Keynotes

Networking Health: Prescription for the Internet

Professor Edward H Shortliffe

Professor Edward H Shortliffe is Professor and Chairman of the Department of Medical Informatics at Columbia University in New York City. Formerly at Stanford University in California, he is a physician and computer scientist with a particular interest in medical informatics education.

Professor Shortliffe's research activities have included clinical decision-support systems, artificial intelligence applications, clinical data systems, and information retrieval on the Internet.

He recently chaired a study on the Internet and health care for the US National Academy of Sciences and during his address to ESEM 2001 he will discuss the findings and recommendations of that report.

Pros and Cons of Medical Record Structures for Capture, Consultation and Extraction of Patient Data

Dr Astrid van Ginneken

Dr Astrid van Ginneken is Assistant Professor of Medical Informatics at Institute of Medical Informatics, Erasmus University, Rotterdam. She was lead researcher on the EU Open Record for Care (ORCA) project, which investigated a structured data entry approach to medical records. She has also participated in other EU initiatives on federated medical records (SYNAPSES and SYNEX).

At ESEM 2001 she will provide the latest research in medical data capture, consultation and subsequent extraction of patient data.

The Evaluation of Clinical Decision Support Systems

Dr Heather Heathfield

Dr Heather Heathfield is a Senior Lecturer at Department of Computing and Mathematics, Manchester Metropolitan University. She is the originator and organiser of Making Medical Informatics Work (MMIW) Conference, held each February in Manchester, UK.

Dr Heathfield's main research interests include philosophies for the design and development of clinical decision support systems, representation of medical knowledge, clinical decision support and interface design and evaluation methods for large-scale health care information systems. In her address at ESEM 2001 she will discuss the evaluation of large-scale clinical information systems.

Evaluation can be viewed as a major factor in the relative failure of healthcare to exploit IT. The reason being that evaluation studies that ask inappropriate questions, apply unsuitable methods, and incorrectly

interpret results can have a severe negative impact upon the progress of Clinical Informatics. Evaluation has been too tightly focused upon a limited number of criteria (such as economic factors and clinical outcome measures) and a single method (i.e. Randomised Controlled Trials). This presentation investigates and defines alternative methods of evaluation, which apply a range of methods and evaluate systems from multiple perspectives.

Bioinformatics: At the Crossroads of Biology, Engineering and Medicine

Professor Shankar Subramaniam

The major mandate of genome research is to identify all the coding protein sequences, understand their function and perhaps their association with molecular diseases. It is necessary to identify all the genes, discover the structure and function of all the gene products and finally the role of the gene product in a functional pathway and its role in the functioning of the organism have to be deciphered.

Understanding how genomes work requires sophisticated computer-based information handling tools - bioinformatics, and new high throughput technologies for understanding the functions of genes on a genome-wide scale (function genomics). Future developments and applications that derive from genomics will depend upon scientific progress at the interface of biology, engineering and computer science.

Professor Subramaniam's laboratory works in the interdisciplinary area of Bioinformatics, which characterises the flow of information in living systems. Specific projects within his laboratory include:

- Genome annotation

- Protein sequence-structure mapping

- Protein sequence-function mapping

- Reconstruction of Biochemical pathways

- Infrastructure for biological databases, analysis tools and interfaces

Computer Interpretation of the ECG: Representation for Decision Support in Medicine

Professor Jan H van Bemmel

ECG interpretation systems are operational in hospital departments, outpatient clinics, primary care, and occupational medicine, and are also used in population screening, epidemiology, etc. After a development of almost 40 years, it seems that computer ECG analysis has been fully accepted, in spite of the fact that it is not yet performing as well as top-expert readers. The question is whether computerized ECG classification can be further improved. Possible new directions for research are: combining knowledge contained in different programs, using information from non-ECG data, and collecting large ECG databases for training, tuning and assessing ECG programs. A short review of developments in these directions will be given. A further question that will be referred to is whether the development of ECG interpretation systems can be a model for developing medical decision-support systems in general.

Some references to earlier work by the authors: (1) Van Bemmel JH, Kors JA, van Herpen G. Methodology of the modular ECG analysis system MEANS. Meth Inf Med 1990;29:346-53 and (2) Kors JA, van Herpen G, Wu J, Zhang Z, Prineas RJ, van Bemmel JH. Validation of a new computer program for Minnesota coding. J Electrocardiol 1997;29 (suppl.):83-8.

Jan H van Bemmel was born in Rotterdam in 1938. He obtained an MSc in Physics (Delft, 1963) and was Head of the Department of Biosignal Analysis, Institute of Medical Physics, Utrecht from 1963-73. He obtained a PhD in Physics and Mathematics (Nymegen, 1969) and was Professor of Medical Informatics at Free University Amsterdam from 1973-87 and at Erasmus University Rotterdam from 1987 to present. He has been Vice-Chancellor of Erasmus University Rotterdam since 2000. His research interests include biomedical signal and image processing, computer-based patient records and decision-support methods. He was Chairman of Dutch Society of Medical Informatics (1976-79, 95-98) and President of IMIA (1998-2001). He has been Editor-in-Chief of *Methods of Information in Medicine since* 1986, of the *IMIA Yearbooks of Medical Informatics* (1991-2000), as well as the *Handbook of Medical Informatics* (1997). Professor van Bemmel has been a member of Dutch Health Council since 1986, The Royal Netherlands Academy of Arts and Sciences since 1987 and the Institute of Medicine of the National Academy of Sciences, USA since 1991. He is the author of more than 400 international articles and books.

Cardiac Mapping as an Effective Tool in the Early Diagnosis of Acute Myocardial Infarction

Professor J McC Anderson

The detection of coronary heart disease leading to sudden death remains one of the greatest challenges in contemporary society. The advancements in new thrombolytic drugs offer significant potential for improved management of patients developing an acute myocardial infarction (MI) outside hospital.

Traditional methods of assessment, i.e. 12-lead ECG offer only a 45% sensitivity to the detection of an early MI. Other more complex clinical tools such as Angiograms or Thallium scans are not available outside hospital and cannot therefore provide the data necessary for early intervention. Recently we have been evaluating portable cardiac body surface mapping as a potential tool to increase the sensitivity of detection to early cardiac events.

Body surface mapping provides more information on the temporal-spatial distribution of cardiac electrical activity by simultaneously sampling electrocardiograms (ECG's) at many points on the thorax. Advances in engineering processes have now increased the computational techniques and microcomputer power to assist in the diagnosis and evaluation of cardiac diseases. Pattern recognition techniques provide discrimination or classification of a set of physiological or pathological data from different patients.

Professor Anderson is on the editorial board of Medical Device and Diagnostic Industry in the USA and Medical Device and Diagnostic Industry Europe. Also in the USA he sits on two committees for the Association of the Advancement of Medical Instrumentation (AAMI) for the development of US medical standards. He is a Fellow of the Institute of Physics in Engineering and Medicine (FIPEM) and in 2000 was elected as an Associate of the Royal College of Physicians (ARCP).

Image Analysis for the Diagnosis and Treatment of Breast Cancer, Quantitative Analysis of Cardiac Ulstrasound and Degenerative Brain Disease

Professor Michael Brady

Professor Michael Brady FRS FREng is Professor of Information Engineering at the University of Oxford. He is also Chairman of two medical image analysis start-up companies OMIA and OXIVA, deputy Chairman of Oxford Instruments plc, and a non-executive director of AEA Technology.

He co-founded the Medical Vision Laboratory at Oxford and is Chairman of the Science and Technology Advisory Group of the EPSRC Innovative Manufacturing Initiative in Medical Devices.

At ESEM 2001 Professor Brady will overview his work on image analysis for the diagnosis and treatment of breast cancer, quantitative analysis of cardiac ultrasound, and degenerative brain disease

Image Registration, Including Non Rigid Applications

Professor David Hawkes

Professor Hawkes has 26 years experience in the physics and engineering of medical imaging. His particular research interests encompass image registration, data fusion, visualisation, shape representation, surface geometry and modelling tissue deformation with applications in image guided interventions, including augmented reality in surgery, cardiology and oncology. He has been on the scientific committees of 27 international meetings and is on the editorial board of 3 journals. He currently is principal investigator of 6 EPSRC project grants and manager of 3 industrially sponsored projects. He formed the Computational Imaging Science Group at Guy's Hospital and is chairman of the Medical Imaging Science Interdisciplinary Research Group at King's College London. He has over 150 publications in the area of medical imaging.

Innovative Medical Instrumentation: An Industrial Perspective

Dr Andrew Barr

This presentation will review some personal experiences from establishing a successful Medical Device Company, reflecting on the factors, which affect market success, product acceptance and company growth. The importance of customer education and training will also be discussed in the context of "disruptive innovations" as defined recently by C.M. Christensen. The presentation will focus on the process of innovation in a commercial context, where it is much more closely related to new product offerings than to ground breaking discoveries. It will conclude with a discussion of the role of technology transfer from University Research as a partner for commercial innovation to achieve truly disruptive technologies.

Andy Barr graduated in 1982 from the University of Kent at Canterbury with a degree in Electronic Engineering with Medical Electronics, which he subsequently converted into a DPhil from the Bio Engineering Centre at the University of Ulster. While working as a research fellow in the Department of Orthopaedic Surgery of Queen's University of Belfast he served as a non-executive advisor to the board

of Amtec - a local startup company, eventually joining the staff in 1994. He was responsible for product development and establishing of a production department, together with certification of the company to meet the requirements of the European Medical Device Directive. In 1998 he joined the Board of Directors and assumed responsibility for generation of new IPR through innovation and acquisition. In 2001 he left Amtec to found Marturion Ltd - a business dedicated to supporting companies in the Medical Device Industry to maximise their innovative potential and extend the scope of their product range and IPR.