day of the session united the participants in the condemnation of terrorism.

Hiie Hinrikus, Ph.D., D.Sc., Professor
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Obituary: Peter Donaldson



A great opportunity in Peter Donaldson's life came in 1967 when he was invited by Giles Brindley to be the Chief Engineer in a new research group the Medical Research Council, Neurological Prostheses Unit. Brindley had impressed the medical establishment while, as an academic at Cambridge, making and implanting into a blind woman a device which stimulated the visual cortex, giving her sensations "like stars"; the first step toward prosthetic devices for artificial vision. This was at a time when pacemakers, with one stimulating electrode, were new and not reliable, so Brindley's 80-channel device was enormously ambitious but suggested what might be possible for the disabled.

However, Brindley's device also showed the difficulty: it deteriorated so that little remained functional after a few months. At that time, there was no theory about how to make micro-electronic implants so that they would have an adequate service life. Indeed, it was not known whether it was possible. Some thought that the components should be encapsulated in a polymer of very low permeability "to keep the water out". Before he could design an improved visual prosthesis, Donaldson had to find a suitable encapsulant. He tried many materials and in those days his lab was full of jars of saline in which encapsulated test circuits remained until they failed. He noticed that sometimes failure occurred because the water penetrated along the interface with the wires, which passed through the encapsulant, rather than by diffusion through it. The breakthrough came, by chance, when he noticed at home that on a kettle that (for some reason) he had mended using silicone bath caulk, the silicone remained bonded to the metal despite the wet and the frequent heating. He tried silicone encapsulants for the tests and found a great improvement over the much more impermeable materials like waxes and epoxies. Making sense of this apparent paradox became one of his great contributions. He went on to produce a series of papers, describing elegant experiments, which were mostly published in *Medical & Biological Engineering & Computing*, in which he dealt with various aspects of silicone encapsulation, such as the important physical properties of the encapsulant, the chemical properties of the encapsulated parts, osmosis, and so on.

Donaldson was born in 1927. His father was a submariner and he followed, entering Dartmouth Royal Naval College, age 13, early in the war. However, he had developed a deep interest in technical subjects at an early age, joined the Electrical Branch, and was sent to study Engineering at Cambridge. Returning to the navy, married, he contracted TB and was invalidated from the service. Later he was to say that it was the best thing that could have happened. His wife's uncle, Professor Bryan Matthews, Head of the Cambridge Department of Physiology, took him on as an engineer to make apparatus. After the war, when such huge advances had been made in electronic engineering, there was enormous scope for its application to electrophysiology. He soon felt able to write a comprehensive book *Electronic Apparatus for Biological Research* (1958).

He was interested too in other fields, with Professor Richard Gregory in optical instruments and with Professor Horace Barlow in learning machines. He made one of the first machines that learnt from a human: the task was to balance an inverted pendulum, an exemplary application that has been used widely since. His apparatus would seem very strange to modern eyes: it was



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entirely hardware and used domestic watt-hour meters for the multipliers. It was described in *Medical & Biological Engineering* (2, p. 393, 1964), the journal of which he was the editor from 1963-7.

Brindley and Donaldson collected a small team in the Neurological Prostheses Unit, which was to be very stable until their retirements in 1992. Donaldson's work on encapsulation spanned the whole of this period but he also worked on packaging, electrodes, RF links, and other aspects of neuroprosthesis technology. There were also many applications. The visual prostheses, most ambitious, were first. The basis for their constructions were flexible caps to fit on the dome of the head, between the skull and the scalp, with electrode arrays on short cables which passed through the skull to the posterior surface of the cortex. To achieve adequate yield (fraction of the outputs that were functional) he made sub-units and tested those before inserting each into a pre-formed recess in the cap and joining them with platinum wires. This required months of careful work under a microscope inside a clean air cabinet. He made two visual prostheses that were implanted into volunteers and, although they were not useful to the blind volunteers for daily life, Brindley and Rushton produced important results for the applied physiology of vision.

By the late 1970s, Brindley and Craggs were interested in what could be done with electrodes on the peripheral nerve roots and members of the Unit, including the late John Cooper and Tim Perkins, developed the Sacral Anterior Root Stimulator (SARS), a device which could be used to empty the bladder of paraplegics made incontinent by spinal cord injury. The principles of the encapsulation were understood during the design, and this device has been found to be very reliable despite its apparent simplicity. Over 2000 have now been implanted worldwide. Many other, more experimental devices were made by Donaldson, or under his guidance, and sometimes in collaboration with other research groups: e.g. for treating epilepsy; for artificial hearing for the deaf (before cochlear

stimulators became the success that they have); and for standing and stepping for paraplegics. The simplicity of some devices, made using elementary electronic circuits, with components soldered together and then encapsulated in silicone adhesive, has the advantage that an implant can be made in a few days. This was important to Brindley whose *modus operandi* was to treat individual patients, who had been referred to him, if possible, and this meant that sometimes-novel devices were required with only a few days notice.

In his retirement, Donaldson contributed to the Lumbar Anterior Root Stimulator project at UCL and helped the company that makes the SARS, Finetech (Medical) Ltd, in their successful application for a CE mark. He also improved his workshop at home, and there produced a number of unusual working models. He became interested in electrostatic machines and made models of a motor, attributed to Benjamin Franklin, and a generator (mechanical voltage doubler) of Nicolson, among other things. These he described in articles in the IEE journal, *Science & Education*. He also wrote thought-provoking articles on historical or fictional topics.

His fascination with electrical technology went beyond the mere functional value: he was delighted by the extraordinariness of the physical world and intrigued by counter-intuitive facts. He was as happy developing illuminating theory as carrying out meticulous experiments or making apparatus.

Nick Donaldson
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October 2001



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Number 51 November 2001



Obituary: Peter Donaldson

It is very unusual for a fundamental advance to be contributed to a field with which the author of that advance has no prior experience or further professional contact. Yet that is what happened with the publication in 1960 of Donaldson's remarkable paper "Error decorrelation: a technique for matching a class of functions." (Proceedings of III International Conference on Medical Electronics, pp. 173-178).

Every specialist field develops its own terminology. Peter Donaldson's paper uses the language of control theory and mathematical statistics, and was motivated entirely independently of its crucial bearing on a set of questions, almost certainly quite unknown to him at the time, with which the developing new field of artificial intelligence (AI) was becoming pre-occupied. These concerned machine emulation of human processes of learning.

At the time of Donaldson's paper the possibility that a machine, in the form of a computer program, might be so designed as to learn a complex skill from its own experience of a given task had just been reported in a symbolic task domain (playing the game of checkers) in Arthur Samuel's 1957 "Some studies of machine learning using the game of checkers" IBM J. Res. Dev., 3, 210-229. Samuel's paper is generally regarded as the foundational paper of the subject of Machine Learning. What Donaldson's demonstration added were two findings: (1) that machine learning of a complex task was possible for a real-time sensorimotor skill, and (2) that it could be achieved by a form of "learning by imitation" from the real-time behaviour of a human mentor skilled in the given control task.

It was not until 1968 that Roger Chambers and I were able to repeat Samuels' feat, using Donaldson's real-time control problem, in a way that in AI jargon was "rule-based" and hence articulately describable by the system itself. In the following year we followed up with a rule-based solution to (2)

above, in which the machine learned the same skill by imitating a skilled human pole-balancer.

In the forty years of Machine Learning work that followed, Donaldson's pole-and-cart task became a standard benchmark problem for a wealth of variants and refinements on the theme of rule-based adaptive control. It was also used in computer simulation to study processes of human "reinforcement learning", as recently reported, for example, in "Simulator-mediated acquisition of a dynamic control skill" by Jean Hayes Michie and Donald Michie (Proceedings of 6th IFAC Symposium on Automated Systems Based on Human Skill, Sept 1997).

In the annals of Machine Learning, Donaldson's 1960 paper is assured of an enduring place as one of the earliest and most seminal contributions.

Professor Donald Michie
Professor Emeritus of Machine Intelligence
University of Edinburgh
November 2001

IEE Launches Healthcare Technologies Professional Network

The IEE professional networks are people-to-people networks that allow engineers to interact with each other in their specialist field. The professional networks can be virtual and/or physical, which differentiates them from other online communities.

The Healthcare Technologies network, which was one of the first to be launched, promises to be a valuable resource for biomedical engineers. Details can be found by visiting http://pn.iee.org/preview/pn_healthtech/



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SUSTAINABLE DEVELOPMENT AND PUBLIC UNDERSTANDING OF SCIENCE AND TECHNOLOGY HEALTH CARE

ICSU has been invited by the United Nations to serve as the “Organising Partner” for the International Scientific and Technological Community (IS&TC) for the extensive preparatory process underway for the World Summit on Sustainable Development (WSSD) to be held in Johannesburg, South Africa, in early September 2002.

IUPESM has been asked to appoint a focal point person to enable ICSU to ensure that we are kept fully informed and hopefully actively involved in the WSSD process. The first major commitment for ICSU is to prepare the 16-page report for the UN by 1 December 2001.

Nandor Richter has kindly accepted to serve as focal person for ICSU and has proposed to send a contribution hoping our activities will be included in the 16-page report from ICSU. At the suggestion of Nandor, the always active Keith Boddy has written our contribution (see below).

Jean-Pierre Morucci

President IUPESM

Email: morucci@cict.fr

In considering sustainable development and public understanding of science and technology, health care is not always highlighted and particularly the contributions made to it by physical and engineering sciences.

As infectious and endemic diseases decline in developing and emerging countries, medical conditions such as cancer, circulatory diseases and physical/mental disabilities increase in significance. There is consequently a greater necessity for the associated expertise and support of medical physicists and biomedical engineers in both diagnosis, such as imaging and physiological measurements, and in treatment, particularly radiotherapy and also in aids to everyday living for people with disabilities. These professionals are also prime contributors to essential developments in fields such as telemedicine and information technology.

A major problem in sustainable development is that generally the number of medical physicists and biomedical engineers per head of population is far fewer in developing countries than in industrialised nations (often by orders of magnitude). In addition, their professional status and roles may be poorly recognised or understood. An associated difficulty is limited opportunities to remain up to date in these rapidly advancing fields.

Health care is of direct interest and personal benefit to the public. An opportunity, therefore, exists to improve and stimulate public understanding of science and technology by illustrating the many applications being made internationally to improve wellbeing, explained in non-technical, readily understandable language.

As a member of ICSU, the International Union for Physical and Engineering Sciences in Medicine (IUPESM) is contributing to sustainable development by providing regional training courses for developing countries and supporting their participation in world congresses. Global biomedical information networking is being established for them, including an on-line medical physics textbook and a biomedical engineering encyclopaedia. As a contribution to public understanding of science and technology, IUPESM has produced an illustrated brochure entitled “Physical and Engineering Sciences in Health Care”, which is available on the Union’s web site (www.iupesm.org) and, with the assistance of a grant from ICSU, in printed form. The Union is seeking collaboration with members of the ICSU and United Nations families in order to promote and extend these contributions to sustainable development and public understanding.



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Second Call for Papers EMBECE'02 Second European Medical & Biological Engineering Conference Vienna December 4–8, 2002 Advancement of Medicine and Health Care through Technology The Challenge to Biomedical Engineering in Europe

Take a look at the EMBEC'02 home page <http://www.embec.org>, where a lot of material has been added since the September announcement.

Important dates

Submission of abstracts: **15 March 2002**
Notification of acceptance: **15 June 2002**
Submission of full papers: **15 September 2002**

For information

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SECOND ANNOUNCEMENT AND CALL FOR PAPERS Fourth International Workshop on Biosignal Interpretation 24-26 June 2002 Villa Olmo, Como, Italy

The International Federation for Medical and Biological Engineering (IFMBE) and the International Medical Informatics Association (IMIA), in collaboration with the IEEE Engineering in Medicine and Biology Society (EMBS), the Japan Society of Medical Electronics and Biomedical Engineering (JSMEBE), the Associazione Elettrotecnica ed Elettronica Italiana (AEI), the Associazione Italiana di Ingegneria Medica e Biologica (AIIMB) and the Polytechnic University of Milan will organise the Fourth International Workshop on Biosignal Interpretation, which will be held in Villa Olmo, Como, Italy, from 24-26 June 2002.

The aim of the workshop is to explore the new fields of biosignal interpretation, including model-based signal analysis, data interpretation and integration, medical-decision-making, and extending existing signal-processing methods and technologies to realise effective utilisation of biosignals in a practical environment and obtain a deeper understanding of biological functions of entire organisms and systems, down to cellular and gene scales. The Third International Workshop on Biosignal Interpretation was held in Chicago, Illinois, USA, in 1999.

Distinguished speakers will be invited to deliver lectures on important topics in the field. Original contributions pertinent with the scope of the workshop are welcome. Prospective authors are encouraged to provide original contributions in any of the following categories (but not limited to the following):



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- Biosignal processing, pattern analysis and data fusion (linear and nonlinear, chaotic and fractal analysis techniques, time-frequency and time scale analysis, cluster analysis, genetic algorithms, data mining and prediction, integration of signals and images, applications to ECG, heart rate variability, EEG, EMG signals analysis, evoked potentials, multimodality approach and other related topics).
- Mathematical modelling of experimental and clinical data (linear and nonlinear phenomena, neural modelling and neural dynamics, modelling and control of cardiovascular and pulmonary systems, modelling of brain functions, perception and learning or other related topics).
- On-line interactive signal acquisition and processing (on-line patient monitoring, intelligent monitoring, ambulatory systems and other related topics).
- On-line interactive signal acquisition and processing (on-line patient monitoring, intelligent monitoring, ambulatory systems and other related topics).
- Medical decision support methods (parameter estimation, decision making, rule based/expert systems, automatic diagnosis, data reasoning and other related topics).
- Medical informatics (biosignal interpretation in virtual reality applications, in telemedicine and internet-based solutions for transmission, exchange and analysis of biomedical data and other related topics).
- Cellular signal and genomics (analysis of DNA sequences, genetic and evolutionary computing, genetic data mining and other related topics).

Deadlines

Submission of papers (maximum of 4 pages):
15 January 2002

Acceptance of papers: **15 March 2002**

Early registration deadline: **1 April 2002**

Return of revised papers: **15 April 2002**

Hotel room reservation deadline: **15 May 2002**

International workshop: **24-26 June 2002**

Paper submission

Camera-ready manuscripts must be submitted in electronic form before 15 January 2002. An author's kit for preparing manuscripts can be downloaded at the conference web site. Manuscript should not exceed 4 pages. Final versions of accepted papers must be submitted by 15 April 2002.

Publications

All submitted papers will be reviewed on the basis of scientific quality, relevance, originality, medical and biological significance, and clarity. Accepted papers will appear in the conference proceedings. A group of selected contributions will be published as full papers in a Special Issue of *Methods of Information in Medicine*.

Poster competition

The Scientific Committee will judge poster presentations and it will award a prize of 500, 300 and 200 (Euro) to the best three poster presentations.

Congress registration

Registration will be performed electronically. Registration fees are **260** (Euro) for registrations received before 1 April and **340** (Euro) thereafter.

Hotel accommodation

Hotel reservation form is available at the workshop web site. Rooms have been reserved at a few hotels, all located in Como downtown within walking distance from the Villa Olmo Conference Centre. A special room rate for the conference participants will be available until the hotel room reservation deadline. For further information please contact the Conference Secretariat at the following address.

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CALL FOR PAPERS
SECOND INTERNATIONAL CONFERENCE ON THE
MANAGEMENT OF HEALTHCARE AND MEDICAL
TECHNOLOGY

THE HOSPITAL OF THE FUTURE

Stuart Graduate School of Business

Center for the Management of Medical Technology

Illinois Institute of Technology

Chicago, Illinois, USA, 28-30 July 2002

The first conference, held at the University of Twente, in Enschede, the Netherlands in April 2001, generated a book: **THE HOSPITAL OF THE FUTURE**, forthcoming by Greenwood Publishing Group in 2002, and a special issue of the *International Journal of Healthcare Technology and Management*, forthcoming in Spring 2002.

This second conference will provide a forum for scholars across the spectrum of healthcare management and technology. The theme of the conference is “bringing together technology, health care, and management.” The emphasis of the conference will be on the gathering of researchers who are exploring the bridging of these three components of healthcare delivery—with an eye toward the future—and practitioners who are interested in these topics. How will healthcare delivery institutions be shaped in the future? What are the trends and transformations that await us in the coming years? How are we going to merge technology, management, and medicine into a workable and economically feasible combination? What are the barriers that we shall certainly encounter, and how can we overcome them? What are the research questions that we should be addressing in this regard?

The conference will have five tracks:

- Management of technology in healthcare organisations: nature of work and skills in healthcare delivery; processes and performance; knowledge management in

health care; strategies for technological positioning in hospitals; managed care and cost controls; uses of technology in primary care; logistics, infrastructure, and architecture of the hospital of the future.

- Management and organisation of information technology (IT) in healthcare organisations: applications and processes in the implementation and diffusion of IT in health care; role of standards in communication and organisation, networking by using IT; computerised medical records.

- Organisation, management, and applications of emerging medical technologies, e-health, telehealth, and telemedicine: role of these emerging technologies; processes, barriers, and organisational issues in the implementation and adoption of these technologies.

- Medical technologies and patient value: how medical technologies contribute value to patients; the role of patient confidentiality in view of technological developments; ethical issues; healthcare technologies and medical outcomes; the role of standards, regulations, government, and their impacts on medical technologies and the value to patients.

- Medical technologies and emergency medicine: how health care and medical technologies contribute and will continue to contribute to emergency medicine, crisis healthcare delivery, and health care in catastrophic situations.



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Deadlines

Abstracts due **30 January 2002**
Acceptance notification **1 March 2002**
Final papers due **1 May 2002**
Pre-registration deadline **15 May 2002**

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Information - who needs it?

You do and our service may well be able to provide it. Save time and get access to quality information at an affordable price by commissioning a trained knowledge professional to solve your information needs.

The technical and business information service attached to the IEE Library has access to many databases, the Internet, market survey reports, company data, news files and thousands of publications. We use these sources to collate information which is often time consuming and tricky to find for the already overworked technical professional.

As well as using information held in the IEE library, which holds 75,000 books and 4000 periodical titles, we also have our own database of up-to-date market statistics covering most areas in our field of expertise.

Our main resources span:

- electrotechnology
- computing

But we can provide solutions to many other information needs

Fees start at £50.00 to members (or £100.00 for non-members). Quotations can be provided and we keep in contact throughout the search process.

Some recent enquiries we have answered have focused on:-

- Literature search on PN junctions
- Worldwide data on the electronics industry
- Worldwide data on electricity generation and demand
- Literature search on overhead power lines and health
- Statistics on the mobile phone industry
- Search for papers written by a particular author

For further details of the information services offered or to discuss commissioning a search please email Cathy Firebrace (cfirebrace@iee.org.uk) or contact her at: Library Services, IEE, 2 Savoy Place, London WC2R 0BL UK. Tel: +44 (0) 20 7344 8429 Fax +44 (0)20 7497 3557.



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Review of “Handbook of Bacterial Adhesion” **Edited by Yuehuei H. An and Richard J. Friedman** **Human Press, Totowa, NJ.**

The handbook focuses on mechanisms of microbial adhesion to biomaterial and formation of bio-films. The topic is very important both to manufacturers of different biomaterials and implants and to medical doctors and patients. It provides very useful information on methods available for the testing of such materials, and on strategies for preventing microbial adhesion and subsequent infections in the host. The 630 pages are divided into six parts, appendix and index. Part I describes mechanisms of microbial adhesion and formation of bio-films. Part II gives a general background and methods for studying microbial adhesion from basic equipment and microbiological techniques to mathematical models of bacterial growth on surfaces. Part III describes different techniques for studying microbial adhesion for instance with electron microscopy and atomic force microscopy. Part IV focuses on microbial adhesion to biomaterials and part V on attachment to host tissue. The last part describes strategies for preventing microbial adhesion. The references are up-to-date and well balanced. The subject index is comprehensive. The handbook is highly recommended to scientists, medical doctors and manufactures in the field of biomaterials, implant surgery and bio-film formation.

The Publishing Committee of the IFMBE has made a decision to make all efforts to increase the visibility of the Proceedings of IFMBE-organised/sponsored conferences. Therefore, the IFMBE Proceedings Series was started with the Proceedings of MEDICON 2001 – IX Mediterranean Conference on Medical and Biological Engineering and Computing. The MEDICON Proceedings (the first volume of the series) got an ISSN number (i.e. a number for periodical publications, referred to the IFMBE) and an ISBN number (a book number, referred to the local publisher –conference organiser).

The MEDICON Proceedings were printed in two parts, containing 306 papers accepted for presentation at the conference and covering 1120 pages.

Please address the inquiries for additional copies of Proceedings to:

Croatian Society for Medical and Biological Engineering
FER - ZESOI
Unska 3, HR-10000, Zagreb, Croatia
Email: crombes@crombes.hr
Website: <http://www.crombes.hr>





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Medical & Biological Engineering & Computing

The official journal of IFMBE is the peer-reviewed *Medical & Biological Engineering & Computing*, published bimonthly by Peter Peregrinus Ltd. Full details, including guide to authors, list of subject-indexed papers and contents of recent issues, can be found on the world wide web by following the [Federation Journal](#) link from the IFMBE homepage.

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