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COST European Cooperation in the Field of Scientific and Technological Research

Overview of the Activities
in the Domain of
Telecommunications
Information Science
and Technology
(TIST)



Information Society



European Commission



COST
European Cooperation
In The Field Of Scientific
And Technical Research

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Foreword

It is indeed a great honour for me and a very welcome duty to write the introduction to this brochure in my capacity as Chairman of the COST Technical Committee "Telecommunications Information Science and Technology" and on this occasion to underline that in the month of November 2001 we celebrated the 30th anniversary of COST.

The origin of COST

"COST constitutes an experimental laboratory for European co-operation which will provide valuable information for the future". With these prophetic words Mr. Camillo Ripamonti, Italian Minister of Scientific and Technological Research and Chairman of the Ministerial Conference convened in Brussels in November 1971, concluded the activities of the Conference which opened for 19 European countries the possibility of co-operation in the field of scientific and technical research.

The Conference - the first milestone of the history of COST - was the conclusion of an intense preparatory work carried out in the late 1960's when the six countries then belonging to the European Community (Belgium, Federal Republic of Germany, France, Italy, Luxembourg and the Netherlands) decided to take adequate initiatives as a response to the international challenging situation. The book written in that period by the famous French journalist Jean Jacques Servan Schreiber " Le defi Americain" (the American Challenge) is indeed a sign of the pressure of that time. The European Community of the Six realized that the only way to cope with the dangerous international competi-

tion was to recuperate the delays that Europe had accumulated in many areas of scientific and technical research. It also became evident that European industrial and scientific competitiveness could be secured in the long term only if research activities transcended narrow national confines and were carried out within Europe on a multinational basis involving the exchange of results.

In 1964 the Council of Ministers of the six Members States of the Community decides to establish a " Committee for Medium-Term Economic Policy" which in 1965 sets up a Working Party on " Scientific and Technical Research Policy", known as PREST. In 1967 the first report from PREST - called the MARECHAL Report after the name of the Working Party's Chairman - proposes to undertake a European co-operation in seven areas of scientific research (informatics, telecommunications, transport, oceanography, materials, environment and meteorology) and to open this co-operation to other 13 European countries. The co-operation is called COST, the acronym of European COoperation in the field of Scientific and Technical Research. In 1969 the AIGRAN Report - bearing the name of the new Chairman of PREST- is submitted to the Council of the six Ministers containing the proposal of 50 research themes for possible co-operation. In 1970 seven Technical Committees - one for each suggested research areas- are formed to examine the feasibility of the 50 research Actions and a Committee of Senior Officials is also appointed to co-ordinate the activities of the Technical Committees. The Ministerial Conference of the 22 and 23 November 1971 which brought together the Ministers of Research of the 19

COST countries approved the first seven COST research Actions proposed by the Committee of Senior Officials and instructed the Committee to foster the European co-operation which the Conference had initiated.

Up to 1978, however, the launch of a new Action was a particularly difficult task since it required the ratification of the Parliaments of the countries that wanted to participate. It was only in 1978, with the adoption by the Council of the "Memorandum of Understanding" as a legal instrument to speed up the procedures for the launching new Actions, that COST acquired a real flexibility and saw a considerable expansion of its activities.

From 1971 to 1983 COST Actions are the only form of co-operation in science and technology at the European level and in many instances they pave the way to the subsequent initiatives of co-operation. In 1983 the First Framework Programme and in 1985 the EUREKA Programme are launched. The existence of these programmes notwithstanding, the interest of the European Scientific Community in COST constantly increased. From the first 7 Actions of 1971 COST has now an average of 200 Actions each year. From the 19 original countries, COST presently has 33 countries associated to its activities.

The Ministerial Conference held in Vienna in 1991 twenty years after the first Conference which in 1971 led to the setting up of COST:

- welcomed the enlargement of COST to new European countries and agreed to consider with interest applications from other European States;

I confirmed the clear commitment in both material and financial terms to COST as an important and flexible means for promoting European research;

- stressed the importance of encouraging initiatives from the scientists and technical experts themselves;
- welcomed the dynamic character of COST and its adaptability to the changing needs of international research, especially in terms of investigating new areas of research;
- undertook to promote COST as an important means of research and development co-operation between Industry, Universities and Research Centres in the different European countries.

Also the subsequent Ministerial Conference held in Prague in 1997 stressed the outstanding success of COST and in particular:

- invited the CSO to decide on the current applications for membership as soon as possible;
- reconfirmed the continuing commitment to COST as a valuable and flexible instrument for promotion of European research and technological development by means of concerted Actions among a large number of participants;
- invited the CSO to continue its efforts to improve the assessment, review and management of Actions, domains and structures; increase the impact of COST through more structured dissemination and exploitation of the results of the various Actions to the benefit of Europe; intensify co-ordination with

the research programmes of the European Union and with the activities of other European fora, such as EUREKA and ESF; promote the public awareness of the value of COST in Europe.

The nature, the principles, the structure of COST

The main keys of the success of COST are: its nature, its principles and its structure.

The nature of COST. COST was not established by a treaty, it has no legal personality and it is not a Community body. COST is simply a “framework” for scientific and technical co-operation set up by intergovernmental agreements at the Ministerial Conference in 1971.

The principles of COST are:

- “bottom- up approach”, i.e. the initiative of launching a COST Action comes from the scientists and technical experts themselves. This approach has proven to be particularly suited to promote research of pre-competitive nature or of social importance, to meet a growing demand from the scientific community and to anticipate and usefully complement the other research programmes of the European Union;
- “voluntary” “à la carte” participation: only European countries interested in the Action sign the relevant “Memorandum of Understanding” through their permanent diplomatic representatives to the EU. The signature does not need parliamentary ratification. A minimum number of 5 signatures is needed to start a COST Action;
- “concerted Actions”, i.e. COST is

based on the co-ordination of national research initiatives funded through national funds. Although the participants only finance their own research activities they have access to all the results obtained in the Action. Duplications and gaps are therefore avoided and the consequent synergy allows a more efficient use of the national resources. COST being simply a flexible structure offered as a framework for European co-operation, the sole purpose of COST central funding—usually only a few percent of the national funds necessary to carry out an Action— is therefore to establish the research “network” and to provide the organisational and operational basis for co-operation;

- “broad participation” open also to countries not belonging to the European Union and consequent ability to adapt and sometimes anticipate the evolving European political situation.

COST has a “flexible structure” for an easy implementation and agile management of research initiatives. The Committee of Senior Officials (CSO) is the central body of the COST structure and is made up of representatives of all COST member countries. It formulates the general strategy of COST, appoints the various Technical Committees, decides on their terms of reference, approves the research Actions to be launched and prepares the relevant Memorandum of Understanding to be signed by the interested countries. The Technical Committees (TC) are responsible for a particular research domain and are formed by representatives of the COST countries. They evaluate the

proposals for new Actions, monitor the Actions in progress and evaluate the results obtained by completed Actions. When necessary, they act as a catalyst to promote proposals for new Actions in particular areas. For each Action a Management Committee (MC), formed by national experts of the signatory countries, is responsible for the activities of the Action. They are co-ordinated by the relevant Technical Committee and prepare annual progress reports and a final report.

Telecommunications Information Science and Technology in COST

In the past thirty years the Telecommunications domain proved to be one of the most suitable for COST co-operation. It was one of the first original domains indicated by the PREST Working Group and three of the first seven Actions launched in 1971- namely 25/1, 25/2 and 25/4 - belonged to the Telecommunications domain, two on Antennas and one on Radiowave Propagation. The number 25 derived from the fact that this subject was the 25th of the total 50 subjects indicated as suitable for European co-operation.

After 1978 and the adoption of the Memorandum of Understanding the number of Actions in this domain steadily increased assuming the number from 201 onward. From 1971 to 2001 a total of 89 Actions have been launched in Radiowave Propagation (9), Antennas (8), EMF biomedical effects and electromagnetic Compatibility (5), Speech technologies and services (8), Video multimedia and Internet services (11), Satellite communications (3), Optical networking and photonics

(15), Mobile and personal communications (4), Telecommunications systems and networks (16), Special needs and user requirements (6), Information and knowledge discovery (4). Of the total 89 Actions, 61 have been completed and 28 are still in progress in 2001.

The COST Technical Committee "Telecommunications" (TCT) was one of the original seven Committees formed in 1970 to examine and propose the first Actions. In 1999 the scope and the terms of reference of the Committee were enlarged to reflect the convergence of telecommunications, broadcasting and information technologies towards the "information society" and the title of the Committee was modified in "Telecommunications Information Science and Technology" (TC-TIST).

While the secretarial services for the CSO are provided by the Secretariat General of the Council, the Scientific Secretariat to the TC-TIST is provided by a permanent Officer of the Directorate General "Information Society" of the European Commission and by his staff. This solution ensures very satisfactorily the links between COST activities and the research programmes of the European Community. The COST fund is managed by the Secretariat with the advise of the Committee through "yearly grants" to the Actions which cover all the expenses connected with the COST framework (meetings of the Management Committee and of Working Groups, short-term missions, publications, workshops and seminars, etc.) including the Secretarial services to the Action. This devolution of the administrative responsibilities has shown to be

very efficient and particularly suited to the COST framework.

In the last years the efforts of TC-TIST were directed to combine the traditions of COST with the needs of the information society and the challenge of liberalisation, globalisation and competition. In particular, the main objectives of the Committee were:

- to maintain, strengthen, enlarge and advertise COST as a very efficient framework for scientific and technical co-operation at European level stressing the main characteristics of the COST tradition;
- to act as a catalyst for the implementation of research activities which may reflect the convergence of telecommunications, information and broadcasting and anticipate the needs of the information society;
- to meet the challenge of the increasing liberalisation and competition which require application-oriented objectives and results by: improving the co-operation with the COST Committee of Senior Officials and with the other COST Technical Committees; improving the evaluation procedures of COST Actions; improving the interactions between COST Actions and the EU research programmes; stressing the links with regulatory and normative bodies, communication operators and industries; improving the dissemination and the transfer of results and COST visibility.

In line with the above objectives, in 1992 the Committee organised in Rome an International Symposium on the "New frontiers for the European COST in Telecommunications" to examine: the major achievements

obtained in the first twenty years of COST co-operation in Telecommunications research; the trends of the European Community research programmes and the role of COST in these programmes; the foreseeable evolution of the international and European normative and standardisation bodies and how COST could contribute to their activities; the trends of advanced research for the years 2000 in Telecommunications. In addition to the COST scientific community, eminent representatives from the Commission of the European Communities, from the ITU, from ETSI, from EURESCOM, from ESA, from the industrial and scientific communities of the USA and Japan participated in the Symposium and the Proceedings of the Symposium were widely distributed.

In 1999 the Technical Committee TIST had a leading role in the "ad hoc" Working Group (WG CEM) established by the CSO with the mandate to propose harmonised procedures for the continuous evaluation and monitoring of COST Actions and formed by the Chairs of all the Technical Committees and by representatives of the European Commission Services and of the Council Secretariat. After one year of intense work the CEM Group proposed a set of "Guidelines for Evaluation and Monitoring of COST Actions" which were adopted by the CSO in June 2000. The adopted Guidelines:

- are characterised by a high degree of uniformity and flexibility so as to render comparisons of data possible yet allowing variations necessary to the specific needs of the different domains to be introduced;

- entail uniformity in the evaluation and monitoring procedures, indicators and forms of presentation;
- significantly decrease the workload on the Management Committees of the COST Actions without significantly increasing the duties of the Technical Committees;
- identify by whom, for whom and how the evaluation and monitoring activities are carried out and specify both time limits and actions to be taken on the results of the evaluation and monitoring;
- provide the basis for a better visibility of COST to a wider audience.

The TC-TIST closely follows the established evaluation guidelines. The evaluation of proposals for new Actions is performed by TC-TIST which, after an oral presentation of the "Co-ordinator" of the group of Scientists who took the initiative of preparing the proposal, appoints one of its member to act as "Rapporteur". The Rapporteur assisted by the Scientific Secretary and, if necessary, by external experts, prepares an "Evaluation Report", which, after the approval of the Committee, is sent to the CSO together with the relevant MoU of the Action. The monitoring of the Actions in progress is based on the annual "Progress Report" prepared by the MC of the Action and presented by its Chair during the yearly meeting of TC-TIST with the MC's Chairs of the Actions in progress. An Evaluation Panel composed by the TC Rapporteur, the Scientific Secretary and two external experts performs the evaluation of completed Actions. The Panel prepares the "Final Evaluation Report" which is presented

to the TC by the Rapporteur and which, after TC approval, is given a wide circulation.

On the basis of this evaluation it may be concluded that the results obtained in the COST TIST domain are on average very satisfactory and outstanding in many instances. The very high number of papers published in excellent scientific and technical journals or presented in the most important international Conferences and Symposia testifies their scientific importance. COST results are well recognised also outside Europe and, in particular, from the scientific communities in the USA and in Japan. Their practical importance has also to be underlined. In many cases research projects in the framework programmes of the European Community derive from ideas originated in the COST environment. Contributions to normative and standardisation bodies are also well recognised: COST results, COST models, COST methods are commonly referred to and recommended in International and European Organisations such as ITU, ETSI, EBU, ESA and EURESCOM. Small enterprises originating in Europe at the frontiers of modern technology show how important is the co-operation through COST of Scientists with an entrepreneurial spirit. Moreover COST is not only important for the advancement of science and technology but also for supporting research activities which have a relevant social importance: for instance in the case of delicate issues arising from new technologies, such as the influence of EMF on human health in mobile communications or the efforts to be made to ensure the benefits of new telecommunications services to disabled and elderly people.

With COST, policy makers can rely on an international collaboration as a reassurance to the public that these issues are taken seriously, that their solution is not restricted to individual countries and that they are treated in a high - standard industry - independent environment.

Conclusions

During the past thirty years COST framework has been of paramount importance for the founding in Europe of consolidated scientific traditions in many key areas at the frontiers of our knowledge, for the establishment of networks of thousands of leading Scientists, for the increase of mobility of researchers in Europe and for the improvement both of co-operation in science and technology and of a better understanding among European countries.

On the basis of these outstanding results it has to be hoped that from the next Ministerial Conference in September 2002 and from the sixth framework programme starting in 2003 may derive a full appreciation of COST potentialities, an increasing support to COST activities and the recognition of the role of COST in the European Research Area.

Francesco Fedi

*Chairman of the COST Technical Committee
" Telecommunications Information Science
and Technology "*

Overview of COST-TIST Research Areas

COST-TIST covers all COST research activities in the field of Telecommunications and Information technologies, services and applications. COST Actions in this area have successfully contributed to the aims of the European Research Area by bringing a large set of national, industrial and university research activities in the field together into a common framework of research objectives.

These Actions have also assisted in extending the scientific co-operation to all the COST member states and in some cases globally, which is a true evidence of the usefulness and complementarity of COST. There have been many contributions from COST to both technology standards, new products and services and this trend is continuing and growing. In addition to the fundamental contribution to science and technology, COST-TIST activities have been instrumental in bringing together scientists with entrepreneurial spirit who started successful companies in Europe on the frontiers of modern technology.

This highly dynamic field is increasingly underpinning the competitiveness of Europe in the global digital and knowledge based economy and the associated Information Society. It is therefore essential to maintain a coherent long term research effort in order to ensure that Europe has a sufficient base of new knowledge and human potential to sustain the future evolution.

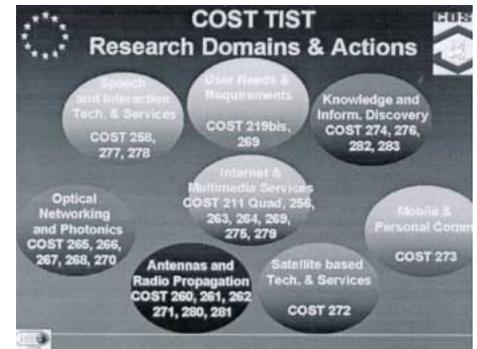
As the lifecycle of these develop-

ments is very short, effective co-operation is required to achieve critical mass and timely and cost-effective research involving both academic and industrial research. COST is a well placed mechanism to contribute to this effort and to bring together different national and industrial efforts in focussed actions addressing specific problems and issues.

COST TIST Actions involve more than 2000 leading scientists from network operators, technology providers, key research institutes and universities from the 34 COST countries and from non-COST countries. Detailed information can be found on the website <http://www.cordis.lu/cost/src/tisthome.htm>

The Actions are addressing the following research sub domains:

- Antennas and Radio Propagation
- Optical Networking and Photonics
- Satellite Based Technologies and Services
- Mobile and Personal Communications
- Multimedia and Internet Services
- Speech and Interaction Technologies and Services
- Knowledge and Information Discovery
- User Needs and Requirements



ANTENNAS AND RADIO WAVE PROPAGATION

Overview

Today people take for granted that their mobile phone works everywhere inside cities and buildings and that their satellite receiver delivers perfect picture quality in any weather. This situation is only possible due to continuous progress in antenna and radio propagation science. Also the proliferation of wireless communications for many purposes require much more efficient utilisation of the available frequencies and bandwidths in ever expanding geographical areas and this in turn puts new requirements for radio wave propagation and better and more intelligent antennas.

In the last 25 years, antenna modelling, design and technology have become more and more sophisticated. This is particularly true for radar and for terrestrial and space-based communications or navigation.

Every new system requires a dedicated design and antennas have become the key to enhanced system performances and to industry's competitiveness.

Electromagnetic Compatibility (EMC) is the engineering discipline associated with minimising unwanted interference between electronic systems of all kinds including systems that are not overtly electronic but which contain substantial amounts of electronics (road vehicles or washing machines for example). The European Union EMC Directive

89/336/EEC requires that all such equipment manufactured or imported into the EU should meet its essential requirements. These are being reasonably immune to such interference and of not generating unreasonable amounts of interference. It is recognised that electromagnetic interference can never be eliminated.

The extensive deployment of wireless communication has led to concerns about the possible health implications arising from the transmitters we are surrounded by in our daily life. It is important to continuously examine the possible implications and to trigger appropriate safety regulations where needed. This requires a strong multidisciplinary research collaboration between technology experts and medical experts in order to be able to draw reliable conclusions to difficult questions and COST is well placed to bring together the research teams from all the COST countries to work together and compare results.

Objectives

The current Actions are addressing research on new and improved antenna concepts at Ka and Ku bands in order to serve the future needs of wireless communication through mobile and handheld communication terminals and satellite payloads. The current objectives are to:

- Develop and validate theoretical and software models for smart antenna radiating elements, feeding circuits and active integrated components,



- Develop low cost high performance technology for printed integrated adaptive antenna front ends including multilayer and interconnected radiating, amplification and digital beam forming components,
- Foster co-operation between users, industry and universities to improve speed and efficiency of related R&D, in order to meet the requirements of emerging applications.

Recent explosion in the demand for broadband (e.g. multimedia) services in telecommunication and broadcasting radio systems leads to the need to optimally use ever higher radio frequency bands (above 20 GHz, with wavelengths expressed in millimetres). Millimetre wave bands, although offering inherently very broad bandwidths, are subject to adverse radio wave propagation conditions due to impact from the atmospheric conditions, causing signal (and thus potential service quality) degradation.

The impairment mechanisms have been successfully identified, investigated and quantified in earlier programmes (e.g. COST 255). This led to the next logical step of how can such knowledge be best applied in the design of systems and services in order to mitigate the negative effects in whole or, at least, in part. Objectives are for both terrestrial and satellite systems to look into:

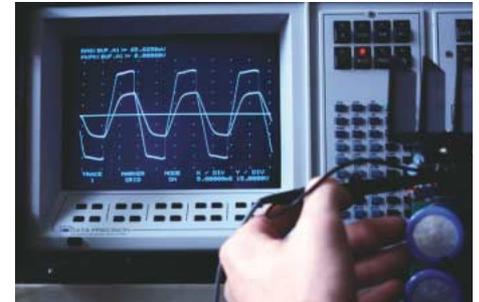
- Improved channel modelling concerning propagation characteristics and channel models for

broadband millimetre wave radio systems

- propagation impairment mitigation techniques (PIMT), encompassing PIMT concepts, algorithms and simulations leading towards improved broadband multimedia radio services.

Previous COST research work has provided a foundation for a better understanding of the upper atmosphere environment, its structure and dynamic characteristics and their effects on communications systems. Accurate propagation information is essential to support the design, implementation and operation of most modern terrestrial and satellite communication systems taking into account that communications through the upper atmosphere should meet more and more requirements. As a result, the recent COST 271 Action is oriented towards the evaluation of the upper atmosphere effects on the advanced Earth-space communications systems including navigational systems in order to:

- perform studies to influence the technical development and the implementation of new communication services, particularly for the GNSS and other advanced Earth-space and satellite to satellite applications,
- develop methods and algorithms to predict and to minimise the effects of ionospheric perturbations and variations on communications and to ensure that the best models over Europe are made available to the ITU-R,



New electronic systems generate new EMC problems and the COST Action in this domain has the following objectives:

- To further develop knowledge related to EMC problems in complex, distributed electronic systems such as computer networks or railway systems. These are vulnerable to interference effects if not adequately designed and implemented and safety and economic disruption issues may arise if interference occurs.
- To act as a co-ordination forum and provide encouragement of research in this area throughout the COST countries.

The increasing deployment of wireless communications warrants careful examination of the potential health implications and there is a need to co-ordinate and advance European research into electromagnetic compatibility in electrical and electronic devices and systems, in particular carrying out research into various current and new fields of application, in order to:

- foster European co-ordination for national and international research in the area of electromagnetic fields (EMF) biomedical effects,
- serve as an independent source of scientific advice for industry and policy makers,
- stimulate multidisciplinary collaboration between experts in the fields of medicine, biolo-

gy, electrical engineering, physics, etc.,

- establish a mechanism and a European network for co-ordinated research in the area of biomedical effects of EMF and interactive repercussions on the corresponding standards, and
- ensure that new European standards relating to the protection of the general public and occupational exposed personnel against EMF exposure have sound scientific bases.

The following actions are presently in progress in this domain:



Action	Title
260	Smart Antennas: Computer Aided Design & Technology
261	Electromagnetic compatibility in distributed and Complex Systems
271	Effects of the upper atmosphere on terrestrial and earth-space communications
280	propagation impairment mitigation for Millimetre wave radio systems
281	potential health implications from mobile Communications systems

OPTICAL NETWORKING AND PHOTONICS

Overview

Communication based on optical principles has provided a dramatic increase in available bandwidth in the last years and this trend is still increasing. In point-to-point transmission of digital signals over global distances photonic technologies have made tremendous advances. Over a single glass fibre on one wavelength (distinct light colour) a million telephone conversations can be carried over thousands of kilometres without a single voice sample being lost for several hundred years. This transmission capacity has recently been extended by two orders of magnitude by employing up to 100 different wavelengths of light in a single fibre. However, networks consist not only of point-to-point links. They cross at the network nodes that have become the bottlenecks of the modern communication networks. The electronic devices used in today's network nodes are not able to cope with the huge data streams of the future to route them to their destinations. New network infrastructure has to be developed based on photonic technologies applied to both transmission and routing of signals.

The important impact of this is that the overall costs of transporting data channels over long distances are significantly decreasing, with the result that high speed communication can be used in much wider applications, even to

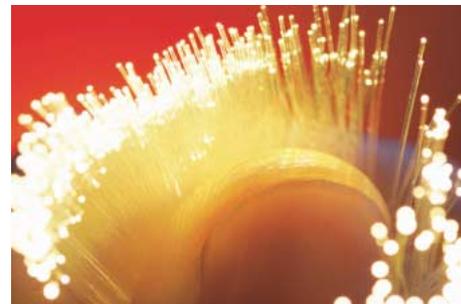
the home. This in turn enables the usage of new applications with high potential for society, e.g. health care, education, culture, information access and entertainment.

The underpinning of this evolution is a sustained research effort into new materials, photonics components, communication protocols, equipment and their integration into the overall communications infrastructure.

Objectives

The objectives of COST-TIST Actions in this domain are to investigate the future reliable architectures, components, services and characteristics for Optical communications and components. The trend is to move towards fully optical based infrastructures for both core and access networks and new research is needed to investigate the most optimal solutions for providing increased bandwidth and the necessary protocols and routing to supply new services in a purely optical environment. The current Actions are addressing research on:

- Architectures and photonics components for next generations of optical communication systems
- Systems and networks designed for the transmission of Terabit/s broadband signals and offering comprehensive access mechanisms,
- Development of wavelength scale photonics in telecommunications, thereby enabling a faster transition from research



prototypes to commercial devices in systems. Example of such devices are Vertical Cavity Semiconductor Lasers (VCSELs), Resonant Cavity Light Emitting Diodes (RCLEDs) and photonic bandgap filters

- Devising and implementing experimental measurement techniques for the accurate determination of the key parameters for fibers and novel active and passive photonic semiconductor devices,
- Modeling methods for the simulation of the performance of components, systems and networks, including the models and software tools for analysing and comparing network elements and configurations,
- Reliability aspects and parameters of optical fibre components for telecommunications.

The following actions are currently in progress in this domain:

Action	Title
265	Measurement Techniques for Active and Passive Fibres to Support Future Telecommunications Standardisation
266	Advanced Infrastructure for Photonic Networks
267	Semiconductor Devices for Optical Signal Processing
268	Wavelength Scale Photonic Components for Telecommunications
270	Reliability of Optical Components and Devices in Communications Systems and Networks

SATELLITE BASED COMMUNICATIONS SERVICES

Overview

Telecommunication networks are moving towards an all IP environment with unified protocols in both access and core networks. Moreover, the distinction between the wireless and terrestrial environment is becoming less and less evident. In the future it will be expected that services can be delivered anywhere, independently of the infrastructure involved.

This ambition requires that the current systems and communication protocols be upgraded to be able to provide the services in the future. Satellite based services will continue to play an important role for cost effective delivery of broadband access to large parts of the population which cannot be served with land based communication due to geographical or financial constraints.

The demand for broadband, multi-media-type type of services over the few next years will continue to grow and in time it is expected to compete with voice services not only in the traffic volume but also in the share of the service providers' revenue.

Objectives

Making satellite active and dynamic components of global networks providing transparent services for satellite and terrestrial interconnections is a major topic for research. This area aims at:

- Identification of technologies supporting IP over satellites and enabling new services and QoS guarantees;
- Study of suitability to implement IP switching in the sky;
- Adaptation of protocols and algorithms initially developed for the fixed and mobile terrestrial networks, to make them suitable for the use in satellite segment;
- Development of new algorithms, designed deliberately for the satellite segment;
- Evaluation of the suitability of using various optical technologies in the space segment.

The following action is currently in progress in this domain:

Action	Title
272	Packet-Oriented Service Delivery via Satellite



MOBILE AND PERSONAL COMMUNICATION SERVICES

Overview

Mobile communications are evolving through second and third generation (GSM, UMTS) towards further generation systems that offer potential for higher bandwidth, sustainable multimedia capabilities and globally interoperable services.

Communications are becoming increasingly personalised, through the unique opportunities offered by strong penetration of mobile communication, the fast evolution of the enabling technology and the related advanced service provision capabilities. As a consequence, R&D continues to be a key factor, and the issues relating to the next generations of mobile systems, dealing with broadband multimedia communications (with bandwidths, hence data rates, much larger than the third generation one), are already being addressed by a large number of people in the European R&D community.

Previous COST Actions in this field (COST 235 and COST 259) have successfully built up a European research community, which brings together the key experts in the field within Europe from academia and industry and these Actions have contributed strongly to the development of the current GSM and UMTS systems.

It has also been recognised, for many years now, that better and faster results are achieved by joint

efforts at the European level, rather than countries conducting their national programmes individually. The main objective is to increase knowledge of the radio aspects of mobile broadband multimedia networks, by exploring and developing new methods, models, techniques, strategies and tools to further the implementation of next generation mobile communication systems.

Objectives

This area aims at:

- exploration and development of new methods, models, techniques, strategies and tools towards the implementation of 4th generation mobile communication systems.
- Covering frequencies ranging from the upper UHF up to millimetre waves
- Delivering data rates higher than 2 Mb/s (probably up to 155 Mb/s).
- Contributing to relevant standard setting activities and for a.
- Supporting the deployment of systems that are very close to completion of their standardisation phase, in particular UMTS and HIPERLAN 2.

The following Action is currently in progress in this domain:

Action	Title
273	Towards Mobile broadband Multimedia networks



MULTIMEDIA AND INTERNET SERVICES

Overview

The convergence between telecommunications and information technology combined with the extremely rapid increase in available transmission capacity and processing power is driving a fast evolution of new services, capabilities and devices. End to end Internet services with well defined quality of Service across heterogeneous optical, mobile, satellite and cable networks and multi computing platforms are required for the future application environments, combined with pervasive information interoperability and availability.

As anyone who has been using today's Internet will agree, we are however far from having fully reliable and guaranteed services. Further research is needed to introduce new communication protocols, services and management tools to allow for high quality service provision over the Internet.

Speech and facial characteristics are some of the major contenders to be used for biometric recognition of users, for security and authentication purposes on the Internet, which is one of the major stumbling blocks for large scale e-commerce and exchange of sensitive information.

Objectives

The objective is to perform research on Internet based multimedia techniques and to study

their application to a distributed multimedia information service, based on available and emerging technology. Actions in this area aims to:

- Study, from the theoretical and the experimental point of view, various possible network schemes with the aim of evaluating their respective technical potential,
- Improve the design of broadband multiservice switching systems and network architecture by determining optimal traffic control and resource allocation procedures and by evaluating alternative solutions,
- Enhance existing tools as well as to develop new ones supporting the modeling and simulation of advanced emerging terrestrial and satellite networks,
- Improve the efficiency of redundancy reduction techniques and develop content analysis for compression of video signals to assist future multimedia applications.
- Develop techniques for the analysis, design and control of advanced multiservice networks supporting mobility, multimedia and interworking, by means of the development and application of new and better analytical techniques for the mathematical understanding and optimisation of the behaviour of communications equipment, protocols, and network topologies and architectures, and of economic aspects such as pricing principles and network cost estimation,



- Co-ordinate and provide appropriate focus from a European perspective to concerted Actions among involved European participating organisations and research groups active in the field of Quality of Internet Service, including support for important community events and consolidation of input to international standards bodies,
- Provide an International forum for researchers and industrialists active in the development of Internet based protocols and services for group communication based on IP multicasting techniques. Conduct experiments to enable a better understanding of multimedia group communications that will be available on various networks in the future and consolidate European contributions to standardisation in the domain.
- Investigate effective methods for the recognition of people over the Internet based on voice and facial characteristics in order to facilitate, protect, and promote various financial and other services over this growing telecommunication medium.

The following actions are currently in progress in this domain:

Action	Title
211 Quat.	Redundancy Reduction Techniques and Content Analysis for Multimedia Services
256	Modeling and Simulation Environment for Satellite/Terrestrial Networks
257	Impacts of New Services on the Architecture and Performance of Broadband Networks
263	Quality of Future Internet Services (QoFIS)
264	Enabling Networked Multimedia Group Communication
275	Biometrics-Based Recognition of People over the Internet
279	Analysis and design of Advanced Multiservice Networks supporting Mobility, Multimedia and Internetworking

SPEECH AND INTERACTION TECHNOLOGIES AND SERVICES

Overview

Speech is now considered as the upcoming major user interface to not just computers but also other digital appliances and this has the potential to revolutionise the way we can interact with computer based systems in the future. However the current state of the art is still not robust enough to be used in normal applications. COST research has been active for a number of years to bring together the best researchers in Europe to further the knowledge and state of the art in speech technology research.

A tremendous amount of work on speech recognition issues has been performed in numerous research laboratories, but many unsolved problems still remain within speech and dialogue processing in telecommunication. In particular, the capabilities of a speech recogniser are still limited with respect to noisy conditions, speaker variability, naturally spoken language and (simultaneous) handling of multiple languages. Also, at the dialogue level, system capabilities are still limited in many cases because of long task completion time, limited error recovery strategy and limited natural language understanding capabilities.

Furthermore, non-linear methods are expected to lead to improved efficiency in future generations of speech coders used in e.g. wireless networks, including packet-based wireless networks.

Objectives

COST TIST Actions in this area intend to:

- improve the naturalness of computer generated speech in the areas of sound quality and prosody
- provide higher quality speech synthesis, more efficient speech coding, improved speech recognition, and improved speaker identification and verification through usage of non-linear speech processing methods
- improve the knowledge of the issues and problems involved in general in spoken language interaction in telecommunication
- achieve knowledge of issues related to robustness and multilinguality within spoken language processing, multi-modal communication and to evaluate telecommunication applications that apply spoken language as one out of more input or output modalities

The following actions are currently in progress in this domain:

Action	Title
258	The Naturalness of Synthetic Speech
277	Non Linear Speech Processing
278	Spoken Language Interaction in Telecommunication



INFORMATION AND KNOWLEDGE DISCOVERY

Overview

The wealth of information and overwhelming volume of data need better support structures to convert the data to useful information and eventually knowledge. The significant advances in computing power and communication speed is rapidly leading to very complex, large scale distributed computing systems where information is scattered.

The scientific community and industry has started to develop the "GRID" concept, in which large scale distributed systems can be constructed through some common fabric of "middleware" which will take care of the basic functionality needed to build the systems and to enable central functions like directories, security etc.

Objectives

COST Actions in this domain are addressing some key aspects of these emerging developments and the Actions in this area are intending to:

- Study the semantical and syntactical aspects of relational structures arising from real world situations and enhance current methods of relational qualitative reasoning about physical systems,
- Investigate automated inference for relational systems, and, where possible or feasible, develop deductive systems which can be implemented into

industrial applications such as diagnostic systems,

- Develop non-invasive scaling methods for the prediction of relational data, and compare and possibly integrate a nominal scaling approach with numerical methods such as fuzzy relations, Bayesian networks etc,
- Develop advanced multimedia data and knowledge management technologies for personal multimedia communication systems and services
- Develop and validate specific signal processing and implementation techniques for users' personal terminals, In addition, key system aspects will be considered, such as: system integration, personification of services, usage trials and demonstrations of advanced personal services
- Develop and implement new computerised systems for extracting previously unknown, non-trivial, and potentially useful knowledge from structurally complex, high-volume, distributed, and fast-changing scientific and R&D databases within the context of current and newly developing global computing and data infrastructures such as the GRID.
- Develop innovative and well-focused approaches to data and information handling, in support of modern research in astronomy and astrophysics. This includes processing and interpretation of data and, more generally, information, at the time of data capture or later



("archival research"), and including aspects of the collaborative work, information visualisation and man-machine environments needed for this.

The following Actions are currently in progress in this domain:

Action	Title
274	Relational Structures as Knowledge Instruments
276	Information and Knowledge Management for Integrated Media
282	Knowledge Exploration in Science and Technology
283	Computational and Information Infrastructure in the Astronomical Datagrid

USER NEEDS AND REQUIREMENTS

Overview

It is becoming increasingly clear that the development of new technology and the subsequent introduction into society needs to be interactively associated with socio-economic perspectives in order to develop successful products and services. It is furthermore also necessary that in order for the information society idea to be viable, the whole population needs to be able to use the underpinning technology and services.

Objectives

The objective of this domain is to perform research to help increase the accessibility of information society services and equipment. Actions have the objectives to:

- study, analyse and propose solutions in order to make services generally accessible to all, make services adaptable when they cannot be made generally accessible and propose special solutions to meet explicit problems,
- support co-operation between the technical specialists of telecommunications, teleinformatics, standardisation, legislation and the specialists working for elderly people and people with disabilities and promote appropriate research activities,
- evaluate new technical solutions for providing telecommu-

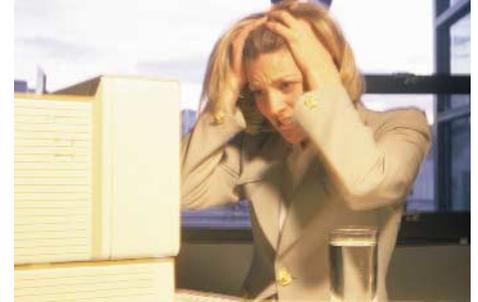
nication and teleinformatics services to elderly people and people with disabilities,

and actively disseminate information to relevant actors and standards bodies,

- identify the impact of technical, social and economic developments on users, and help define their needs and alleviate their problems,
- improve knowledge about user behaviour and preferences to produce guidelines for meeting the needs of the target groups and influence the development of services and equipment,
- perform studies to influence the technical development and the implementation of new telecom services, and influence standardisation, regulation and legislation to take into account users present and future needs.

The following actions are currently in progress in this domain:

Action	Title
219bis	Telecommunications for All
269	Users Aspects of ICTs



Contact Details

Further information about COST activities in Telecommunications and Information Technologies can be found on the COST TIST web-site at:

<http://www.cordis.lu/cost/src/tisthome.htm>

or can be requested from the contact persons below:

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COST-TIST Chairperson	Prof. Ing Francesco Fedi Ministero Istruzione Università Ricerca Via Paolo Bentivoglio 29B, 00165 ROMA Tel: +39 06 39387241 Fax: +39 06 39389651	francesco.fedi@tiscalinet.it
COST-TIST Scientific Secretary	Mr. Peter Wintlev-Jensen European Commission Information Society DG / Unit F4 Av. de Beaulieu, 33 Office BU33 2/80 B-1160 Bruxelles Tel: +32 (0)2/299 93 20 Fax: +32 (0)2/296 91 31	peter.wintlev-jensen@cec.eu.int

RESEARCH AREAS AND ACTIONS IMPLEMENTED IN THE PERIOD:

November 1971 - November 2001

Total: 89 Actions

Radiopropagation: 9 (25/4, 205, 210, 235, 238, 251, 255, **271,280)**

Antennas: 8 (25/1, 25/2, 204, 213, 223, 245, 260, **284)**

EMF biomedical effects and e.m. compatibility: 5 (243, 244, 244bis, **261, 281)**

Speech technologies and services: 8 (209, 232, 233, 249, 250, **258, 277, 278)**

Video, multimedia and internet services: 11 (206, 211, 211bis, 211ter, **211quarter, 225, 230, 237, 263, 264, 275)**

Satellite communications: 3 (252, 253, **272)**

Optical networking and photonics: 15 (208, 215, 216, 217, 218, 234, 239, 240,241, 246, **265, 266, 267, 268, 270)**

Mobile and personal communications: 4 (207, 231, 259, **273)**

Telecommunications systems and networks: 16 (201, 202, 202bis, 214, 224, 226, 227, 228, 229, 242, 247, 254, **256, 257, 262, 279)**

Special needs and user requirements: 6 (212, 219, **219bis, 220, 248, 269)**

Information and Knowledge Discovery: 4 (274, 276, 282, 283**)**

- 61 Actions completed

- **28 Actions in progress**

COST-TIST ACTIONS COMPLETED

ACTION NO.	TITLE	DURATION	No of Signatories	CHAIRMAN
25/1	Aerial Network with Phase control	Nov. 1971 Apr. 1977	4	E.F. Bolinder - Sweden
25/2	Aerials with Reduced Side Lobes and maximum G/T Yield	Nov. 1971 Dec. 1976	5	J. Vanderscheer - Netherlands
25/4	Influence of the Atmospheric Conditions on Electromagnetic Wave Propagation at Frequencies above 10 GHz	Nov. 1971 Oct. 1978	15	F. Fedi - Italy
201	Methods of Planning and Optimisation of TLC Networks	Dec. 1979 Dec. 1983	10	K. Nivert - Sweden
202	Digital Techniques in Local Telecommunications Networks	Dec. 1979 Dec. 1982	12	B. Scharoe Petersen - Denmark
202bis	Wideband Digital Local Telecommunications Networks	April 1984 April 1989	11	W. Maggi - Italy
204	Phased Array Antennas and their Applications	July 1980 July 1984	9	E.F. Bolinder - Sweden
205	Influence of the Atmosphere on Radiopropagation on Satellite Earth Paths at Frequencies above 10 Ghz	July 1980 July 1985	13	F. Fedi - Italy
206	Coding and Transmissions of High Definition T.V Signals	Sep. 1984 March 1992	6	L. Stenger - Germany
207	Digital Land Mobile Radiocommunications	March 1984 Sept. 1988	10	R. Failli - Italy
208	Optical Fibre Communication Systems	Dec. 1977 Dec. 1984	11	J.E. Midwinter - UK
209	Man Machine Communications by Means of Speech Signals	April 1984 April 1988	9	F. Lundin - Sweden
210	Influence of the Atmosphere on Interference between Radio Communications Systems at Frequencies above 1GHz	June 1984 Sept. 1990	10	M.P.M Hall - UK
211	Redundancy Reduction Techniques for Visual Telephone Signals	March 1977 March 1982		H. Seguin - France

ACTION NO.	TITLE	DURATION	No of Signatories	CHAIRMAN
211 bis	Redundancy Reduction Techniques for the Coding of Broadband Video Signals	Dec. 1982 Dec. 1990	13	H. Seguin - France
211 ter	Redundancy Reduction Techniques for coding of Video Signals in Multi-media Services	Oct. 1990 Oct. 1997		H. Seguin - France
212	Human Factors in Information Services	Aug. 1986 Aug. 1991	5	A. Orlando - Italy
213	Antennas in the 1990s: Electronically Steered Antennas for Future Satellite and Terrestrial Communications	Oct. 1984 Dec. 1988	13	E.F. Bolinder - Sweden
214	Methods for the Planning and Evaluation of Multiservice Telecommunication Networks	Feb. 1985 Feb. 1988	11	J. Roberts - France
215	High Bit Rate Optical Fibre Systems	July 1985 July 1990	14	B. Daino - Italy
216	Optical Switching and Routing Devices	Feb. 1986 Feb. 1991	12	P. Salathe - Switzerland
217	Optical Measure Techniques for Advanced Optical Fibre Devices and Systems	Sept. 1986 Sept. 1991	11	P. Di Vita - Italy
218	Material Science & Reliability of Optical Fibres & Cables	Feb. 19987 Feb. 1993	10	Th. Staub - Switzerland
219	Future Telecommunications and Teleinformatics Facilities for Disabled People and the Elderly	Sept. 1986 Sept. 1996	17	J. Ekberg - Finland
220	Communication Protocols for Terminals Used by Disabled People	June 1988 Dec. 1995	9	P. Reefman - Netherlands
223	Antennas in the 1990 - Active Array Antennas for Future Satellite & Terrestrial Communications	Jan. 1989 Jan. 1993	16	E.F. Bolinder - Sweden
224	Methods for the Performance Evaluation and Design of Asynchronous and Synchronous Multiservice Networks	Sept. 1988 Sept. 1991	9	J. Roberts - France

ACTION NO.	TITLE	DURATION	No of Signatories	CHAIRMAN
225	Secure Communications	Jan. 1989 Jan. 1995	10	J. Carracedo - Spain
226	Intergrated Space/Terrestrial Networks	Febr. 1990 Febr. 1995	13	O. Koudelka - Austria
227	Integrated Space / Terrestrial Mobile Networks	April 1991 April 1995	12	E. Del Re - Italy
228	Simulation for Satellite / Terrestrial Networks	Jan. 1992 Jan. 1996	8	J. Collard - Belgium
229	Applications of Digital Signal Processing to Communications (DSP)	April 1990 Dec. 1994	13	A. Figueiras - Spain
230	Stereoscopic TV – Standards Technology and Signal Processing	April 1991 April 1998	8	A. Chiari - Italy
231	Evolution of Land Mobile Radio (including personal) Communication	April 1989 April 1996	20	E. Damosso - Italy
232	Speech Recoqnition Over the Telephone Line	April 1990 April 1994	14	D. Johnston - UK
233	Prosodics of Synthetic Speech	Nov. 1990 Nov. 1995	10	B. Lyberg - Sweden
234	Expanded Single mode Optical Fibre Communications	Dec. 1990 Dec. 1992	5	F. Sporleder - Germany
235	Radiowave Propagation Effects on Next-Generation Fixed Service Terrestriall Telecommunications Systems	Oct. 1991 Oct. 1996	14	M.P.M Hall - UK
237	Multimedia Telecommunications Services	Febr. 1992 Jan. 1997	14	A. Danthine - Belgium
238	PRIME: New Predictions and Retrospective Ionospheric Modelling over Europe	March 1991 March 1995	13	P. Bradley - UK
239	Ultra-High Capacity Optical Transmissions Networks	June 1991 June 1998	19	E. Le Coquil - France
240	Techniques for Modelling and Measuring Advanced Photonic Telecommunications Components	April 1991 April 1998	16	G. Guekos - Switzerland

ACTION NO.	TITLE	DURATION	No of Signatories	CHAIRMAN
241	Characterisation of Advanced Fibres for the New Photonic Network	Jan. 1992 July 1998	16	P. Di Vita - Italy
242	Methods for Performance Evaluation and Design of Multiservice Broad-Band Networks	May 1992 May 1996	18	J. Roberts - France
243	Electromagnetic Compatibility in Electrical & Electronic Apparatus and Systems	Dec. 1992 Dec. 1996	13	P. Corona - Italy
244	Biomedical Effects of Electromagnetic Fields	Oct. 1992 Oct. 1996	19	Z. Koren - Croatia
244bis	Biomedical Effects of Electromagnetic Fields	Nov. 1996 Nov. 2000	18	Z. Koren - Croatia
245	Active Phased Arrays and Array Fed Antennas	April 1993 April 1997	18	E.F Bolinder - Sweden
246	Material and Reliability of Passive Optical Components and Fibre Amplifiers in Telecommunications	March 1993 March 1997	10	T. Volotinen - Sweden
247	Verification and Validation Methods for Formal Description	Dec. 1993 Dec. 1996	18	K. Inan - Turkey
248	The Future European Telecom User	Oct. 1993 Oct. 1997	15	A. Kant - Sweden
249	Continuous Speech Recognition Over the Telephone	May 1994 May 1998	19	J. Martens - Belgium
250	Speaker Recognition in Telephony	Sept. 1994 Sept. 1998	12	A. Paoloni - Italy
251	Improved Quality of Service in Ionospheric Telecommunications Systems Planning and Operation	April 1995 April 1999	11	R. Hanbaba - France
252	Evolution of Satellite Personal Communications for 2nd to Future Generations	Oct. 1996 Nov. 2000	9	E. Del Re - Italy
253	Service-efficient Network Interconnection via Satellites	Oct. 1996 Oct. 2000	9	G. Maral - France
254	Intelligent Processing and Facilities for Communication Terminals	Nov. 1996 Nov. 2000	10	A. Figueiras-Vidal - Spain

ACTION NO.	TITLE	DURATION	No of Signatories	CHAIRMAN
255	Radiowave Propagation Modelling for the New SatCom Services at Ku-band and Above	May 1996 May 2000	14	B. Arbesser Rastburg - Netherlands
257	Impacts of New Services on the Architecture and Performance of Broadband Networks	Sept. 1996 Sept. 2000	19	P. Tran-Gia - Germany
259	Wireless Flexible Personalised Communications	Dec. 1996 April 2000	18	E. Damosso - Italy
260	Smart Antennas Computer Aided Design and Technology	May 1997 May 2001	19	A. Roederer - Netherlands

COST – TIST ACTIONS CURRENTLY IN PROGRESS

COST Action: 211 quat Redundancy Reduction Techniques and Content Analysis for Multimedia Services

Start date: 13 May 1998

Duration: 5 Years

End date: 12 May 2003

No. Participating Countries: 10

Objectives

The main objective of the proposed Action is to improve the efficiency of redundancy reduction techniques and to develop content analysis for video signals to assist future multimedia applications. Furthermore, it is the objective to strongly influence the standardisation activity in this field. It will, in particular, focus on content-oriented processing for emerging interactive multimedia services, such as the ongoing ISO MPEG-4 standardisation phase as well as the new ISO MPEG-7 initiative. The aim is to define and develop a set of tools assisting these new services in the analysis, characterisation and processing of their video and audio signals.

Interactive multimedia services will strongly influence and even dominate the future of communications and telecommunications. Both the flexibility and efficiency of the coding systems used, as well as the ability to efficiently search for particular content of interest on distributed data-bases are essential for the success of these emerging services. A major outcome of this Action will be a valuable contribution towards new and economic solutions for interactive multimedia services. Therefore, a strong European position in this field and an active participation in the standardisation process will be of great benefit for all European actors.

More information on all of the above can be found at
<http://www.iva.cs.tut.fi/COST211/index.html> or by contacting:

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COST Action: 219 bis

Telecommunication: Access for Disabled and Elderly People

Start date: 10 December 1996

Duration: 5 Years

End date: 9 December 2001

No. Participating Countries: 18

OBJECTIVES

The main objective of the Action is to increase the availability of telecommunication services and equipment designed so as to be accessible also to elderly people and people with disabilities or, alternatively, adaptable for that purpose when required. In cases where this can not be achieved, the Action will aim at establishing appropriate supplementary services and equipment.

STRUCTURE OF WORK

The scientific work is split in working groups on:

- Universal service issues
- Design guidelines
- Research and Development
- Web Access

as well as projects on:

- Industry Awareness
- Design for All-principles
- Accessibility issues in Education
- Accessibility in Smart homes
- The preparation of the Final Report and the Conference 2001

MILESTONES AND RESULTS

The Action has produced publications and guidelines such as:

- Accessibility requirements for new telecommunication equipment
- Producing Web Pages that Everyone can Access
- Design Guidelines on Smart Homes
- Guidelines-Booklet on Mobile Phones
- New Ways of Using Video Telephony
- Pay phones with immediate public access - Design guidelines,
- Text telephony for deaf, hearing impaired, deaf-blind and speech impaired people

More information can be found at <http://www.cost219.org> or by contacting:

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COST Action: 256
Modelling and Simulation Environment for Satellite and Terrestrial Networks

Start date: 02 June 1997

Duration: 4 Years

Extension: 6 months

End date: 18 June 2001

No. Participating Countries: 9

OBJECTIVES

The main objective of the Action is to determine the need, and make suggestions for the enhancement of existing tools, and for developing new ones supporting the modelling and simulation of emerging terrestrial and satellite networks.

STRUCTURE OF WORK

Work is concentrated in the following areas:

Area I: Investigations on Existing Simulation Languages/ Tools

Area II: Teletraffic Modelling

Area III: Network Access

Area IV: Quality of service

Area V: Propagation

Area VI: Theoretical / Technical Problems in Simulation

MILESTONES AND RESULTS

The main Scientific and technical Achievements of the Action as listed below may be regarded as significant contributions to the state-of-the-art in modelling and simulation.

1. The role of self-similar (fractal) nature of the traffic and development of a traffic generator
2. Subscriber behaviour and terminal traffic
3. Non-linear effects on optical fiber channels
4. AI based techniques in network simulation
5. Effects of the lack of detailed description of the mathematical models and algorithms on software verification/validation tests performed by the user
6. Potential use of the Quantum Test Program for validation purposes
7. Radio channel simulation using ray tracing techniques
8. Semi-analytic simulation techniques in communications networks
9. Basic issues in simulations (Verification, validation, accelerated simulation techniques)
10. Problems related to simulation and analysis of mobile satellite systems
11. New concepts for a universal simulation environment

More information can be found at <http://www.ituvsam.org.tr/cost256/> or by contacting:

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Tel: +90 2163499250
Fax: + 90 2163491358

COST Action: 258

The Naturalness of Synthetic Speech

Start date: 10 December 1996

Duration: 4 Years

Extension: 1 Year

End date: 09 December 2001

No. Participating Countries: 17

OBJECTIVES

The overall objective of the project is to improve the naturalness of computer-generated speech in the areas of sound quality and prosodics. For each language represented in the Action, improvements will be pursued in the naturalness of styles of speech used in typical telecommunications applications. Such improvement can be expected to lead to greater usefulness of speech synthesis in a large number of concrete telecommunications applications.

STRUCTURE OF WORK

The scientific work is pursued within the following working groups:

- Signal processing issues
- Prosody issues
- Speech rhythm issues
- Automatic segmentation and synthesis-oriented text mark-up

MILESTONES AND RESULTS

The main Scientific and technical Achievements of the Action as listed below may be regarded as significant contributions to the state-of-the-art in modelling and simulation.

1997 First meeting, organisation

1998 Survey of current work in the area, definition of work objectives

1999 Development and exploitation of pilot data base for styles of speech, test battery for speech synthesis systems.

2000 Reports of activity, compilation of scientific volume to be published by Wiley and Sons

2001 Reports of results, and development of outlook

More information can be found at

http://www.unil.ch/imm/docs/LAIP/COST_258/cost258.htm or by contacting:

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e-mail: eric.keller@imm.unil.ch

COST Action: 261

Electromagnetic Capability in Complex and Distributed Systems

Start date: 16 July 1998

Duration: 4 Years

End date: 15 July 2002

No. Participating Countries: 14

OBJECTIVES

Electronic systems falling into the category of 'distributed and complex systems' are manufactured by many companies within the European Union. The principal objectives of this action are to encourage and co-ordinate research into the means by which the EMC performance of such systems can be ensured at the design stage and assessed during the prototype and manufacturing phases of the systems lifetime. The research will include both practical hardware aspects and numerical modelling.

STRUCTURE OF WORK

The research and development activities of the Action are concentrated into four working groups as described below.

Working Group 1; Appropriate description of interference sources and victims external to the complex or distributed system. This will include information on the appropriate frequency range to be examined, the power and vulnerability of the sources and victims and a statistical description of their numbers and location.

Working Group 2; Coupling of complex or distributed systems to nearby interference sources or victims. The coupling of the interference source/victim ensemble will be evaluated by numerical methods and measurements

Working Group 3; Derivation of suitable measurement techniques. Once the characteristics of the problem are known from the above, suitable measurement techniques can be evolved.

Working Group 4; Protection. This working group deals with issues of protection of large systems.

The Action is facilitated through Workshops on specific aspects of the work, through a census of research in the area amongst participants and through Joint Technical Actions. The current Joint Technical Action is a Round Robin measurement campaign to evaluate a new cable performance standard. Other actions are planned.

MILESTONES AND RESULTS

More information can be found at <http://emc2.ohm.york.ac.uk/cost261/>
or by contacting:

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Fax: +44 1904433224

COST Action: 262

Spread Spectrum Systems and Techniques for Wireless and Wired Communications

Start date: 16 September 1998

Duration: 4 Years

End date: 15 September 2002

No. Participating Countries: 16

OBJECTIVES

The main objective of the Action is to increase the knowledge on Spread Spectrum Techniques and Applications for any wireless and wired system and to propose generic products and methods for a variety of possible applications. It aims also to lead to a FORUM on Spread Spectrum Systems.

Specific objectives are:

The support of industrial competitiveness, SMEs and consumers, the support of basic and applied research and development for spread spectrum systems and devices, to provide an integrated concept of any possible spread spectrum application and to provide guidelines for integrated design and implementation of future spread spectrum networks.

STRUCTURE OF WORK

The scientific work is split in four working groups and one sub-working group as defined in the following:

- WG1: Media Characterisation - Contact: Prof. Nicolae Cotanis, LCC, UK
- WG2: System Design and Implementation - Contact: Prof. Hermann Rohling, Technische Universität Hamburg-Harburg, Germany
- WG3: Networking Aspects - Contact: Prof. Ramon Agusti/Dr. Oriol Sallent, Universitat Politècnica de Catalunya, Spain
- WG4: Biomedical effects and EMC - Contact: Dr. Dario DiZenobio, FUB, Italy
- SWG-PLCs (Power Lines Communications) - Contact: Prof. B. Honary, Lancaster University, UK

MILESTONES AND RESULTS

Basic and applied research is carried out on Spread Spectrum Applications with emphasis on Multicarrier techniques. The list of technical documents can be found on the Web. A database on Standardisation activities relevant to Spread Spectrum systems is offered through the Action's Web Page. The database is updated regularly. Research on Power

Lines Communications constitute a basic activity of the Action, with participation to conferences and related events.

More information on all of the above can be found at <http://newton.ee.auth.gr/cost262> or by contacting:

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COST Action: 263
Quality Future Internet Services (QofIS)

Start date: 23 November 1998

Duration: 4 Years

End date: 22 November 2002

No. Participating Countries: 15

OBJECTIVES

The main objectives of the Action are to:

- co-ordinate and provide appropriate focus from a European perspective to concerted actions among involved European participating organisations and research groups being active in the field of the Quality of Internet Services, including support for existing events, and,
- establish and maintain the technical Programme in the area of QoIS, aiming at research, technical and engineering improvements of the quality of existing and emerging Internet services.

More information on all of the above can be found at
<http://www.fokus.gmd.de/cost263/> or by contacting:

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COST Action: 264

Enabling Networked Multimedia Group Communication

Start date: 16 September 1998

Duration: 4 Years

End date: 15 September 2002

No. Participating Countries: 16

OBJECTIVES

The main objective of this action will be to provide a forum where researchers and industrials active in this area will participate. They will co-operate in order to identify solutions for the improvement of the multipeer communication architecture, including application, communication mechanisms, and infrastructure. Complementary experimentation will be conducted to enable and understand multimedia group communications that will be available on various networks in the future. These activities will contribute to leverage European research in this domain as well as to the development of enhanced architectures at the International level.

STRUCTURE OF WORK

The action is divided into two complementary parts of similar importance that, together will enable the action to meet its goals:

· Infrastructure and dissemination

This part aims at co-operation and co-ordination between research actors to improve the existing infrastructure to support group communication (principally the Mbone). The infrastructure activity is a pre-requisite to the scientific co-operation. It will allow experimentation with the applications and mechanisms developed by participants, as well as providing a way to support an effective dissemination of the work.

· Research and experimentation

This part is devoted to co-operation between participants in the areas of multicast, multipeer, group communication and relevant applications. This is an area of utmost and strategic importance for research and industry. Multimedia group communication will leverage industry competitiveness and provide new tools for co-operative work.

MILESTONES AND RESULTS

- The main results are:
 - the existence of the action built on 16 different participating countries,
 - management committee meetings held several times since the creation of the Action,

- Euroseminars held electronically to support information dissemination,
- Short Term Scientific Missions between action members,
- Working group activities,
- NGC workshop.

More information on all of the above can be found at
<http://www.lip6.fr/COST264> or by contacting:

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e-mail: Serge.Fdida@lip6.fr

COST Action: 265

Measurement Techniques for Active and Passive Fibres to support Future Telecommunications

Start date: 17 December 1998

Duration: 4 Years

End date: 16 December 2002

No. Participating Countries: 13

OBJECTIVES

The objectives of the project are:

- to investigate new measurement methods to characterise new properties or new types of optical fibres and fibre components
- to validate these measurement methods via round robin measurements
- to underpin or initiate the work of standardisation bodies in this area by providing them with data to inform their deliberations
- to ensure that European industry has access to reliable measurement methods and confidence in component specifications
- to provide European industry with advance information on the characteristics of optical fibre and fibre components for advance optical communication applications.

More information can be obtained by visiting

<http://www.npl.co.uk/COST265/intro2.htm> or by contacting:

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COST Action: 266

Advanced Infrastructure for Photonic Networks

Start date: 10 February 1999

Duration: 4 Years

End date: 09 February 2003

No. Participating Countries: 16

OBJECTIVES

The main objective of the action is to propose and evaluate suitable architectures and identify the key photonic components for the infrastructure of next generation photonic networks and work out alternative scenarios for the evolution towards next generation networks

STRUCTURE OF WORK

Three Working Groups (WGs) have been formed:

WG1. Physical limitations of photonic transport

WG2. Network elements of advanced photonic infrastructure

WG3. Network evolution and the role of photonic infrastructure in the next generation networks

MILESTONES AND RESULTS

Dynamic behaviour of erbium-doped and Pr³⁺-doped fluoride fiber amplifiers by modelling and computer simulation has been analysed. Chains of optical fiber amplifiers have also been considered. Performance of a novel device based on dispersive reflectors integrated with DFB multisection DFB lasers which enables integration of clock and decision functions on the same wafer has been analysed. All-optical realisation of regular topologies like e.g. the Color Section Ring or the WDM-Gridconnect methods of subdividing these into smaller real-life networks like rings and meshes have been studied by application of the graph theory. Networking concepts that take advantage of the entire third low attenuation window (1450-1650 nm) for wavelength routed networks with up to 1,000 wavelength channels have been proposed.

More information on all of the above can be found at <http://www.ure.cas.cz/dpt240/cost266/index.html> or by contacting:

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COST Action: 267

Semiconductor Devices for Optical Signal Processing

Start date: 30 September 1998

Duration: 4 Years

End date: 29 September 2002

No. Participating Countries: 13

OBJECTIVES

The main objectives of the action are to co-ordinate national efforts on modelling and design of photonic devices for optical signal processing based on active semiconductor waveguides and to develop and implement measurement techniques for the experimental evaluation of their application capabilities in high capacity optical networks

STRUCTURE OF WORK

The work is divided into two working groups.(WGs)

WG1 deals with modelling and simulation of devices for optical signal processing, in particular semiconductor optical amplifiers and interferometric configurations. A few common exercises have been defined, which aims at comparing the different models in order to understand the limitations.

WG2 deals with experimental characterisation. A number of devices have been made available by various companies and research labs. These circulate among the COST participants and measurements on key device characteristics are compared.

MILESTONES AND RESULTS

Milestones have not been defined but please refer to the homepage of the COST 267 action (<http://www.com.dtu.dk/cost267/>) for examples of recent results

More information on all of the above can be found at <http://www.com.dtu.dk/cost267/> or by contacting:

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COST Action: 268
Wavelength Scale Photonic Components for
Telecommunication

Start date: 04 August 1998

Duration: 4 Years

End date: 03 August 2001

No. Participating Countries: 19

OBJECTIVES

The objective of the COST 268 Action is to investigate the potential and to promote the use of wavelength scale photonics in telecommunications, thereby enabling a faster transition from research prototypes to commercial devices in systems. A co-ordinated effort on wavelength scale photonics in telecommunication is expected to enable an increased system performance. This is due to a higher level of hardware integration being possible, the devices being compact with low power consumption, and an increased device functionality due to a more optimal use of optical waveguiding/mode and material gain properties of devices

STRUCTURE OF WORK

The work is divided into three working groups,

Working group 1: Microcavity devices

Working group 2: (Quasi) periodic structures

Working group 3: Quantum confined gain materials for photonic telecom devices

MILESTONES AND RESULTS

See the action webpage <http://www.ele.kth.se/COST268/>, which is regularly updated.

More information on all of the above can be found by contacting:

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COST Action: 269

User Aspects of ICTs

Start date: 28 April 1999

Duration: 5 Years

End date: 27 April 2004

No. Participating Countries: 15

OBJECTIVES

The main objectives of the action are to study and analyse ICTs usage and users, with emphasis on communication, in order to increase knowledge of how and why a person incorporates or rejects ICT products and services into his/her daily life.

The objectives can be specified in operational terms as follows:

1. To collect and analyse information, in order to identify which variables are likely to be important in the ICT assimilation process, whether that person is stationary or mobile. In the case of rejection, to identify possible causes. On the basis of this we aim to identify key factors shaping the market for a variety of ICTs.
2. To promote the exchange and dissemination of results from ICT user research between experts from both behavioural and technical disciplines. This will be managed via a number of mechanisms including participants reporting back to their own companies, ongoing ties with EURESCOM, the publication and promotion of material on the COST248 web site and participating in conferences and seminars organised by other bodies.
3. To create a network which includes any expert interested in this field, regardless of discipline.
4. To analyse peoples competence in the use of ICTs.
5. To collect information on the processes by which states, municipalities and other such institutions manage ICT use in the relation to their citizens.

More information can be obtained by visiting <http://cost269.free.fr/> or by contacting:

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COST Action: 270
Reliability of Optical Components and Devices in
Communications Networks and Systems

Start date: 17 May 2000

Duration: 5 Years

End date: 16 May 2005

No. Participating Countries: 12

OBJECTIVES

The main objective of the Action is to develop methods to ascertain and improve the reliability of the new types of optical components and devices in communications networks and transmissions systems including aspects regarding network and component costs, environmental conditions and installation procedures for equipment in core transport networks, in subscriber access networks and in in-house (local area) networks

Thus most of the effort at first will be to improve the understanding of the failure mechanisms of new types of optical components and devices in new high capacity/bandwidth/speed systems and networks. Simultaneously, information on their field behaviour will be gathered to study the effect of the service environment on the components, devices, networks and systems. Following this, efforts will be concentrated on improving life test methods. Finally, lifetime estimation methods will be analysed and developed.

It is also an objective that this research work will be done by co-operation between component and system manufactures and research institutes and universities. The work will also use all the results and achievements of earlier reliability actions (COST 246, 218 etc.). The work will influence the suppliers in developing and manufacturing reliable components and devices. The final objective is also the appropriate transfer of results and experience to the standardisation bodies, such as ETSI, CECC, IEC, and ITU, in the form of input and help for standardisation.

More information can be obtained at <http://www.cost270.com> or by contacting:

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COST Action: 271

Effects of the Upper Atmosphere on Terrestrial and Earth-space Communications

Start date: 16 August 2000

Duration: 4 Years

End date: 15 August 2004

No. Participating Countries: 15

OBJECTIVES

The main objectives are:

- to perform studies to influence the technical development and the implementation of new communication services, particularly for Global Navigation Satellite Systems and others advanced Earth-space and satellite to satellite applications,
- to develop methods and algorithms to predict and to minimise the effects of ionospheric perturbations and variations on communications and to ensure that the best models over Europe are made available to the ITU-R,
- to collect additional and new ionospheric and plasmaspheric data for now-casting and forecasting purposes,
- to stimulate further co-operation in the domain of ionospheric and plasmaspheric prediction and forecasting for terrestrial and Earth-space communications, including interactive repercussions on the corresponding standards in this field, taking into account users present and future need.

More information can be obtained by visiting <http://www.cost271.rl.ac.uk/> or by contacting:

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COST Action: 272
Packet Orientated Service Delivery via Satellite

Start date: 15th June 2001

Duration: 4 Years

End date: 14th June 2005

No. Participating Countries: 10

OBJECTIVES

The main objective of the Action is to contribute to the identification of key requirements, analysis, performance comparison, architectural design and protocol specification of future packet-oriented satellite communication systems, with a clear focus on Internet-type system concepts, applications and protocols/techniques on the various layers.

MILESTONES AND RESULTS

- Inaugural Management Committee Meeting held in Brussels on 15 June 2001

More information can be obtained by visiting
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COST Action: 273

Towards Mobile Broadband Multimedia Networks

Start date: 17 May 2001

Duration: 4 Years

End date: 16th May 2005

No. Participating Countries: 23

OBJECTIVES

The main objective of the Action is to increase knowledge of the radio aspects of mobile broadband multimedia networks, by exploring and developing new methods, models, techniques, strategies and tools to further the implementation of fourth generation mobile communication systems. It will consider frequencies ranging from the upper UHF up to millimetre waves, and data rates higher than 2 Mb/s (probably up to 155 Mb/s). As a secondary objective, it is intended that the Action continues to play a supporting role similar to the one played by the previous Actions in the mobile communications area. That is, besides giving inputs to the development of fourth generation systems it is also expected that it will contribute to the deployment of systems that are very close to completion of their standardisation phase, in particular UMTS and HIPERLAN 2. These goals agree with the more general European targets for the next 4 to 5 years in the mobile communications area, hence encompassing the 4 year schedule of the Action and giving a justification for its length

MILESTONES AND RESULTS

- Inaugural Management Committee Meeting held in Brussels on 17/18th of May 2001

More information can be obtained by visiting <http://www.lx.it.pt/cost273> or by contacting:

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COST Action: 274

Theory and Applications of Relational Structures as Knowledge Instruments

Start date: 11th June 2001

Duration: 4 Years

End date: 10 June 2005

No. Participating Countries: 15

OBJECTIVES

The main objective of the Action is

To advance the understanding and use of relational structures in applicable object domains.

There are the following sub-objectives:

1. To study the semantical and syntactical aspects of relational structures arising from real world situations.
2. To investigate automated inference for relational systems, and, where possible or feasible, develop deductive systems which can be implemented into industrial applications such as diagnostic systems.
3. To develop non-invasive scaling methods for the prediction of relational data, and to compare and possibly integrate a nominal scaling approach with numerical methods such as fuzzy relations, Bayesian networks etc.
4. To study and enhance current methods of relational qualitative reasoning about physical systems.

MILESTONES AND RESULTS

- Inaugural Management Committee Meeting held in Brussels on June 11th 2001

For more information, you can visit the website <http://www.tarski.org> or contact:

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COST Action: 275
Biometrics-Based Recognition Over The Internet

Start date: 08th June 2001

Duration: 4 Years

End date: 07th June 2005

No. Participating Countries: 10

OBJECTIVES

In operational terms, the main objectives can be specified as follows.

1. To improve knowledge of the issues and problems involved.
2. To study the current techniques for voice and face recognition and to evaluate their performance in the medium considered.
3. To investigate methods for the fusion of the considered biometric data and the interpretation of the results.
4. To analyse the implementation problems including user-interface issues and investigate effective solutions.
5. To identify the potential applications and analyse their requirements.
6. To develop standard methods and tools for the assessment of biometrics-based identification methods.

MILESTONES AND RESULTS

- Inaugural Management Committee Meeting held in Brussels on June 08th 2001

For more information, see <http://www.fub.it/cost275> or contact:

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COST Action: 276
**Information and Knowledge Management for Integrated
Media Communication**

Start date: 22nd June 2001

Duration: 4 Years

End date: 21st June 2005

No. Participating Countries: 15

OBJECTIVES

The main objective of the Action is to develop advanced multimedia data and knowledge management technologies for personal multimedia communication systems and services, including specific signal processing and implementation techniques for users' personal terminals. In addition, key system aspects will be considered, such as: system integration, personification of services, usage trials and demonstrations of advanced personal services. The planned activities that should be pursued will not only influence the base of innovations and competitiveness, but will also make a contribution towards answering personal and European society's needs

MILESTONES AND RESULTS

- Inaugural Management Committee Meeting held in Brussels on 22nd June 2001

For more information, see <http://cost276.fe.uni-lj.si> or contact:

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COST Action: 277
Non-Linear Speech Processing

Start date: 27th June 2001

Duration: 4 Years

End date: 26th June 2005

No. Participating Countries: 12

OBJECTIVES

The ultimate objective of this Action is to improve the voice services in telecommunication systems through the development of new non-linear speech processing techniques.

The new technologies developed within the Action are to provide higher quality speech synthesis, more efficient speech coding, improved speech recognition, and improved speaker identification and verification. The methods are expected to contribute significantly to the acceptance of voice interfaces for information systems such as the mobile Internet (by improved synthesis and recognition). Furthermore, these methods are expected to lead to improved efficiency in future generations of speech coders used in wireless networks, including packet-based wireless networks

MILESTONES AND RESULTS

- Inaugural Management Committee Meeting held in Brussels on 27th June 2001

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COST Action: 278
Spoken Language Interaction in Telecommunications

Start date: 30th April 2001

Duration: 4 Years

End date: 29th April 2005

No. Participating Countries: 20

OBJECTIVES

The main objective of COST Action 278 is to "increase the knowledge of potentially useful applications and methodologies in deploying spoken language interaction in telecommunication. Emphasis is on achieving knowledge of speech and dialogue processing in multi-modal communication interfaces".

Furthermore, the objective is to achieve knowledge of natural human-computer interaction through more cognitive, intuitive and robust interfaces, whether monolingual, multi-lingual or multi-modal.

MILESTONES AND RESULTS

- Inaugural Management Committee Meeting held in Brussels on 30th April 2001

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COST Action: 279

Analysis and Design of Advanced Multiservice Networks Supporting Mobility, Multimedia and Internetworking

Start date: 25th June 2001

Duration: 4 Years

End date: 24th June 2005

No. Participating Countries: 17

OBJECTIVES

The main objective of the Action is to develop techniques for the analysis, design and control of advanced multiservice networks supporting mobility, multimedia and interworking, by means of the development and application of new and better analytical techniques for the mathematical understanding and optimisation of the behaviour of communications equipment, protocols, and network topologies and architectures, and of economic aspects such as pricing principles and network cost estimation. The results will have the form of mathematical models and results, algorithms, computer tools, and analyses of empirical traffic and network data.

MILESTONES AND RESULTS

- Inaugural Management Committee Meeting held in Brussels on 25th June 2001

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COST Action: 280
Propagation Impairment Mitigation for Millimetre Wave
Radio Systems

Start date: 18th June 2001

Duration: 4 Years

End date: 17th June 2005

No. Participating Countries: 13

OBJECTIVES

The main objective of the Action is to improve the design and planning of present and future millimetre wave broadband telecommunications systems (including broadcast) and services (especially multimedia) through the development of knowledge and tools for a refined evaluation of their performance.

To achieve this goal it will be necessary to co-ordinate European research activity in the following areas:

1. Designing and planning of millimetre-wave broadband telecommunications systems (including broadcast, and especially for multimedia services)
2. Development and implementation of propagation impairment mitigation techniques
3. Channel modelling for Earth-satellite and terrestrial paths above about 20 GHz

The Action will address the interest of European Industry to introduce terrestrial and satellite-based broadband telecommunication systems, which are making optimal use of the limited frequency spectrum. The work will build on the results of earlier successful COST Actions such as COST Action 255.

MILESTONES AND RESULTS

- Inaugural Management Committee Meeting held in Brussels on 18/19th June 2001

For more information, you can visit the website <http://www.cost280.rl.ac.uk/> or contact:

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COST 281

Potential Health Implications from Mobile Communication Systems

Start date: 26th September 2001

Duration: 4 Years

End date: 25th September 2005

No. Participating Countries: 20

OBJECTIVES

The main objective of the Action is to obtain a better understanding of possible health impacts of emerging technologies, especially related to communication and information technologies, that may result in exposure to electromagnetic fields.

Some secondary objectives of the Action are the providing of:

- a scientific evaluation of available data for use by various decision makers involved in risk management of electromagnetic fields,
- a basis for risk communication efforts related to emerging technologies, electromagnetic fields and possible health risks, and
- data on electromagnetic field exposures related to emerging technologies on a European level,

A major benefit of this action will be to enable a common response across European nations at an early stage of the technical development. In addition, the fact that this Action will be composed primarily of individuals from the European research community will also facilitate early initiation of research efforts where such are deemed appropriate.

The community added value of this Action will be the:

- early onset of relevant research for unresolved or emerging issues of electromagnetic field exposures and possible health risks,
- provision of independent information on matters of public concern, and
- provision of independent advice to the relevant authorities at the national and European level.

In these ways, this Action will also contribute to improved conditions for further technical and industrial development, because it will increase the concordance, and an acceptance of this concordance, between technical development and public health.

More information can be obtained by viewing <http://www.cost281.org>
or by contacting:

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COST Action: 282
Knowledge Exploration in Science and Technology

Start date: 10th December 2001

Duration: 4 Years

End date: 9th December 2005

No. Participating Countries: 13

OBJECTIVES

The primary objective of the Action is to develop and implement computerised systems for extracting previously unknown, non-trivial, and potentially useful knowledge from structurally complex, high-volume, distributed, and fast-changing scientific and R&D databases within the context of current and newly developing global computing and data infrastructures such as the GRID. The development of new discovery methodologies capable of effectively and efficiently extracting knowledge from such databases will be achieved not only by close collaboration of information scientists and database experts, but also by the readiness of both to adequately familiarise themselves with the motivations, goals, methodologies, and languages of the scientific fields involved.

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COST Action 283
Computational and Information Infrastructure in the
Astronomical DataGrid

Start date: 23rd November 2001

Duration: 4 Years

End date: 22nd November 2005

No. Participating Countries: 8

OBJECTIVES

The objective of the Action is to develop innovative and well focused approaches to data and information handling, in the context of astronomy and astrophysics. This includes processing and interpretation of data and, more generally, information, at the time of data capture or later ("archival research"), and including aspects of the collaborative work and man-machine environments needed for this. To achieve this very broad goal, this Action will address a range of problems on the interface between astronomy and astrophysics, and the computational sciences. Serendipitously this Action will seek to tie together the work of astronomers and computer scientists, to mutual benefit.

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