European Society of Biomechanics
Newsletter
JUNE 1998

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Search Committee for the ESB Council

Leif Ryd, University of Lund

President

Any society is alive by its members, who have gathered around some topics of mutual interest, like, for example, biomechanics. Some of the members, by necessity, need to serve on the council in order to get business done. Communication then between the council and the members at large becomes imperative and there should be a continuous exchange of opinions and ideas. This is oftentimes hard to achieve, and a situation where the two bodies move as individual objects may develop. Further, any individual who serves on the council should be given information of what is expected of him; the position carries duties and rights. And he or she should be given time to consider these facts before accepting.

The task of this search committee will be to propose the individuals to be elected to the council at the General Assembly

In order to implement these processes further in the activities of the Society, the council will propose the formation of a search committee at the next General Assembly, in Toulouse. A proposition of an amendment to the by-laws of the Society to this effect will be put forth.

The task of this search committee, which will be permanent, and the members of which will be chosen at the general assembly, will be to propose the individuals to be elected to the council at the General Assembly. The search committee should be independent from, but should work in close collaboration with, the council. The members at large should feel free to call on the committee at any time to ventilate issues regarding how the society is run. As time approaches for the next general assembly, the committee should inquire among the members of the council whether they want to stay on or retire, always, of course, honouring the rules in the statutes regarding maximum period in office. Vacancies should be addressed by identifying individuals willing to serve and these should be approached, informed, and their acceptance should be secured before the General Assembly. The final decision will, of course, be up to the general assembly and the above activities do not preclude in any way the possibility to propose individuals at the General Assembly. Thus, the sovereignty of the General Assembly will not be imposed upon. This way, it is the council's belief that the election process will be conducted in a smoother and more efficient manner with a better collaboration between the members and the executive bodies of the Society.

For the upcoming general assembly in Toulouse, John O'Connor has agreed to serve as a one-man interimistic and informal search committee. John can be reached at:

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Headington
OX3 7LD
England, U.K.
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Propositions and comments on the present and future council are thus solicited to John O'Connor. Comments on this proposition as such are welcome to the Secretary-General, Leendert Blankevoort (l.blankevoort@orthp.azn.nl), or to Leif Ryd (ortlry@pop.usil.lu.se).

- a real face to face meeting is more than three times as expensive as a videoconferencing meeting;
- telephone conferences cost half that of a videoconferencing meeting, but are much less effective;
- information exchange is equivalent to conventional meetings;
- some difficulties in making arrangements with partners due to full timetable;
- all the clinicians want to use the system again.

Effective videoconferencing requires good preparation (1 to more than 7 days), but less than conventional meetings

Some technical problems (audio and video setting) are sometimes present but they can be avoided with the respect of a common protocol and with preliminary technical checks of 15 minutes before the session. Similar results have been obtained from the other sections of the project not related to orthopaedics, confirming our conclusions for the specific application of ISDN videoconferencing in orthopaedics.

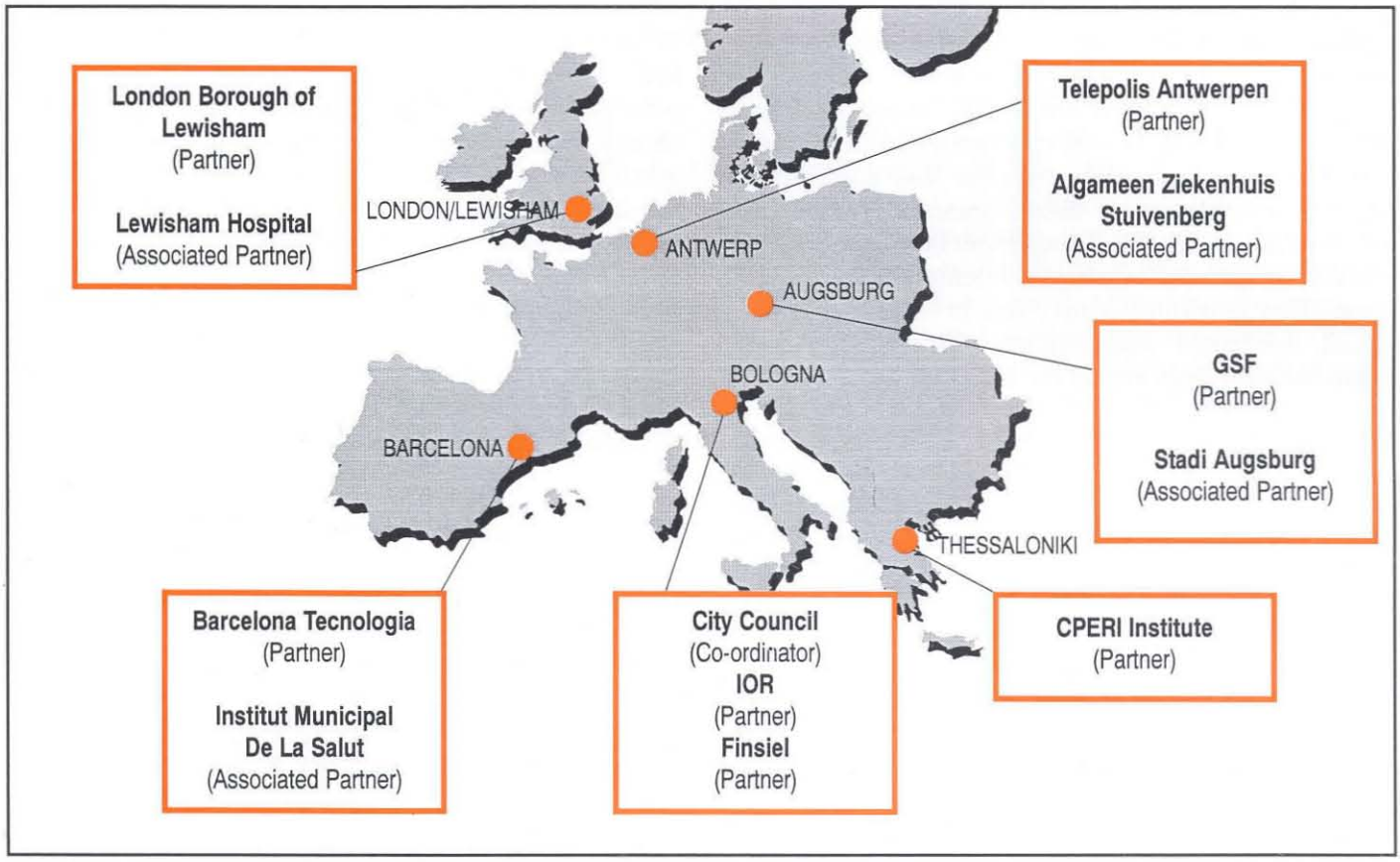
Videoconferencing firms must be forced to abandon proprietary solutions and to adopt fully standardised data sharing solutions

CONCLUSIONS FROM THE PROJECT: We can say that ISDN videoconferencing applied to orthopaedics is an effective, cost and time saving alternative to conventional methods of communication. The technology available is able to support and enhance international information exchange and scientific collaboration. Moreover the bandwidth of ISDN is sufficient, if it is used intelligently both by users and software, also for the interactive sharing of clinical images. From our experience, the large-scale deployment of ISDN videoconferencing systems is highly recommendable. A real obstacle for that development is the lack of universally accepted standards for data sharing. Videoconferencing firms must be forced to abandon proprietary solutions and to adopt fully standardised data sharing solutions.

REFERENCES

[1] A study of the application sharing capabilities in telemedicine; P.Mattioli, P.J.Klutke, F.Baruffaldi, M.Viceconti, A.Toni and K.H.Englmeier; Computer Methods and Programs in Biomedicine, in press.

[2] X-ray film and paired digitised image evaluation in total hip arthroplasty: a statistical comparison regarding the diagnostic capability; M.Testoni, P.Mattioli, F.Baruffaldi, P.Trentani, G.Bianchi, F.Fanton, M.Mieti and A.Toni; Proceedings of the 8th EORS, Amsterdam, May 7-10, 1998



Summary of Series on European Research

In the last four issues of the Newsletter, members of the E.S.B. have described their research activities carried out under one of the European Research programmes. One clear result has been to show the range of research programmes as follows;

Elizabeth Tanner (GB)
Concerted Action on Skeletal Implants.

Ivars Knets (LV)
Development of educational Systems in bioengineering, biomechanics and biomaterials for substitution of damaged biological tissue.

Georges Van der Perre and Hans Druyts (BE)
Assessment of bone quality in osteoporosis.

Fabio Baruffaldi (IT)
ISDN-based applications in telemedicine in Orthopaedics.

Research was carried out under a different programmes, viz. EU Concerted Action Programme, EU TEMPUS Joint European Project, EU BIOMED I programme, and EU PH-NET project (preparatory call before the call for proposals for TEN-TELECOM programme). Furthermore, biomechanics research is also being carried out under the Standards, Measurements and Testing programme, and under the Brite-EuRam programme. How will the situation change under the fifth framework programme which is "designed to ensure that European research efforts are translated much more effectively than hitherto into practical and visible research efforts"? All the research involved collaborations between several European countries.

Even from this brief survey of four projects, several conclusions can be made;
(a) there are many different research programmes biomechanics researchers can obtain funding,
(b) collaborators in other European countries are essential (i.e. networks of researchers),
(c) there is a significant level of research in biomechanics presently being funded by the European Commission.

What role can the European Society of Biomechanics usefully play for its members regarding European research? The first is to inform members of the opportunities available both by formal presentations and through informal 'social' networks. In this regard, Dr Marie-Christine Hobatho, Chairperson of ESB 98, has co-organised with ESEM a symposium on "EC Projects Research" from 14:30 to 16.00 hrs on Friday July 10th. The second is to try and ensure representation for biomechanics in the decision making which defines the content of the research programmes. Thirdly, the ESB gives members the opportunity to meet others with whom they can write research proposals with the level of cross-country partnership required.

P.J. Prendergast,
ESB Newsletter-Editor & Council Member,
Trinity College,
Dublin, Ireland.

European Society of Biomechanics • Membership Application

I hereby submit my application for active membership of the European Society of Biomechanics

I (a) Family name: _____

I (b) Given Names: _____

II Date of birth (day/month/year): _____

III Office address: _____

_____

_____

Tel: _____

Fax: _____

E-mail: _____

IV Private address: _____

_____

_____

Tel: _____

Fax: _____

V Academic degrees and years awarded: _____

_____

_____

VI Present affiliation and position: _____

_____

_____

VII Actual activity in biomechanics: _____

Date: _____

Signature: _____

(not required if a written letter of consent with signature was already mailed or faxed)

N.B. – include a brief curriculum vitae and a list of relevant publications.

Mail to: Dr. Leendert Blankevoort
Biomechanics Section, 800 Orthopedie, University of Nijmegen
P.O. Box 9101, NL-6500 HB NIJMEGEN, The Netherlands
Fax: +31 24 354 0555 • E-mail: l.blankevoort@orthp.azn.nl

Thank You!

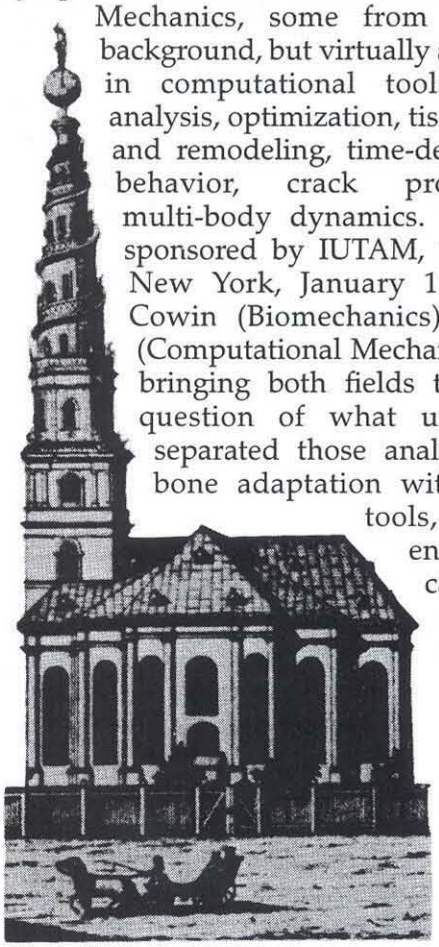
Patrick Prendergast would like to thank Mrs. Joan Gillen for secretarial assistance and the following who have contributed to the ESB-Newsletter under his Editorship.

Hans Druyts .....Belgium
Georges Van der Perre .....Belgium
Jos Vander Sloten .....Belgium
Michel Dalstra .....Denmark
Marie-Christine Hobatho .....France
R. Darmana .....France
E. Estivalèzes .....France
Felix Eckstein .....Germany
Dieter Liepsch .....Germany
John Middleton .....Great Britain
Elizabeth Tanner .....Great Britain
Sandy Nicol .....Great Britain
Peter Ferris .....Ireland
Fabio Baruffaldi .....Italy
Gustavo Zanoli .....Italy
Maurice Whelan .....Italy
Kozaburo Hayashi .....Japan
Masaso Tanaka .....Japan
Hiromichi Fujie .....Japan
Ivars Knets .....Latvia
Leif Ryd .....Sweden
Nico Westerhof .....The Netherlands
Frans van der Helm .....The Netherlands
Rik Huiskes .....The Netherlands
Marjolein van der Meulen .....USA
Ralph Müller .....USA

"Synthesis in Bio-Solid Mechanics"

an IUTAM-Symposium (International Union of Theoretical and Applied Mechanics) held in Lyngby, Denmark, May 24-27, 1998

Some 50 delegates convened for this symposium, from all over the world. Some from a Mechanics, some from a Biomechanics background, but virtually all with an interest in computational tools: finite-element analysis, optimization, tissue differentiation and remodeling, time-dependent material behavior, crack propagation, and multi-body dynamics. The symposium, sponsored by IUTAM, was conceived in New York, January 1997, when Steve Cowin (Biomechanics) and Bob Kohn (Computational Mechanics) succeeded in bringing both fields together over the question of what united and what separated those analyzing mechanical bone adaptation with computational tools, and those engaged in numerical optimization of structures and materials.



Our Saviour's Church, Copenhagen. The 90 metre spire has the staircase on the outside. It was built between 1749 and 1752

Bone was again the main thrust in the present meeting, discussed by representatives of both fields. As pointed out so elegantly by prof. Lekszycki from Poland, adaptation and optimization of a tissue (or a material) structure differ fundamentally in that during optimization the material knows where it must go - as the global optimization goal is specified in the objective function for the structure - whereas in adaptation the tissue can only, at any moment in time, respond to the actual mechanical stimuli, and has no clue where the structure as a whole will end up. Another difference is in the pathways of both procedures. Where it's irrelevant that optimization procedures travel through intermediate architectures which have no practical significance, the adapting tissue is supposed to keep carrying the loads while on its way to a final, equilibrium configuration. And then, finally, adaptive processes are restrained by realistic time scales of dynamic loading and cell-based biological processes, whereas optimization only knows computer time. But the algorithms used to describe either procedure deliver architectures which are surprisingly similar. The reason for this may be that most of the present adaptation algorithms mimic optimization procedures rather than vice versa, as they are not commonly built to represent the actual biological regulatory processes in a mechanistic sense. In short, one may wonder whether computational (bio)mechanics of optimization and adaptation are really on parallel tracks.

A more common ground for collaboration and mutual fertilization may be in the area of damage initiation and accumulation in bone; fatigue, so to

speak. Bone, as a composite on several dimensional levels, is full of microcracks, which seem to have an effect on both adaptation and failure mechanisms. Bone-fracture risk is an extremely important parameter in the clinical field of osteoporosis, and not well understood yet by biomechanicians. Computational mechanics could really mean a difference here, which was also evident in the symposium proceedings.

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Anyway, the meeting was well organized by Pauli Pedersen, Martin P. Bendsoe, Ole Sigmund and Robert Zetterlund from the Technical University of Denmark, Lygby. The program was well composed by an international board, and it was fun. The evening proceedings proved again that when it comes to fluid mechanics, the Irish will always win. The lectures will appear in a IUTAM symposium volume. A special thanks must go to John Currey, again playing the role of the biological conscience so eloquently and wittily.

Rik Huiskes,
University of Nijmegen,
The Netherlands.

The Organisers of the 11th ESB conference in Toulouse, France provide some breakdown on the countries and subject catagories for the abstracts.

About the 11th Conference of the European Society of Biomechanics

MC Hobatho, R Darmana, E Estivalèzes, INSERM U305, Hôtel Dieu, Toulouse, France

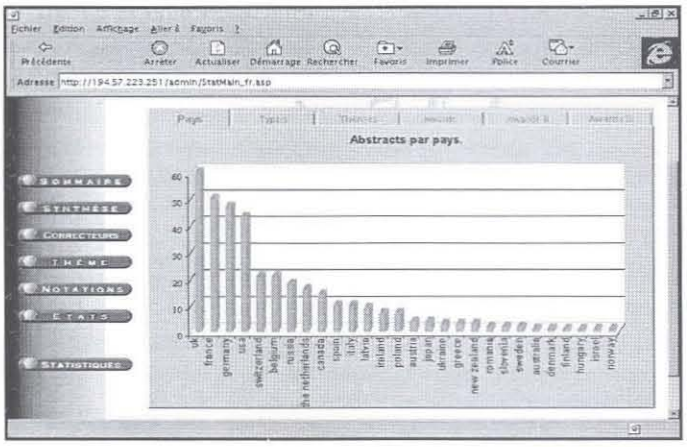
Introduction: The challenges of the 11th Conference of the ESB are to promote the research of students and to create further interaction between clinicians and scientists. The state of the art of research in Biomechanics will be presented and will provide directions for the next millennium.

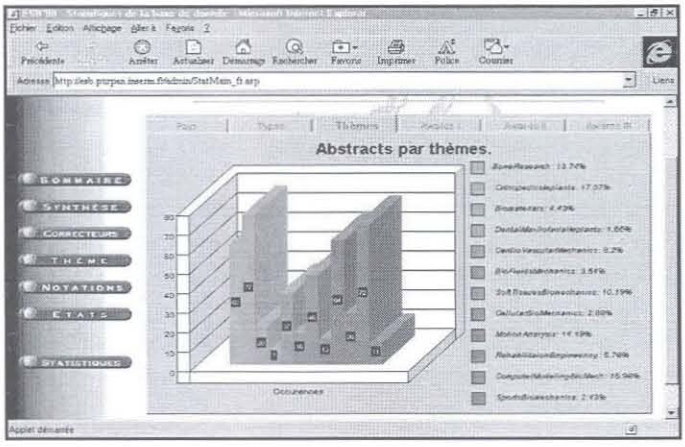
Materials and Methods: Biomechanists from hospitals, universities and companies are expected. A conference website has been created allowing the following: (i) to obtain information about the European Society of Biomechanics and the 11th conference, (ii) abstracts submission by internet and, (iii) data base management of the entire conference.

Results: About 380 abstracts have been submitted (27% by internet and 4% by e-mail), 362 have been selected for presentation. Twenty eight countries have been represented. The figures 1-2 illustrate respectively, the pages of interest of the website: abstracts versus the country, abstracts versus topics. Nineteen abstracts from 8 countries have been submitted for the ESB Student Award instituted by the Council for the first time for the Toulouse conference. Student submissions per country were: Germany (6), United Kingdom (4), France (3), USA (2), New Zealand (3), Ireland (1), Italy (1), Israël (1). Thanks to them for their participation.

Discussion: Let's do it during the conference.
Conclusions: Thank you for your contribution, we do hope that the Conference will be a success and if you are not a member of the Society, do join us, you can be an active member of the Society.

Perspectives: Rendez vous à Dublin in 2000 for the 12th Conference of the ESB.





Bone and Joint Decade, 2000–2010

by Leif Ryd, Lund University, President of the ESB

On April 18-19, about 75 individuals representing major organisations and journals of orthopaedics, rheumatology, science, etc., convened in Lund, Sweden to discuss an exciting initiative to make the first decade of the new millennium the decade of bone and joint diseases. During the first day invited speakers presented their special topics which were grouped into four fields, (i) joint diseases, (ii) osteoporosis, (iii) back disorders and (iv) trauma, designated the four prime areas of the initiative. During the ensuing night, five groups prepared a document, one for each prime area and the fifth, the plan of action group, considered how the initiative should be taken further. After some few hours sleep the second day was concentrated to the scrutiny of the nights work and a 40-page consensus document was finally produced, representing approximately one highly-trained man-year of effort.

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- Joint diseases account for half of all chronic conditions in persons aged 65 and over,
- Back pain is the second leading cause of sick leave,
- An estimated 40% of all women over 50 will suffer from a fragility fracture,
- It is anticipated that 25% of health expenditure of the developing countries will be spent on trauma related care by the year 2010.

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These and other facts form the basis of the initiative. The idea is that we all, everybody working in the area of bone and joint disorders, should promote this initiative. This involves a large portion of the members of the ESB. From the plan of action document the following can be read:

Guiding Principles of the Decade:

The Decade will be a global campaign to establish priorities and provide information and support to national and international organisations representing patients with musculo-skeletal disorders and health care professionals. This will enable them to achieve the goals of the campaign at a local level. The campaign will set a framework to promote co-operation within the decade 2000-2010 rather than establish a new organisation. The campaign will promote initiatives around all musculo-skeletal health. The campaign will include initiatives in any geographical location and will try to support activities in developing countries. The campaign programme will be developed in collaboration with patient and professional organisations, research bodies and scientific journals in consultation with all other stakeholders from all countries and regions. The campaign will be launched at an independent international forum in 1999 and coordinated announcements made globally. The campaign will identify the size of the burden of musculo-skeletal disorders now and in the future by undertaking a review and compilation of existing data. The campaign will support strategies that encourage the application of cost-effective prevention and treatment. Research needs will be identified and encouraged. The strength of the campaign will depend on a coordinated approach. Any activities undertaken in co-operation with the campaign should be identified by using a trademark campaign logo. All organisations joining the campaign will have a representative on its Board. A Steering Group will be elected to direct the project. The campaign will act independently of sponsors and will not be linked to any one specific organisation. Philanthropic donations will be sought from member organisations of the Board and other non-commercial organisations to fund the campaign initially. It is thus up to ourselves, really, to make this initiative come true. By engagement, individually or in groups, we can make this happen: to make the problems known and realized globaly and the make more money avaliable for research and health care. In such a state-of-mind the following letter of intent was signed by representatives from about 60 professional bodies of the sciences involved and about 30 journals: Among which was the European Society of Biomechanics through Leif Ryd, President.

LETTER-OF-INTENT

"Musculo-skeletal conditions are crippling diseases that are the most common causes of severe long-term pain and physical disability, affecting hundreds of millions of people across the world. The extent of human suffering is expected to worsen as people live longer and the number of accidents increases. Resulting health problems will cause significant economic burden, escalating the amount of money governments will need to spend and potentially denying patients the right to necessary treatments and rehabilitation.

We, the undersigned, propose that 2000–2010 be designated the decade committed to improving quality of life to people with bone and joint disease and injuries throughout the world."

This is the 5th contribution in a series on Teaching Biomechanics. Previous contributions were by Peter Walker (London), Marjoliein van der Meulen (Cornell University), Sandy Nicol (Strathclyde University)

Biomechanics Research and Education in the Netherlands

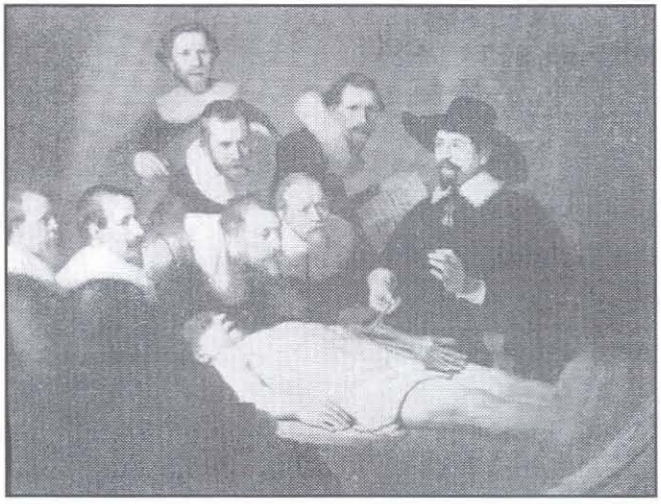
F.C.T. van der Helm, Delft University of Technology

A few years ago Jack Winters, prominent biomechanics researcher in the U.S.A., said: "There is no country in the world with so much talent in biomechanics per capita as the Netherlands." Statements like these make you feel proud to be Dutch, but also make you wonder for the reasons why. Beyond doubt, there are some very talented individuals and very successful research groups in the Netherlands. To what extent this is a structural phenomenon or just a co-incidence is probably only to be judged in the future. In the Dutch university system there is a strong emphasis on the coherence between research and education. Students can only be challenged to push back their limits, if their teachers themselves are involved in good research projects. The quality of research in the Netherlands is enhanced by a few causes. There is a good collaboration between research groups, without a direct competition for grants. Decisions about grant money are taken at a higher hierarchical level, and direct competitors are to be found in other (medical) fields. Under the sponsor of the Dutch National Science Foundation there are often national meetings in Biomechanics and Human Motion Control, organized by the Dutch Society of Biomechanics (http://www-mr.wbmt.tudelft.nl/NWO_biomech/). In these meetings there is the opportunity to discuss, to exchange information and for PhD students to present their work. And last but not least there is a good educational system.

Students can only be challenged to push back their limits if their teachers themselves are involved in good research projects

Educational system: In the Netherlands, secondary school preparation for university lasts for six years, from 12 to 18 years. At that age the ordinary student enters university. In the last two years of secondary school, a student chooses 7 courses in which he/she takes the final exams. In this phase students already specialize in social and humanity studies, or in exact science studies. After secondary school, there is a distinction between direct vocational training as e.g. physical therapist or physical education teacher, and university training. The vocational training lasts for four years, and can more or less be compared with a bachelor's degree. University training lasts for four (for humanities) or five years (for the exact sciences), and can be compared with a Master's degree in other countries. So a student who pursues his/her Master's degree, there is not a bachelor's degree before. Of course, students with a bachelor's degree can also enroll in the Master's program. The advantage of this system is that education at the universities can start directly with the desired level of abstraction in the first years. The disadvantage is that students who take their bachelor's degree first have a lengthy study, when they go for their Master's.

Enrolling in a PhD program is quite different from most other countries. PhD students are the working force in most research institutes. PhD students get a full (though low) salary paid during the time of their project, normally four years. Research groups have project grants available from their own university, the National Science Foundation, European Union, other government agencies or from companies. Potential candidates for the PhD position apply for the job, and are hired by the university for the full period (most often with one year probation time). Very seldom PhD students bring their own money or projects with them. Most PhD programs are not very strictly organized. The first year is spent on course work, organized within so-called graduate schools. The next three years are dedicated to the research project, though they might have teaching



The Anatomy Lesson of Professor Tulp by Rembrandt

responsibilities for maximally 25% of their time. After four years the promotor decides if the PhD student can defend his thesis. The actual defense is public, with a more ceremonial emphasis. The PhD thesis committee, including members of other universities, has formally the final decision whether or not the candidate graduates. During the public defense (lasting one hour), the PhD thesis committee has the opportunity to raise questions about the research work. It is extremely rare that a PhD student after four years would fail to pass his or her defense. If the PhD student is not capable, the project will be stopped long before.

The actual defense is public. The PhD thesis committee, including members of other universities, has formally the final decision

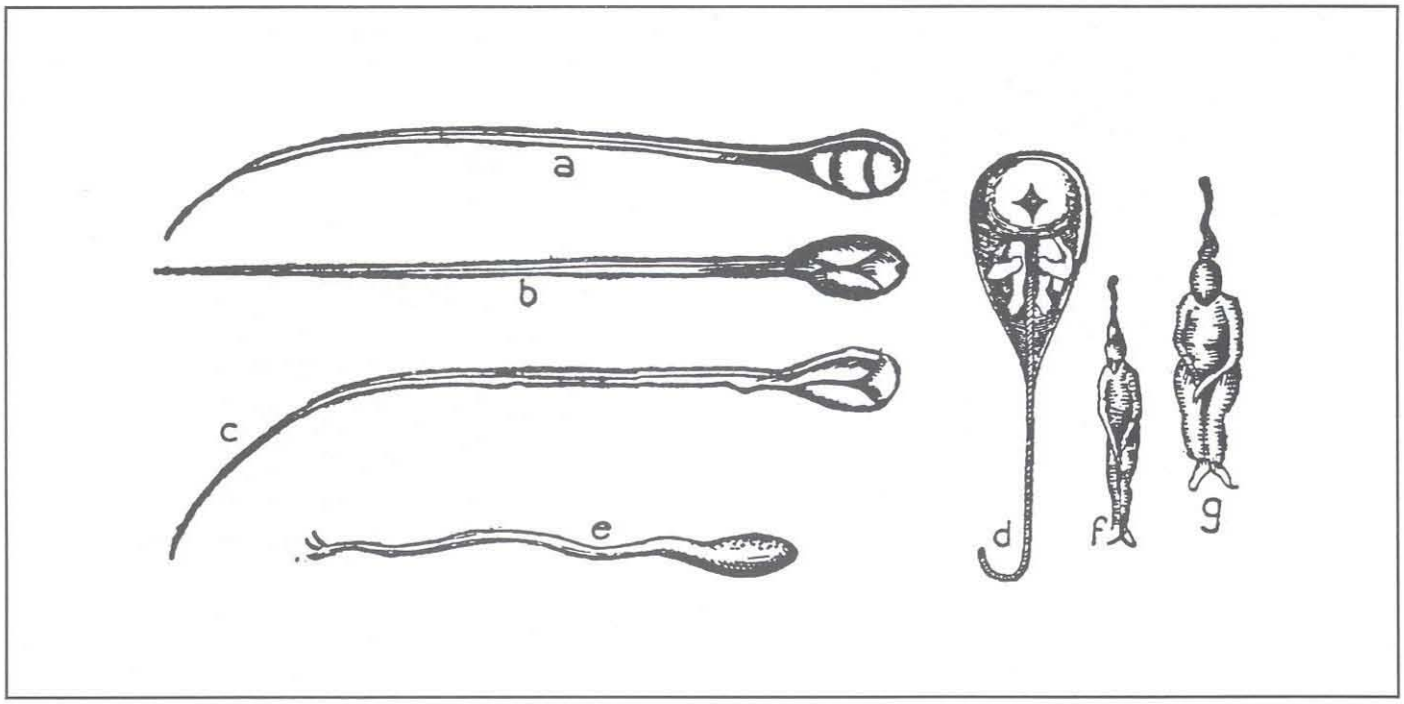
Biomechanics education:
In the field of Biomechanics one can roughly distinguish three types of University education:

1. Medical education, including dentistry and veterinary medicine.
2. Engineering education
3. Human movement sciences

Medical professions: Students in medical professions have normally very few biomechanics courses. They remain mainly 'consumers'. However, at the medical departments there are often good, clinically oriented research groups. The influx of researchers in these groups come from other institutes as (Medical) Biology, Engineering Universities or Human Movement Sciences. In the Netherlands there are 7 medical schools, some of them with biomechanically oriented research groups which can be found in Leiden (Dept. of Orthopaedics, (http://www.medfac.leidenuniv.nl/orthopaedics/), Biomaterials Research Group (http://home.pi.net/~brg/), Rotterdam (Dept. of Biomedical Physics and Technology (http://www.eur.nl/FGG/BNT/.), Maastricht (special-izing in cardiovascular mechanics), Groningen and Nijmegen, specializing on bone tissue biomechanics and implants (Orthopaedic Research Institute, no website available yet). At the University of Utrecht there is a research group concentrating on biological systems in the physics department, which used to be also affiliated with the medical department (http://www.phys.uu.nl/~wwwfm/). Also there are dentistry institutes (Amsterdam, http://www.acta.nl/english/departments/anatomy.htm), and a veterinary institute (Utrecht, specializing in horse locomotion http://www.dgk.ruu.nl/fumo/).

At the University of Twente there is the Institute for Biomechanical Technology (BMTI). In 1997 at the Eindhoven University of Technology a new department in Biomechanical Technology started. A specialization on Medical Technology and Biomechanics can be found at the Man-Machine Systems & Control group at the department of Mechanical Engineering of Delft University of Technology.

Technical Universities: In the Netherlands there are just three universities which have engineering degrees. The unique situation is that two of them (Eindhoven and Delft) have only engineering degrees, whereas the third (Twente) also carries a number of social studies. Other universities do not have an engineering department. At the University of Twente there is the Institute for Biomedical Technology (BMTI), a collaboration between Electrical Engineering, Mechanical Engineering, Chemical Engineering, Applied Physics, and the Rehabilitation center 'Roessingh' (http://www.utwente.nl/bmti/). In Mechanical Engineering there is the Laboratory for Biomechanical Engineering (http://utwbbwu2.wb.utwente.nl/home.htm), specializing in prosthetics and orthopaedic inplants, muscle dynamics and posture maintenance. In 1997 at the Eindhoven University of Technology a new department in Biomedical Technology started (http://www.tue.nl/wtb/bmt/), in collaboration with the medical department at the University of Limburg (in Maastricht). Though they just finished their first year, the department is strongly growing. At the Biomedical Technology department two majors are planned: Biomedical System – on Information Technology and Biological Tissues and Structures. Traditionally, there is a strong emphasis on Biomechanics at the Mechanical Engineering department (http:www.wfw.wtb.tue.nl/english/research/index.html), specializing in tissue and fluid mechanics. At the Delft University of Technology there is not a special emphasis on Biomechanics or related fields, though in many research groups medical applications exist. A specialization on Medical Technology and Biomechanics can be found at the Man-Machine Systems & Control group at the



Anthony van Leeuwenhoek (1632–1723) in Delft and his contemporaries Marcello Malpighi in Bologna and Robert Hooke in London developed new microscopes which shedded new light on the microscopic world. The diagram shows spermatozoa as seen by van Leeuwenhoek (a,b,c) and others before him (d,e,f,g).

department of Mechanical Engineering (http://www-mr.wbmt.tudelft.nl/mms/), with major research topics in upper arm prosthetics and orthotics, shoulder/elbow biomechanics, minimal invasive surgery, cardiovascular mechanics and control.

Human movement sciences: Probably one of the most well-known institutes is the Department of Human Movement Sciences at the Vrije Universiteit in Amsterdam (http://www.fbw.vu.nl/). Being an independent department, they offer a complete course-work for biomechanics and related topics. Researchwise, there are almost too many topics to mention. Research areas are divided in three themes: Physical load and capacity of musculoskeletal tissues, Energy metabolism and fatigue and Movement coordination. There are two other universities which offer a degree in Human movement sciences. At the University of Groningen it is a major of psychology. At the Catholic University of Nijmegen, human movement sciences are a part of human health sciences within the medical department (http://www.azn.nl/fmw/onderwys/bgw1.htm).

Graduate schools: Since 1993, the state government thought it might be a good idea to re-organize the research at the Dutch universities in so-called graduate schools, in which research groups of different universities co-operate. Within the graduate schools there is a framework to co-ordinate research topics and enhance co-operation, and also to provide a course work to PhD students. In the biomechanical field there are three graduate schools. The graduate school 'Integrated Biomedical Engineering for restoration of human function' (IBME, http://www.utwente.nl/bmti/ibme-home.html) is a co-operation between the biomechanical groups at University of Twente and Delft University of Technology. The graduate school Institute for Fundamental and Clinical Human Movement Sciences (IFKB, http://www.fbw.vu.nl/Stgids96/H1/H1_7.htm) is a co-operation between the medical department of the Catholic University of Nijmegen and the Department of Human Movement Sciences at the Vrije Universiteit in Amsterdam. At the University of Utrecht there is the Helmholtz Institute (http://www.phys.uu.nl/~wwwfm/), a graduate school affiliated to the physics department.

Future: As can be seen, there are many institutes and universities in the Netherlands involved in Biomechanics research. Biomechanics being a relatively young science, the institutes are increasingly growing and getting access to major funds, as is especially noticed at Eindhoven, Amsterdam, Twente, Nijmegen and Delft. Hopefully this will have an impact on the international Biomechanics field as well.

BIOENGINEERING... The Irish Way

Last February, I had both the pleasure and privilege to be one of the few foreigners at the first Joint Conference of "Bioengineering ... in Ireland" and "The Ulster Biomedical Engineering Society", sponsored by Howmedica Ltd. Friday afternoon, February 19th, about 120 Irish people from North and South converged on an old Victorian country house just outside Dundalk, County Louth. I was actually quite surprised to see how Ireland with its population of about 5 million could produce so many people with an interest in bioengineering. After registration and having put the luggage away in the rooms, it was time for that what the Irish are renowned for: socialize over a good pint of Guinness. A very nice way to renew old friendships and start new ones indeed!

Saturday morning began with an opening address by the conference organizers, Dr. Patrick J. Prendergast (Trinity College Dublin) and Dr. Glenn R. Dickson (Queen's University Belfast), and after that the scientific program started. The first session was a plenary session with presentations of a more general interest. It was in this one, that I found myself back with a lecture on the methods and techniques, which we use at my laboratory in Aarhus to determine mechanical and architectural properties of trabecular bone. The second half of the morning, there were parrallel sessions on biomaterials, audiology & cardiology, and rehabilitation engineering. After lunch, it was time for the 1998 Haughton Lecture, in memory of Ireland's first "bioengineer", the Rev. Dr. Samuel Haughton, author of "Principles of Animal Mechnics (1873)" Despite having to struggle with a terrible headache, Professor Annraoi M. de Paor (University College Dublin), fascinated his audience with a very interesting and entertaining lecture on the subject of mathematical insights into bioengineering and rehabilitation. Two more parrallel sessions followed after this on the subjects orthopaedic bioengineering, biomechanical engineering, biomaterials, and physiological signal processing. The last afternoon session lasted until 18.00, so after a long day everybody was really looking forward to the pre-dinner drinks in the bar and the subsequent conference dinner. After this superb meal, where the chef of the Ballymacscanlon House Hotel had really outdone himself, it was back to the bar for most of us to participate in the much-anticipated "Bioengineering in Ireland" sing-along. Besides the traditional Irish songs, Peter Nuijten, another Dutchman-gone-native, and myself were lured into singing some Dutch songs, which culminated in "Tulips from Amsterdam". I have to admit here that the Dutch singing tradition is not as well established as the Irish, but then we had the extra disadvantage, that we were drinking Guinness all the time instead of Heineken ...

Luckily for the presenters of the Sunday morning sessions, serious buisiness did not start again until 10.00 next morning. But even then, some presentors (and some people in the audience, but they could at least sit down) were still a bit shaky. First, there were two parrallel sessions on orthopaedic bioengineering and medical informatics. This was followed by the final plenary session, which was chaired by Jane Grimson, the Dean of Engineering of Trinity College Dublin. After lunch, the conference was already over again and people started going back home. Luckily for me, some of the conference organisers, including my host, Patrick Prendergast, had decided to stay one more night at the "Ballymac", so we had some time left to recuperate and enjoy the cullinary skills of the chef once more. We then drove quietly back to Dublin on Monday morning, where I was well in time to catch my plane back to Denmark. For me, this first Joint Conference of "Bioengineering ... in Ireland" and "The Ulster Biomedical Engineering Society" was an experience, I will not easily forget.

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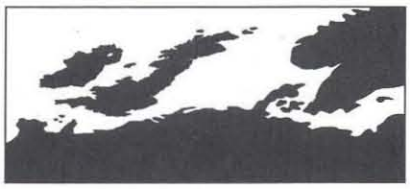
European Research Forum



Dr. Fabio Baruffaldi for the Biomaterials Technology Laboratory, Rizzoli Orthopaedic Institute, Bologna, describes a European project which studies I.S.D.N.-based applications of telemedicine in the orthopaedic field. A section of the European PH-NET project (DGXIII, contract n.45491, TEN-ISDN preparatory actions) has been approved and supported to demonstrate the feasibility of telemedicine applications in orthopaedics.

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ISDN lines can guarantee constant bandwidth and the respect of data privacy, two key factors for successful telemedicine applications

INTRODUCTION: Mandatory guidelines for the project were the adoption of commercial devices and the use of ISDN digital phone lines. In fact the large scale deployment of ISDN lines has been strongly recommended by the European Union as a very well standardised carrier for low cost digital connections. Moreover ISDN lines can guarantee constant bandwidth and the respect of data privacy, two key factors for successful telemedicine applications. This feasibility study has investigated functional, technical and organisational aspects of telemedicine applications for orthopaedics.

METHODS: A preliminary task of the project was dedicated to test the technical performances [1] and the diagnostic accuracy [2] provided by the use of commercial, low cost videoconferencing tools connected with basic rate ISDN lines (128 kbit/s). Because of the presence of different implementations of the technical standard regarding remote sharing of data and applications (T.120) with systems not always compatible with each other, all the participants to the consortium were forced to use the same videoconferencing device. The system adopted by the PH-NET consortium for videoconferencing and application sharing was Intel ProShare 200 â v2.0. After the successful results obtained in this first preliminary task, we applied the ISDN videoconferencing tools in a real clinical setting.

We had national (hosp. 1 and hosp. 2) and international (hosp. 1 and hosp. 3) point-to-point telemedicine applications, providing second opinion service on the following clinical arguments:

- total hip arthroplasty (failure, replacement, infection, surgery technique, prosthetic choice);
- hip fracture;
- cuboid osteonecrosis;
- long caput biceps tendinitis;
- shoulder displacement.

We involved 9 clinicians (AT, AS, GBB, LB, RB, LA, MC, DV, EDG – see participant list) with an orthopaedics or radiology professional degree. Each clinician spent an average of two hours providing or asking for a real time second opinion service to a remote colleague. All the evaluated sessions made use of CT, MRI and x-ray images. After the sessions, the clinicians filled in a questionnaire with more than 80 questions, mostly to evaluate the ease of use, the user acceptance and the time needed for training. We considered also the aspects related to the cost effectiveness and the organisational impacts of the new procedures and problems encountered.

DISCUSSION: The results from the questionnaire can be summarised as follows:

- easy installation and start-up of the system;
- education time of less than 4 hours for independent use;
- ease of use of the image sharing tools;
- effective videoconferencing requires good preparation (1 to more than 7 days), but less than conventional meetings;