

NEW ORGANISATIONS



NEW ORGANISATIONS AND MARKETS



IST is changing the nature of organisations and markets fundamentally. With the rise of e-business, organisations of all types and sizes are having to reassess how they function, and how they can best serve their customers in the new digital economy.

These changes take many forms. At one level, enterprises are having to rethink their internal operations and processes, and turn themselves into "smart organisations". The smart organisation is knowledge-driven, adaptable and inter-networked, with the agility to create and exploit the opportunities offered by the new economy.

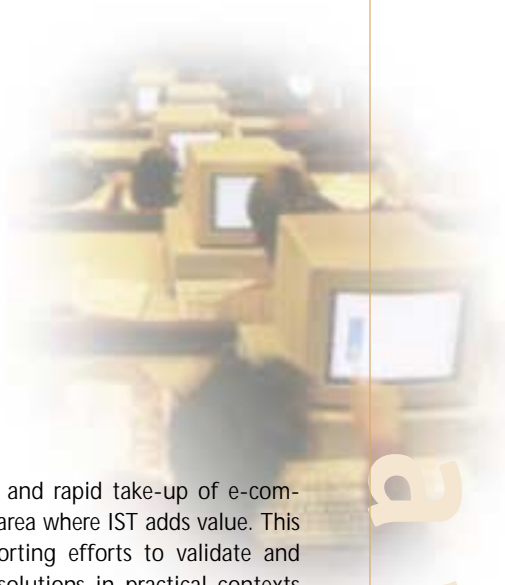
Relationships with customers and suppliers are changing too. From publishing to manufacturing to fisheries, companies are having to examine their position in the market and how they generate and retain value. New business models are emerging, and companies are co-operating within virtual or extended enterprises. These virtual enterprises are increasingly dynamic, with partners coming together not just to meet existing needs but also in anticipation of new market opportunities.

The effective management of knowledge and intellectual assets is emerging as a key success factor in the digital economy. With intangible knowledge assets accounting for an increasing proportion of an organisation's economic value, the capture, application and reuse of those assets is becoming the main source of competitive advantage for knowledge-based organisations.

Public services, too, are having to adapt. Administrations at all levels are seizing the opportunities presented by IST to interact with the public in new and innovative ways. IST enables public agencies to make the delivery of public services more citizen-centric, and to work more closely with the public and with each other. Examples highlighted here include collaborative working in health services, the streamlining of customs procedures, use of smart cards to exchange employment data, and new approaches to the management of cultural institutions.

Another interesting aspect is the way in which the workplace itself is evolving. Remote or mobile working is becoming the norm, a trend that has profound implications for our use of office space, for city and spatial planning, and for our attitudes to work itself.





Taking the long view

It is impossible to pick up a newspaper or business magazine these days without reading about e-commerce. The message is clear: e-business has arrived and every company and sector is affected. The same publications are also full of advertisements for commercial solutions to help companies make the transition to the e-world. With so many products and services already available within the marketplace, and many more under development by the IT industry and the new “dot-coms”, why does the EU support e-commerce research at all?

The truth is that while e-business is already here today, we are still only at the very beginning of the digital revolution. Existing commercial technologies and solutions on the market, many developed by European suppliers, only scratch the surface of the commercial, organisational and technological transformation companies will face in the future.

The IST Programme focuses on this bigger picture: beyond stimulating the take-up of e-commerce and e-work in Europe, it emphasises visionary research and technological develop-

ECLIP: Exploring legal barriers to e-commerce

e-Commerce is impacting all sectors of the economy as well as creating new ones and, in the process spawning, a number of legal and regulatory challenges. Laws and regulations are being adapted, with emphasis on self-regulation and co-regulation where appropriate. A related challenge has to do with making sure that people and organisations, SMEs in particular, are aware of changes in the legal and regulatory framework. Continuing work started under Esprit, ECLIP II seeks to address these challenges by analysing delicate new questions as well as producing practical guides and tools for SMEs.

ment for the medium to long term. With limited resources at its disposal, IST addresses key research challenges and areas where a high multiplier effect can be expected. It targets the major, rather than incremental, advances needed to ensure that Europe can capitalise on the new digital economy.

Companies of all sizes are seizing the benefits of e-business



One such challenge is knowledge management. Touted by many and understood by few, knowledge management is emerging as the essential “glue” that will hold future enterprises together. To succeed in an era of globalisation, mass customisation and mobile working, companies need to be able to leverage corporate knowledge effectively. Enterprises need to derive commercial advantage from the masses of data locked in company databases. And employees need to be empowered to access and share information whenever and wherever they are working. IST is exploring novel knowledge management approaches that make it possible to cut across traditional functional and organisational boundaries and, in so doing, enhance creativity, innovation, competencies and responsiveness in the enterprise.

Interoperability and standards is also an important issue. The digital economy is characterised not only by its speed but also by its complexity. Organisations of all types and sizes are having to rethink their position in the market and how they generate and retain value. Thus, we are seeing the emergence of new business models and “smart” – networked, adaptive, knowledge-driven – organisations. This interconnected world places a heavy emphasis on interoperability: systems have to integrate with legacy applications and with those of other companies throughout the value network. In this context, the ability of a company to quickly reconfigure itself, identify new business partners and interoperate with them is critical. The exploration of novel solutions and practices that help turn organisations into ‘smart’ entities, help them form and interoperate across dynamic value chains is another central theme under Key Action II.

Stimulating early and rapid take-up of e-commerce is another area where IST adds value. This is done by supporting efforts to validate and customise novel solutions in practical contexts so that they can move quickly to the marketplace. The benefits of new best practice solutions are also showcased so as to ensure their broad deployment amongst SMEs.

In an emerging area like e-commerce, RTD has a major role in supporting the regulatory process. Each piece of legislation requires a thorough analysis of the technology impact, and in return technology development and its innovative deployment might affect current and future legislation. The IST Programme is one of a number of means that facilitate this two-way flow of information. Promotion of interoperability and standardisation are again important here, as well as cooperation with international initiatives and bodies.

Similarly, in the e-commerce arena there is a close interplay between technological, economic and social issues. The IST Programme supports a wide variety of research aimed at monitoring and assessing the socio-economic impacts of new technologies, working practices and business models. As well as informing corporate decision-making, this research helps shape IST’s own RTD priorities and policy actions.

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Virtual health services

Health services, like other organisations, are having to embrace the opportunities presented by the internet and other communications networks. Within many hospitals, standardised patient medical records already assist the exchange of information between specialist departments. Frequently, hospitals have to work with other health agencies as well, necessitating the sharing of clinical information between different organisations and specialities.

Patients need a single point of entry to healthcare services that cuts across institutional boundaries. The "virtual hospital" should enable healthcare services to be provided to the patient as promptly and as locally as possible, while supporting the collaboration of healthcare professionals throughout the care episode. This implies an optimal mobilisation of healthcare resources, for instance by sharing the results of diagnostic tests irrespective of where they are produced, or sharing the best expertise irrespective of geographical location. Effective collaboration, therefore, requires standardisation, concerning how the data is collected and stored, and interoperability in the solutions applied.

Co-operative work for healthcare professionals was a major focus of previous EU programmes for healthcare telematics. The Telematics Application Programme (1994-98), for example, included an action cluster on co-operative work in the field of oncology and transplantation. This highly successful action led to the formation of Onconnect.net, an extranet of cancer reference centres throughout Europe. Onconnect provides a common telematics service platform, based on internet standards, targeted at medical staff involved in oncology research, diagnosis and treatment. The reference centres act as a bridge between national oncology networks and international networks, providing access to services and redistributing content.

Under the IST Programme, RTD on collaborative healthcare aims to enable healthcare professionals to access remotely available best medical practice and patients' medical files, whether from their surgery, hospital, patient's home or accident site. Within WP 2000, the work focuses on the integration of intelligent interfaces and mobile multimedia workstations exploiting the potential offered by UMTS communications systems. Such advanced systems should allow doctors and nurses reliable, user-friendly, interactive access to multimedia medical information, including dynamic images. Privacy and security issues are also addressed.

ICT helps make health services more patient-friendly



Early detection in ophthalmology

Building on the results of the FP4 project OPHTEL, TOSCA aims to reduce blindness through the use of new ICT solutions in ophthalmology. The focus is on diabetic retinopathy (DR) and glaucoma, which are the most frequent causes of blindness in Europe. Besides the suffering of patients affected, both diseases cause immense costs.

TOSCA is developing an infrastructure for telescreening services for the early detection of DR and glaucoma, based on European and international standards. Access to services will be managed by a broker, which will act as a portal to a distributed network of ophthalmology service centres for screening, monitoring, image processing etc.

Image processing and reference image databases are being developed to improve the efficiency of DR screening and support quality assurance. Compliance and quality of care for glaucoma will be improved by remote monitoring of patients at home, and by a patient-centred glaucoma information system.

TEAM-HOS is specifying and testing an innovative methodology and set of tools for analysing opportunities for ICT-supported team work in hospitals. The new methodology is expected to benefit hospitals in introducing new ICT solutions, bringing cost savings of at least 40% and reducing risks by at least 95%. The work involves technologies and systems for resource sharing, real-time team co-ordination, innovative workplace design, knowledge sharing within teams, and team communication.

Continuity of care is recognised as a key issue for improving quality and cost-effectiveness of healthcare. Current approaches rely either on a single, comprehensive, centralised electronic health record (EHR), or a virtual, networked EHR physically scattered between a number of organisations. Both approaches have their limitations. C-CARE intends to improve access to essential personal clinical data by authorised healthcare professionals. Users will be able to access at any time and from anywhere (e.g. patient's home, hospital emergency department, on the road), through both standard internet technology and traditional voice telephony. C-CARE's services are based on emerging industry standards, principally XML.

The organisation, control and management of clinical diagnostic tests is addressed by D-LAB. It aims to contribute to a shift in the organisation of these services through a virtual laboratory concept, involving the integration of testing activities performed outside hospitals at medical offices, pharmacies, and health centres. The work focuses primarily on the development of middleware to integrate the different information sources within a distributed environment.

Further info IST Action Lines:

IST-2000 I.1.3

IST-2000 I.1.4

Project References:

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D-LAB
TEAM-HOS

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Electronic customs clearance

Customs procedures within the EU remain complex. Goods imported into Europe are subject to the same customs duties wherever they enter the Union. But despite standard tariffs and common regulations, the nature and efficiency of customs procedures for goods imported into Europe by post vary from country to country. Bilateral arrangements between national postal and custom services are the norm. On the export side, each postal service must implement its own procedures for dealing with non-European customs.

It is essential that procedures within Europe be standardised and that a single European interface be established for overseas Posts. A European system for exports is also becoming imperative as each national postal system moves towards electronic customs clearance.

The SAMPLE project, launched in early 2000, aims to specify and implement procedures and systems for the customs clearance of letters and parcels across Europe. Based on open-standards approaches, the development is utilising EDI-FACT and the emerging XML technologies that will facilitate widespread use at reasonable cost.

Lufthansa Airbus 310 being loaded with German mail



Typically, an exporting postal service has detailed information available several days before goods arrive at the importing country. SAMPLE will provide advanced notice of arrival, enabling customs services to spread their workload. In some cases mail will be pre-advised for priority clearance on arrival, while items needing to be inspected will be clearly identified. The detailed information generated will serve customer enquiries, calculations of duties and economic reporting.

With the SAMPLE system the exporting postal service should be able to quickly transfer data to both the importing postal service and customs authority. Importing customs authorities can then notify the postal service about inbound items, ideally before the arrival of the goods themselves, while maintaining separation of responsibilities for preparation, transmission and legal submission of data.

The work builds on several earlier projects. CAPE, launched in 1992, developed an electronic tracking system for mailbags that is now used by more than 20 postal authorities. Hundreds of computers and scanners at locations throughout Europe have been interconnected, generating data on mail movements in real time. This information is used to optimise transport schedules, predict staffing levels and improve tracking of mail.

CAPE 2000, which began in 1996, introduced air carriers into the post's electronic messaging network so that mail could be tracked while it is being transported by air. Ten postal services and eight airlines are already using the technology. Both CAPE and CAPE2000 actively collaborated with international standards groups of the Universal Postal Union and the International Air Transporters Association to ensure open systems and international standardisation.

Further info IST Action Lines:

IST-1999 I.4.1

Project References: Commission Contacts: Web:

IST-2000 I.3
SAMPLE
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Systems enhancing the efficiency
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The digital studio

Broadcasting is going digital. Not only is digital broadcasting bringing new services into the home, digital technologies are also being used increasingly throughout the audio-visual production process. With millions of content items in their archives, which are being added to daily, cost-effective production and management of media assets is critical to broadcasters. They need to know what content they have, where it is, who owns the rights, and what it will cost them to use. And this information is needed not just for specific programmes but down to the level of individual audio-visual items.

Digital techniques are already widely used in editing and post-production processing. The success of Hollywood films such as Toy Story and Jurassic Park are well-known examples of post-production of 3D animation and special effects. The processing of individual video objects in real-time can be hugely expensive, however, and studios are looking for more cost-effective techniques. Nowadays, post-production can be PC-based and the technology allows faster image processing, for rendering 3D images for example. The next step is to automate the content processing – manual processing of megabytes of video and 3D is unthinkable for most studios and editors.

The emerging MPEG-4 and MPEG-7 standards are central to these trends. These are open standards for audio-visual and multimedia content being developed by the Moving Picture Experts Group (MPEG), an industry forum. The MPEG-4 and MPEG-7 standards allow audio-visual media to be described and indexed by their contents – what is in a film scene for example. This object-based approach will enable broadcasters and other audiovisual industries much more

flexibility to index, search, track and retrieve multimedia content. The new standards provide a consistent set of descriptions that can be used throughout the lifecycle of content, including the production phase. This means that once produced content can be reused easily across many different media, such as TV broadcast, interactive DVD, internet streaming, games etc.

A variety of activities supported under previous EU RTD programmes have already produced promising results. VICAR, for example, has developed a system for documenting and analysing digital video material. The system combines a powerful video browser and editing program with a suite of software tools that allow semantic contents of streamed video to be extracted automatically according to MPEG-1 and MPEG-2 formats. NEMESIS is developing multimedia information management tools for 2D and 3D objects. Implemented as a suite of plug-ins for professional digital post-production software packages, these tools open up sophisticated special effects to the business and amateur markets.

*Digital video editing suite developed under
Esprit project AMAS*



Further info IST Action Lines:

IST-1999 III.5.2
IST-2000 III.4.1

Project References:

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Media representation and access
Content-processing for domestic
and mobile multimedia platforms
Esprit 22012 <http://tco8.thomson-csf.fr/NEMESIS/index3.htm>
Esprit 24916 <http://iis.joanneum.ac.at/vicar>
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Building smart organisations

The new economy is the result of the information revolution, of shrinking and ever-powerful computers, and the emergence of an efficient, ubiquitous and invisible communications infrastructure. This new economy promotes new forms of organisations. For companies, the transition to the digital age will have implications on their business processes and on the organisations as a whole. The transformation involves much more than setting up a digital infrastructure and requires even more than the ability to enter into a virtual collaboration with other partners.

During the industrial revolution enterprises changed dramatically, from closely-knit rural communities to a core of structured and independent urban organisations. In the 1980's and 90's these became more global and collaborative. This transition was encouraged by fiercer competition, the introduction of information and communication technologies (ICTs) and the rapid emergence of the new business paradigm of an economy that is "going digital". This shift in paradigm is giving rise to new types of inter-networked organisations. These organisations are virtual in concept, highly flexible, dynamic, and capable of leveraging the power of network technologies to meet customer demands for high added-value products and services in a global market.

These developments are being facilitated by rapid advances in telecommunications, open networks (like the Internet), object-oriented technologies (like CORBA and Java), and interactive multimedia services. But as more business is done electronically, critical business processes are gradually shifted from corporate internal and protected environments to open networks.

The concept of the extended enterprise applies to an organisation in which a dominant enterprise "extends" its boundaries to all or some of its suppliers. Virtual organisations (VOs) comprise networks of organisations that share resources and skills to achieve their mission/goal, but not to an alliance of enterprises. A smart organisation is a virtual organisation

that incorporates substantial knowledge management in its business processes, i.e. it is knowledge-driven, inter-networked, and dynamically adaptive to new organisational forms and practices, and learning opportunities. In short, it has the agility to create and exploit the opportunities offered by the new economy.

The IST Programme supports the transformation of profit and non-profit entities into smart organisations. Some projects work on technologies for the constitution and operation of virtual enterprises through web-based partner search (BIDSAVER); services for new business development of virtual enterprises (BUSINESS ARCHITECT); and methodologies for extended enterprise modelling, analysis and operation (EXTERNAL). Other are concerned with the development of sales assistant systems (LIAISE) and innovative supply chain and sectoral applications (CHAINFEED, CO-OPERATE, DAMASCOS, DRIVE, DYCONET, GLOBEMEN, IST-FOR-CE, OSMOS, SOL-EU-NET).

The European Commission has accompanied the technology developments with relevant policies, legislative measures and socio-economic analyses. The action line "New Perspectives for Work and Business" of the IST programme focuses on socio-economic research regarding networked organisational structures, based on benchmarking, econometric models, new statistical indicators, technology foresight, and legal issues such as liability and IPR protection.

Sharing knowledge and skills is the key to success for the extended enterprise



Legal and regulatory issues related to Smart Organisations

Legal Issue	Status	Solution
Legally binding declarations in e-format	Resolved	EU Directive
Digital Signature	Resolved	EU Directive
Security of Communication	Resolved	EU Directive
New legal proceedings	Unresolved	New legislation /Coregulation
Electronic tracking of responsibility and liability	Unresolved	New software
Sample contract clauses for digital environment	Unresolved	Legal Draft
Software to support legal issues	Unresolved	Legal & software
Automatic generation of access rights to databases	Resolved	New software
Automatic authorisation of legally valid orders	Resolved	New software
System of approval	Resolved	New software

The point of departure is the fundamental characteristic of virtual organisations: a co-operative alliance, often between entities with individually distinct legal identities, which come together to exploit a particular business opportunity. In virtual organisations there is not always a clear separation between the issues regarding the internal operation of the organisation, the relationships between the different participants, and those regarding the way in which the VO deals with the external business environment.

The legal challenges stem from the fact the VO appears to be a single entity but may not have a legal identity. Therefore, questions arise as to the liability with respect to third parties, the necessity for a consumer protection framework, the contractual arrangements between the VO and potential suppliers, and the extent and duration of liability, given that the virtual organisation is both dynamic and temporary. Moreover, VO partners, dispersed geographically, operate under diverse national legal frameworks.

The development of the digital marketplace is moving much faster than the abilities of regulatory bodies to respond. Different approaches are being explored such as self-regulation, co-regulation and technical solutions and practices for disputes resolution, digital contract preparation and set-up in order to encourage on-line collaboration.

Further info IST Action Lines:

IST-2000 II.1.1

New perspectives for work and business

Project References:

IST-2000 II.2.2
IST-2000 II.3.1
BIDSAVER
BUSINESS ARCHITECT
CHAINFEED
CO-OPERATE
DAMASCOS
DRIVE
DYCONET
EXTERNAL
GLOBEMEN
IST-FOR-CE
LIAISE
OSMOS
SOL-EU-NET

Smart organisations
Dynamic value constellations
IST-1999 10768
IST-1999 10878
IST-1999 10625
IST-1999 12259
IST-1999 11850
IST-1999 12040
IST-1999 11780
IST-1999 10091
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The new workplace

Today's workplace is changing fundamentally. Mobile computing and communications devices, such as laptops, mobile phones and personal assistants, play an increasing role in all forms of working environment from the office to the building site. Applications of wearable computers are beginning to emerge. Working in a fixed office environment is giving way to "working from anywhere". This trend has profound implications for our use of office space, for city and spatial planning, and for our attitudes to work itself.

Predictions of major shifts in working patterns are nothing new. Over the last 10-15 years new networking technologies have substantially changed office working practices, while at the same time there has been a clear trend towards home and remote working. European Telework Development (ETD), initiated under ACTS, has monitored and reported on these changes and is now recognised as a key source of information on telework, teletrade and tele-cooperation. By 2000, ETD was able to report that 10 million people in the EU were involved in some form of tele-working, a five-fold increase from 1994.

The theatre of work

IST's TOWER project is developing a novel co-operative work environment and work-space to enable new ways of working over distance. Users will be able to perceive other people's presence, movement and actions within a "theatre of work", a shared environment which enables effective social interactions. New ambient displays will be integrated into real working environments to create tangible effects of actions in virtual and real spaces. Recording systems will enable users to recapture activities that have happened during their absence. The system aims to overcome the social isolation of individuals in distributed teams and to improve team-working.

DIPLOMAT, another ACTS project, established a European Charter for Telework as a means of building consensus between public and private sectors on the benefits of new ways of working. These activities are being continued under the new Work, Information Society and Employment Forum (WISE).

Tomorrow's workplaces will cater for the needs of mobile workers



But telework is only one manifestation of "the New Work". Whereas remote working may only be suited to certain types of employment, the opportunities ICT presents to reinvent the workplace are open to all. The average office in Europe is only occupied around 8% of the time, and it is estimated that between 40-60% of business communication is done in informal meetings. People's attitudes are changing too: office space is no longer a reflection of status, and conflicts between work and family are

becoming less acceptable. People need the tools to enable them to work more flexibly while retaining the key attributes of office life: social interaction, collaboration, access to information.

We need to look at totally new models which reflect these changes. Developments such as virtual team-working environments, wearable computers and intelligent office equipment offer the prospect of innovative workplace environments, but where the technology itself is invisible. Most likely, we will need new paradigms for office work: for example, the office as a "laboratory", as a "buffet", or as a "theatre".

There will also be implications at a spatial and environmental level. Will these new ICT-enabled workplaces require more work-related travel or less? How will shared building facilities and office space impact the built environment and city planning? How can smart design reduce the consumption of energy and resources in the workplace? In short, how can ICT help make our workplaces more sustainable? These are important questions requiring a multi-disciplinary approach involving, amongst others, architects, spatial planners, interior designers and social scientists.

We need to consider the social dimension too. How will these new environments affect social relationships in the workplace? And as divisions between the office and the home, working and non-working time blur, what will this mean for our quality of life?

Maintenance at your fingertips

With modern mechanical and electronic systems containing hundreds of separate parts and components, maintenance engineers need access to huge amounts of information. STARMATE is developing a system of computer-guided maintenance that allows engineers to directly access full documentation and manuals within their everyday working environment. Utilising augmented reality technology, the system should enable maintenance engineers to work more flexibly and preserve their mobility in situations where on-the-job access to conventional documentation is cumbersome. The user will be guided through the appropriate procedures through visual and audio augmentation, controlled through both speech and a pointing device. The prototype will be tested in real life applications in opto-electronics, aerospace and the nuclear industry. As well as maintenance, the system will also be used in workforce training.

Further info IST Action Lines:

IST-2000 IL.1.1

IST-2000 IL.1.3

Project References:

IST-2000 IL.2.1
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Creating value in publishing

Digital technologies are having profound effects on the content industries. There is a blurring not only of the roles of traditional actors, such as publishers, broadcasters and record companies, but also of content itself. Networks allow consumers to interact with content suppliers and, further back along the chain, with content aggregators and even directly with creators. The traditional value chain is breaking down as customers and publishers undertake collaborative, iterative development of multimedia works. And increasingly, new low-cost, high performance multimedia technologies enable users themselves to become content creators and publishers.

These advanced interactive publishing paradigms call for intelligent publishing platforms with which to acquire, create and integrate content resources. These platforms need to cater for the interactive authoring of all kinds of media: not just books, magazines, CD-ROMs and websites but also films, music, 3D animated models and immersive environments, simulations and visualisations, virtual environments, broadcast pro-

Paper-free animation

PAPERLESS is developing animation software which will allow animated films to be produced without the need for paper. Animators will draw directly onto an interactive slate, eliminating the need to draw and scan hundreds of paper sketches. They can then use the system to drag and change characters and objects frame by frame.

This paper-free approach will enable cartoon artists and animation designers to work in a radically new, streamlined way and should open the door to on-line and TV cartoon production for small animation and multimedia producers. Thus, PAPERLESS should support the creation of a new edutainment market in which cartoons are integrated as self-active and inter-active elements in multi-media environments.

grammes, multi-player games and worlds, cultural presentations, maps and much more. They also need to enable the creative re-assembling and re-purposing of content resources between the different media.

A 3D visualisation of the Grassmarket in Edinburgh based on animation of architectural drawings (Picture from Esprit project ENTICE)



State-of-the-art video retrieval

Handling rich multimedia information, especially video, is becoming critical for content industries such as TV and technical or professional training. To cope with these needs, the ADVISOR project aims to advance the state-of-the-art in video annotation and retrieval systems. Basic technologies are being developed to permit the analysis, coding, indexing, archiving and retrieval of videos. These will be integrated into prototype systems for two target applications, a video studio and distributed video retrieval, based on detailed consultations on users' requirements.

Productivity and workflow are also key parameters. New tools and environments should enable creative content generators – the author, artist, editor, journalist, producer, director, designer, curator etc – to work together collaboratively regardless of location. Furthermore, this co-creative process should be neutral to the format of the component information resources.

One of the most successful areas of the multimedia industries over recent years has been interactive video games, a sector where Europe is strong. Games publishers have produced new and imaginative content and pioneered many innovations in technology and working practices. Even relatively inexpensive games offer consumers high-quality interactivity, animation,

3D-graphics and sound effects. The challenge for content creators is to emulate the richness of the video games "experience" within mainstream products and services. In short, to embrace a digital culture in all forms of content creation.

The IST Programme aims to support the emergence of this digital culture through the action line on Interactive Publishing, Digital Content and Cultural Heritage. The action line addresses publishing in its broadest sense of providing multimedia content for new marketplaces or according to new and emerging business models. In 2000, RTD work has been focused on two key areas of the electronic publishing chain: interactive authoring of web content; and improved personalisation of content.

Support for audio-visual production is a key theme in projects funded to date. G-FORS, for example, is developing a generic storage format for video files. MIGRATOR 2000 is developing tools to support the use of the new JPEG2000 format in multimedia authoring packages. ONRADIO aims to facilitate access to public radio archives over the internet. A virtual studio that will allow authors to conceive and animate digital storytelling is being developed by VISIONS.

Further info IST Action Lines:

IST-2000 III.1

Interactive publishing, digital content and cultural heritage

Project References:

ADVISOR
G-FORS
MIGRATOR 2000
ONRADIO
PAPERLESS
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IST-1999 10147
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Mapping cyberspace

One of the great paradoxes of the information age is that we are surrounded by data but lacking in meaningful knowledge. The explosive growth of the internet and other computer networks has clearly demonstrated the need to organise, filter and present information in a way which enables users to cope with the sheer quantities of data available. Even finding the right website and seeing how it is linked to other related sites can be a major challenge. New techniques and tools are needed that enable users to navigate, search and understand large-scale and complex multimedia datasets and unfamiliar information spaces.

Information visualisation, a relatively new discipline, is concerned with new ways of presenting information spaces and structures, such as websites or networks, to make them easier for users to access and understand. It enables large masses of data to be presented quickly in an understandable way by using graphics. Different types of visualisation approaches are under investigation for different classes of information, for example whether the data is linear (as in tables), in a hierarchy (as in a thesaurus) or in network form (hypermedia nodes).

With the World Wide Web growing at an exponential rate, the mapping of and retrieval of information from cyberspace is a key focus. Like maps of the real world, these cybermaps will help users to navigate the new information landscapes beyond their computer screens. New metaphors are being applied to describe cyberspace and the information flows within it. Current examples include cities, molecules, spheres, trees and filing cabinets.

The IST Programme supports RTD on information visualisation under its action line on Information Access and Filtering (IAF). The work aims to supplement recent advances in computer graphics and image processing by focusing on the semantics, interactivity and usability of the images. One priority is scientific visualisation and dynamic representations of information structures. Another area of interest is tools for interacting with and manipulating virtual objects. The visualisation-based management of very large-scale datasets, in the region of terabytes and beyond, is also being pursued.



With the Web growing at an exponential rate, researchers are having to find new ways to navigate cyberspace

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Connecting Europe's e-entrepreneurs

One of the most remarkable phenomena of the new economy is the tremendous unleashing of creative talent. Right across Europe entrepreneurs are seizing the opportunities presented by the internet and associated technologies to create new businesses. But having the creative idea is one thing; accessing the finance to build the idea into a viable business is quite another. The European Investment Forum (EIF) connects e-entrepreneurs with sources of finance and also helps equip them with the management skills to grow sustainable businesses.

EIF provides practical and meaningful assistance and contacts for companies planning to raise venture capital or growth finance in the converging information, communications and internet technology sectors. Start-up companies and financial investors are brought together at a series of investment workshops. For each workshop, around 50 technology ventures are hand-picked to present their plans and fund-raising targets to some 400 international investors, advisors and the press. Companies gain valuable exposure, presentation training and networking opportunities. Investors benefit from access to many outstanding, high-growth technology ventures under one roof.

To improve their chances of being accepted for the EIF, companies are invited to attend pre-forum workshops, known as the European Venture Academy. The Academy has been likened to a "boot camp" for growing enterprises. Through direct feedback and coaching, companies learn how to perfect their business plans and gain valuable insight on how to finance and effectively grow seedling ventures.

The EIF programme of investment fora and investment workshops is part-supported by the IST Programme in association with private sec-

tor partners. The latest forum is being held in Nice in November 2000 alongside the IST 2000 Conference & Exhibition, and follows successful events in Vienna, Helsinki and Berlin. Some of the companies attending are participants in IST or previous EU RTD programmes looking for funding to exploit research results. Virtually all European countries are represented at EIF, highlighting the increasing demand for pan-European capital with value-added to help the rapid growth of high-tech ventures.

Many technology companies presenting in former EIFs have gone on to raise significant development capital. One such is Smarterwork.com, which raised euro 12-13 million from venture capitalists directly as a result of presenting at the EIF in Helsinki in 1999. Other companies which have found investors or business partners through the events include Vitaminic.com, Physical Networks, Alafolie and Syzygy.

By connecting IST participants and other industrialists, on the one hand, and private investors, on the other, the European Investment Forum is helping to foster the dynamic entrepreneurship so essential to Europe's future competitiveness.

The European Investment Forum brings together technology and finance



Further info
IST Action Lines:

IST-2000 II

Project References:
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New methods of work and electronic commerce
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Smart manufacturing

Manufacturing industries face many competitive challenges. The globalisation of markets, saturation of many market segments, shortening of innovation cycles, and the growth of electronic trading have all emerged as business pressures. To stay ahead in this competitive environment, manufacturers are having to reinvent themselves to achieve the speed and responsiveness to customer needs demanded in the new digital economy.

There are many avenues open to manufacturers in meeting these challenges. One is to make more effective use of their internal knowledge, about processes, products, customers etc. Another is to improve their external relationships and networks by working more closely with their suppliers and customers. And in both their internal and external organisation, companies need to be able to adapt to new business practices and techniques, learning as they do so. In short, manufacturers are having to transform themselves into "smart" organisations: agile, inter-networked and knowledge-driven.

New ICT solutions are essential to this transformation process. Although well established, technologies such as computer-aided design (CAD), computer-aided manufacturing (CAM) and enterprise resource planning (ERP) have been

Dynamic supply chain management

Today's ERP systems still fail to integrate the supply chain from production right through to the end consumer. There is considerable potential for optimisation therefore, especially in industries where just-in-time approaches are not applicable. Effective supply chain management requires the integration of distribution and consumer demands in production planning and control, allowing a demand-driven approach to production.

DAMASCOS focuses on the management of customised supply networks through the use of dynamic forecasting models. The project is developing a system for managing lean supply networks that takes account of consumer demands and market mechanisms. The architecture employs new emerging standards and advanced forecasting technologies, as well as distributed and co-operative workflow management technologies.

out of the reach of many SMEs because of their cost and complexity. Now, companies of all sizes can have access to these tools and can communicate with each other electronically, through the public internet, company-only networks (intranets), and external networks linking a company with its business partners (extranets).

Manufacturers are using ICT to get closer to their customers and suppliers, as with this collaborative engineering tool developed under Esprit project CANET



External, inter-company relationships are especially important for future competitiveness. In manufacturing, as elsewhere, conventional distinctions between supply chains, business models and market definitions are becoming blurred. Manufacturing value chains are no longer linear but complex networks in themselves. Product offerings are becoming highly customised and, increasingly, manufacturers not only produce the goods but also sell them direct to the end-user, often with a valuable service component. As a result of these trends, new forms of co-operation are emerging within so-called virtual or extended enterprises. These virtual enterprises are increasingly dynamic, with partners coming together not just to meet existing needs but also in response to, or in anticipation of, new market opportunities.

The IST Programme is supporting a number of projects that aim to help companies make the transformation to smart manufacturing. The emphasis is on novel open, interoperable solutions and platforms for flexible working in and between organisations. This includes solutions to support co-operation, flexible workflow management and co-ordinated planning across virtual/extended enterprises and the associated business processes. Approaches to dynamic value creation are also addressed, including the full lifecycle management of products and services.

Innovative approaches to supply chain management is a key focus. CO-OPERATE focuses on manufacturing planning and control as a means to improve supply chain management in manufacturing. The outputs will be a set of flexible, low-cost ICT tools suitable for SMEs. An automated performance measurement system is being developed under APM. This is essentially an enhanced ERP system that allows manufacturing SMEs to automatically collect performance data so as to improve their position in global supply chains. ADRENALIN aims to apply innovative information management concepts to increase the efficiency of networked organisations.

Collaborative engineering within extended enterprises is another key theme. GLOBEMEN aims to specify and demonstrate generic ICT architecture to support inter-enterprise collaboration in a global setting. The project addresses three main aspects relevant to manufacturing: sales and advertising, delivery process management, and product/process engineering. WHALES is developing a planning and management infrastructure that will allow corporates and SMEs to co-operate in large-scale engineering projects. E-COLLEG is making use of enabling technologies, such as Jini and CORBA, for collaborative engineering. The approach is being demonstrated through pan-European showcases for image processing and telecommunications systems.

Further info

IST Action Lines:

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Commission Contacts: Web:

IST-2000 II.2.2

IST-2000 II.3.1

ADRENALIN

APM

CO-OPERATE

DAMASCOS

E-COLLEG

GLOBEMEN

PABADIS

PSIM

WHALES

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Smart organisations

Dynamic value constellations

IST-1999 10181

IST-1999 10279

IST-1999 12259

IST-1999 11850

IST-1999 11746

IST-1999 60002

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Learning for work

As the world of work becomes ever more complex and portfolio careers become the norm, on-the-job training is increasingly important. Future learning environments will have to address moves in and out of work and between working tasks in a world where skills, disciplines and jobs mutate rapidly. Increasingly, organisations require a flexible workforce with broad competencies rather than workers trained in a specific but limited skill set.

Current approaches to ICT-supported vocational training mainly address the use of new technology within traditional training settings. The benefits sought are mostly cost reductions with little or no added value in the learning process itself. Users often fail to see the benefits of ICT-based training solutions, which are developed with little involvement of pedagogical experts. Current solutions also tend to focus mainly on technical subjects and to be applied in large industrial organisations.

IST's Advanced Training Systems action line is developing and validating radically new approaches to ICT-based vocational training. The work aims to demonstrate improvements in learning processes through ICT, including evidence of the benefits of just-in-time, just-as-required on-the-job training. This approach puts the learner at the centre of a web of innovative learning processes and leading edge technologies. The outputs will be innovative, prototype training environments which are adaptive to the learner (their style, knowledge level etc), and provide support where and when required.

Research areas include new learning environments for complex, high-tech industrial situations using advanced simulation and immersive VR; collaborative training environments; and co-operative team-based training using corporate knowledge networks.

The CORONET project, for example, is integrating corporate knowledge networks and group learning processes. DERIVE is combining the use of robotics and informatics within virtual reality-based training systems. A-TEAM focuses on advanced training systems for emergency management (see box). VirTEPPE is creating a fully integrated learning and teaching channel for workers in the printing industry based on satellite, ISDN-DSL and internet technologies. Other industry-specific applications include aircraft maintenance (AITRAM) and aviation training (ASIMIL and ADAPT-IT).

Barriers between work and learning are disappearing: in the future the emphasis will shift from "training" to "job-related learning". As individuals take greater responsibility for their own professional development they will need to access work-related learning opportunities throughout their lives. People will be looking to learn where, when and how they need to – at the office, in the factory, on the road. Such learning will be self-determined, tailored and specific to their skill needs, but at the same time will bring the benefits of collaborative, team-based approaches.

The smart instructor

A new approach to advanced training for complex technical domains is being investigated under A-TEAM. Artificial intelligence technologies are being integrated with dynamic simulation modelling to create a fully interactive real-time knowledge-based system for emergency management applications. The system guides the learner through a simulated emergency and monitors student reactions, providing additional help and feedback where necessary.



IST is a key tool for job-related learning

From the employer's perspective, the challenge is to integrate learning into day-to-day working processes as part of an overall approach to managing knowledge and leveraging the organisation's intellectual capital. The increasing relation to work implies the application of knowledge to real tasks with an element of "learning-by-doing".

Thus, we should think in terms of flexible individual learning solutions available on a ubiquitous basis and with complete mobility. Mobility is a complex concept, not just a question of the use of portable devices. It may include movement between jobs and the ability to learn either on- or off-the-job, as well as learning flexibly at different times or in different places. Research priorities include new methods of learning, as opposed to well-understood patterns of computer-based training, and the application of innovative learning methods within companies.

Further info IST Action Lines:

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Commission Contacts: Web:

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IST-2000 III.2.2
ADAPT-IT
AITRAM
ASIMIL
A-TEAM
CORONET
DERIVE
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Advanced training systems
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IST-1999 12241
IST-1999 12241
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Smart government

With mounting pressure for more efficient government, public administrations at all levels are having to rethink the relationship between the public, private and voluntary sectors. Local, regional and national authorities are having to co-operate more closely, including with administrations in other member states. At the same time, the demands on public agencies are increasing, with more concerted approaches being expected in areas such as crime prevention and public safety. The public is also demanding increasing scrutiny and consultation and the opportunity for democratic participation.

Information and communication technologies (ICT) promise to revolutionise public services over the next decade. They will empower public administrations to provide their customers with responsive and efficient access to government information and services. As we move into an era of user-driven service provision, administrations across the EU will be able to exchange data, documents and information between themselves and transact with individual citizens and enterprises. Improvements in efficiencies and speed of transactions are expected to generate significant cost reductions, with consequent savings and competitive gains for companies, more customised services for citizens, and potential savings for tax-payers.

Re-engineering the Structural Funds

With around 20 million people out of work, unemployment remains a critical concern for the European Union. The European Structural Funds are an important mechanism for addressing employment issues but their administrative procedures are notoriously complex. EMPLOY is developing innovative multimedia tools and services to support the management of the Structural Fund process. Starting with an identification of user requirements, the project will re-engineer management processes and define a global systems architecture to support the actors concerned. The resulting user-friendly, web-based services will automate work flows and allow SMEs and citizens to easily access the relevant officials. The re-designed processes will be validated in four EU Objective 1 regions.

IST's RTD in support of administrations focuses on this new generation of citizen-centric public services. It aims to develop advanced multimedia systems and services that enable public agencies to work more closely with the public and with each other. Such systems should facilitate the exchange of data in both directions and streamline working practices between different levels of government. Innovative systems to support and improve democratic process are also a key concern.

Administrations can use IST to provide better access to public services, as with this virtual meeting environment developed under Esprit project HOME-VR



Where possible, applications are based on common data formats, tools and process models that enable the development of integrated systems and services. Applications need to be standardised, interoperable and re-usable to allow for the fast development of integrated e-services. The standardisation of user interfaces and data structures and the interoperability of administrative applications will permit sets of e-services to be linked in ways which provide users with intelligent choices, customised to their requirements. Trustworthiness, data privacy and multilingualism are also important issues.

The AIDA project, for example, is developing and demonstrating a technical platform for administrations to use e-documents within a flexible and secure environment. Key elements include a secure terminal for creating and reading back electronic signatures; a mutually-acceptable document format based on XML; and a management platform for e-Administration Services. FASME is developing an employment documentation system for mobile workers based on JavaCards. CENTURI21 is a Community Empowerment Forum that promotes the widespread use of electronic services by citizens. EUSlanD is a knowledge management model for local government that allows local and regional administrations to share their information resources more effectively. And TRIDENT is developing a tool for land use planning for local authorities that integrates a variety of mature technologies.

PACE is an accompanying measure that aims to accelerate and expand the market for public e-services. Working closely with Telecities, Europe's largest grouping of local authorities, PACE provides a learning environment for public authorities on e-services issues. It hosts workshops and conferences, organises surveys and training, and maps trends as part of a wide-ranging programme to enhance the successful deployment of e-commerce in the public sector.

The WP 2000 action line, Smart Government 2005-2010, focuses on longer-term research for national and local administrations. One emphasis is on advanced user assistance systems that provide citizens with access to government online services from home terminals, public kiosks or on the move. Another priority is systems, such as personal assistants and intelligent agents, that enable users to access e-services when abroad.

Further info IST Action Lines:

IST-1999 I.4.1

Systems enhancing the efficiency and user-friendliness of administrations
Smart government 2005-2010

Project References:

IST-2000 I.3.1
AIDA
CENTURI21
EMPLOY
EUSlanD
FASME
PACE
TRIDENT

IST-1999 10497
IST-1999 10191
IST-1999 10007
IST-1999 12115
IST-1999 10882
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Natural interaction

Despite the efforts of designers and engineers over many years, most people still find ICT applications, devices and services complex. As users, either we waste time in trying to get the service or device to function as it was intended or, more likely, we give up altogether. Only the most enthusiastic or technically-aware are prepared to invest the time and effort into getting the most out of the system. We still have a long way to go to make applications truly "user friendly".

For new ICT products and services, such as mobile devices, virtual environments and e-commerce, to enter the mainstream, we need more natural, intuitive interfaces. Systems should work the way people work and should be able to recognise and respond to actions such as touch, pointing, speech, gesture and expression, as well as the keyboard. These so-called multi-modal interfaces offer the prospect of making machines, systems and services much more productive. In particular, speech, being the most natural means of human interaction, is likely to be one of the most important modalities in future systems. Incorporating speech and natural language technologies can make it much easier to manage or access information, or to control a complex application.

Natural interactivity is a key theme under the IST Programme's RTD in Human Language Technologies. The research aims to enhance the naturalness of human-computer interactions and the effectiveness of interpersonal communications. Areas covered include spoken and written language input-output, and mono- and

European speech recognition

State-of-the-art speech recognition technology still lacks robustness with respect to environmental conditions and speaking style. In addition, most research effort has been devoted to American English. The CORETEX project aims to improve current technology by making it less sensitive to environmental and linguistic factors, and more suitable to European languages. This is being achieved by the development of generic speech recognition technology capable of adapting dynamically to new domains and languages with little training or contextual data.

multi-lingual conversational systems with advanced understanding capabilities. Interaction modes other than speech are also supported.

IST's SPOTLIGHT project is researching methods to extend spoken language technology into mass market e-commerce services in the financial services and travel industries. Users will be able to create customised transaction interfaces to suit their own requirements. SPEECON is promoting the integration of multilingual speech recognition technology into consumer devices such as mobile phones, TV controls and car navigation kits. SMADA aims to automate a large proportion of the requests made to telephone directory assistance services. And I-EYE is investigating accurate and affordable tracking devices based on eye movements.

Further info

IST Action Lines:

IST-2000 III.3.1
IST-2000 V.1.2 CPA2

Project References:

CORETEX
I-EYE
SMADA
SPEECON
SPOTLIGHT

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Natural interactivity

User-friendliness, human factors, multi-lingual and multimodal dialogue modes
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IST-1999 11883
IST-1999 10667
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Managing digital collections

Libraries, museums and archives face huge challenges in the way that they acquire, preserve and offer access to their collections in the digital age. Although having similar objectives, the different types of institution tend to use different technologies and working methods. With more cultural objects, especially documents, being created digitally without any physical equivalent, new issues are raised in terms of cataloguing, search and preservation. As the different types of institution move closer together, they are seeking common frameworks for managing digital collections and content across the cultural sector.

For users, the value of libraries, museums and archives lies not only in their own resources but as gateways to huge distributed collections in other cultural institutions. This, too, poses major challenges in terms of content management: namely how to provide the user with seamless, high value, interactive services based on these distributed resources.

New gateways to academic information

As the internet continues to expand rapidly, no single gateway or portal can hope to catalogue all the resources available online. A distributed model is required where each country takes responsibility for describing the quality resources available on its national network. REYNARD is fostering such a collaborative model on a European scale. A Europe-wide brokering service is being initiated that will provide integrated access to national networks of subject gateways and metadata repositories. As well as contributing to standardisation, the project will develop new business models for this type of service.

The key objective is to establish a European cultural space based on interoperable platforms and standards. Projects initiated over recent years have provided progress in this respect, establishing standards, technical guidelines and management frameworks. For example, NEDLIB, an FP4 project, addressed technical issues for deposit libraries in managing electronic publications. Wider developments in standardisation, such as MPEG-4 and MPEG-7, are also of significance for cultural applications. By embedding metadata into the objects themselves, these multimedia standards will lead to much richer search encoding and retrieval facilities.

The IST Programme is supporting RTD into new ways of representing, analysing, manipulating and managing cultural objects in the digital environment. The work addresses technical and organisational issues regarding distributed collections and very large-scale digital repositories. This includes content management and long-term preservation. Models for future virtual collections and guidelines for integrating real and virtual objects and collections are also emphasised.

DELOS is a network of excellence on digital libraries. It provides an open forum within which to debate and set an international research agenda and stimulates exchange of know-how and best practices. ECHO is developing a reusable software architecture for digital film archives which will facilitate web-based access to documentary film collections of great historical value. The system will also improve the productivity and effectiveness of the archives and ensure their usability for the long term. COVAX is drawing up a global search and retrieval solution for all types of archive, library and museum collections based on the application of SGML/XML.

Further info

IST Action Lines:

IST-2000 III.1.4
IST-2000 III.1.5
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Project References:

COVAX
DELOS
ECHO
REYNARD

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Access to digital collections of cultural and scientific content
Trials on new access modes to cultural and scientific content
Virtual representations of cultural and scientific objects

IST-1999 11820 www.covax.org
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IST-1999 10562 www.renardus.org

Better statistics

Accurate and reliable statistics are crucial to our understanding of economic and social phenomena. They enable us to quantify trends in business and society. They also enable us to make linkages between key variables, even ones which at first sight may seem unconnected. At a time of such profound and rapid change, statistics are especially important in benchmarking the many new facets and trends of the emerging digital economy.

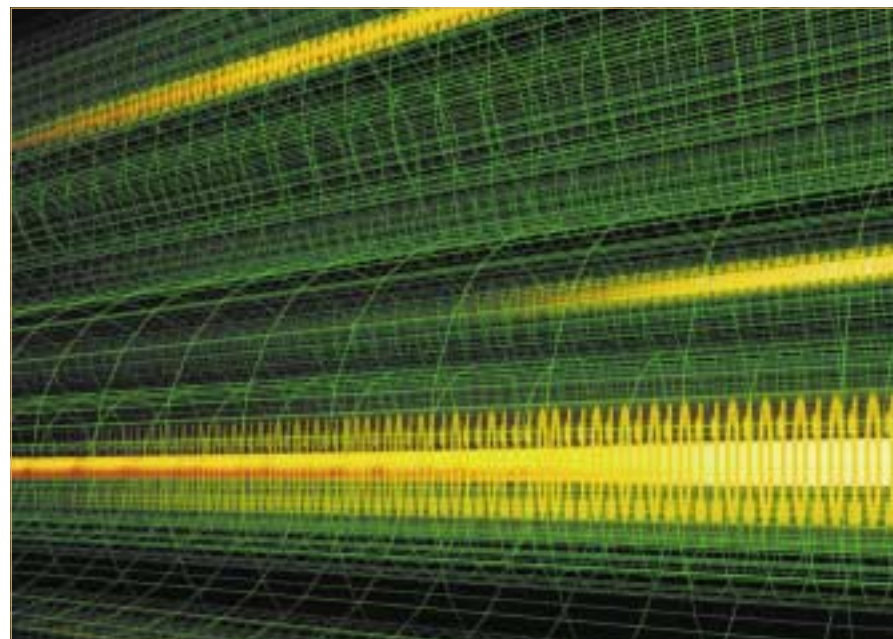
The development of new statistical tools, methods and indicators is supported as a Cross Programme Action under the IST Programme. The work aims to demonstrate and disseminate the use of these new approaches in ICT-based applications while serving the needs of official statistics within the European Statistical System. Under WP 2000, priorities include statistical data mining, statistical modelling and the representation of non-numerical data. The use of administrative data, particularly business registers, for statistical purposes is also addressed, as

Data quality in social statistics

The harmonisation of surveys run by national institutes is of growing importance for the European statistical system. The European Community Household Panel (ECHP) is a statistical instrument for regular reporting of social dynamics. Recent changes in ECHP methodology for three countries could have implications for data quality. The CHITEX project tries to clarify whether it is necessary to have centralised, standardised survey instruments to achieve harmonisation and comparability, or whether the same objective can be achieved through ex-post harmonisation based on national sources.

well as improvements in quality and in timely and low-cost data production. The definition, measurement and exploitation of new socio-economic statistical indicators for the Information Society is also a priority issue.

Accurate statistics are essential to our understanding of the digital economy



Data mining for geo-referenced data

Data mining systems (DMS) and geographical information systems (GIS) are complementary tools for analysing and modelling data about real world systems. The rapidly expanding market for these technologies is driven by pressure from the public sector, environmental agencies and industry to provide innovative solutions to a wide range of problems. Most contemporary GIS have only very basic spatial analysis and data mining functionality. Typically, this is confined to comparing maps and descriptive statistical displays like histograms and pie charts. Data mining techniques offer many potential benefits for applied GIS-based decision making. SPIN! is integrating DMS and GIS tools into a data mining system for geo-referenced data. The system has an open and extensible architecture based on internet technologies. It will be tested in the analysis of seismic and volcano data, and in disseminating census data over the web.

Several IST projects focus on the collection and classification of statistical data. IQML, for instance, aims to provide a solution that will enable agencies to collect statistical data more quickly and cheaply while reducing the reporting burden on enterprises. The solution combines XML and CORBA technologies in a form of intelligent questionnaire. METAWARE focuses on the development of a standard metadata repository for data warehouses and standard interfaces to

exchange metadata between data warehouses and the basic statistical production system. CLAMOUR is a cluster project concerned with improving the quality of existing and future statistical classification systems.

Other projects apply IST solutions to the dissemination and use of statistical information. A user-friendly analysis tool that will enable non-experts to interrogate and interpret commercial statistical databases is being developed by X-STATIS. MISSION aims to provide a software solution to enable statistical data providers to easily publish data on the Web. As well as reducing costs for the data providers, the agent-based solution will allow users to share methods and datasets.

BUSY proposes new tools and practices for analysis of the business cycle for use by European national statistical offices. New tools and services to enable public administrations to design, organise and disseminate public information systems based on statistical information are being targeted by IPIS. The systems will assist public agencies in effectively using and exploiting information from distributed sources. VL-CATS is a virtual library for computer-assisted training in statistics, accessed via distance learning or self-study sessions.

Further info		
IST Action Lines:	IST-2000 V.1.8 CPA8	Statistical tools, methods, indicators and applications for the Information Society
Project References:	BUSY CHINTEX CLAMOUR IPIS IQML METAWARE MISSION SPIN! VL-CATS X-STATIS	IST-1999 12654 IST-1999 11101 IST-1999 10122 IST-1999 12272 IST-1999 10338 IST-1999 12583 IST-1999 10655 IST-1999 10536 IST-1999 10971 IST-1999 12134
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The flexible university

With higher education now a global market and knowledge transfer increasingly seen as the key driver of wealth creation, universities are having to re-invent themselves. To compete in an increasingly commercial and international market, European higher education institutions are collaborating in developing competitive curricula. They also face a major new challenge as knowledge providers in individuals' life-long learning.

For universities to offer flexible, easy access they need more open technological solutions. Information and communication technologies (ICTs) offer the prospect of flexible learning services that meet user needs in terms of range, access and costs while adopting innovative learning processes. ICTs allow learning to be effective and cost-efficient and tailored to the needs of individuals who are demanding and increasingly mobile. They also allow institutions across Europe the opportunity to collaborate in producing, managing and delivering the curricula and skills required by future students. ICT is critical for universities in their emerging role as "knowledge centres" for lifelong learning.

Universities are the knowledge centres for lifelong learning



Design your own courses

UNIVERSAL is investigating the feasibility of an open exchange system for academic course units. The aim is to develop a brokerage platform, based on common models and standards, that will enable lecturers to enrich their curricula with remotely sourced units. Different classes of course units will be covered including live, person-to-person units and packaged, person-machine units. The system will be compatible with a variety of current business models including open universities. Students will benefit from a wider choice of course units and from virtual mobility based on mutual recognition.

Tomorrow's universities will be very different from those of today: increasingly virtual institutions serving a much wider client base. Curricula will be produced collaboratively from distributed educational resources, and flexibly managed and delivered to learners worldwide. The boundaries between academic education and vocational training will become increasingly blurred as

learners access personalised and flexible learning services, available as and when they want them, as part of a continuum of lifelong learning. Students will no longer be confined to one curriculum but will be able to build their own based on courses from multiple institutions.

IST's action line on the Flexible University aims to integrate and demonstrate emerging ICT technologies in higher education. The approach focuses on applications-oriented research involving innovative learning processes and delivery methods. Aspects covered include: collaborative learning and self-assessment; broadband networks and new internet technologies; and standards-based solutions for co-operative development, sharing and reuse of educational objects. The aim is for a set of compelling ICT-based demonstrations that contribute to open

A virtual design school

A virtual school of architecture, civil engineering and environmental design is being set up under WIND. The system comprises a networked tutoring environment for teaching design involving contributions from 23 universities in 10 European countries. Students will have access to services through the internet by means of shared tools, web-browsers and commercial CAD systems. Co-operation between students (peer tutoring) and between students and teachers (remote tutoring) will be supported by groupware tools.

standards and build cross-sectoral links and partnerships. The best practices studied will be disseminated throughout Europe.

Several projects focus on personalised course delivery. LEDA, for example, is developing a networked system to support post-graduate education in the field of digital media. The project will generate an international knowledge base on digital media production processes, methods and techniques, which will be used by universities and industry to access research results and learning materials interactively. PEARL is developing a collaborative environment for science and engineering students to undertake experiments.

Another area of interest is collaborative course production. A Web-based framework for sharing high-quality learning material over the internet is being developed by OR-WORLD. An important issue in this, and other projects, is the "granularity" of the educational content – at what level should the teaching resources be re-usable (course, lecture, media elements etc)?

User-friendly brokerage systems for university courses is also an emerging area. CUBER is developing a system to support individuals and corporations in finding a three-dimensional match in courses between vocational demands, academic offers and individual learning conditions. Using brokering middleware, it will integrate European universities within a virtual network through a common knowledge base of standardised course descriptions.

Further info

IST Action Lines:

IST-1999 III.3.2
IST-2000 III.2.2

Project References:

CUBER
LEDA
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The flexible university The learning citizen

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Managing knowledge

Knowledge is the currency of the Information Society. Whereas in the industrial era the key asset was capital, in today's knowledge organisations the dominant asset is knowledge. Just as capital assets can be acquired, used, depreciated and then replaced, so intellectual assets are captured, applied, maintained and perhaps ultimately deleted through the knowledge lifecycle. Indeed, such intellectual assets are only of value to the organisation through their capture, application, and reuse. If people are unable to share their precious intellectual assets with colleagues, their value to the organisation may be lost. This fluidity presents a new challenge for knowledge organisations and is the central issue in knowledge management.

Knowledge management is not a new development. For many, it has its roots in the business process redesign (BPR) movement of the late 1980s and early 1990s. BPR involves the transformation of enterprise processes, information infrastructures, work situations and related resources into more optimal configurations. While a variety of BPR concepts, tools and techniques were developed, the approaches were never completely formalised. In particular, BPR approaches took little account of the informal tacit information that is the daily currency of knowledge workers, and did not draw on the underlying motivations which lead knowledge workers to share their knowledge. Throughout the BPR movement, knowledge continued to reside in the collective memory of the workers themselves, and was thus poorly preserved and managed.



*Knowledge management
is the glue in modern
organisations*

Over recent years, attention has shifted to corporate or organisational memory as one of the main themes in knowledge management research. Organisations routinely "forget" what they have done in the past and why they have done it. As a result, they have an impaired capacity to learn because they are unable to represent critical aspects of what they know. Indeed, sometimes they are incapable of even knowing what they know. Since the effective use of knowledge is the source of competitive advantage for knowledge organisations, how they manage their knowledge assets is vital to their long term survival.

In commercial terms, the value of knowledge management is not just in accumulating and preserving knowledge but in sharing it. As knowledge is made explicit and managed it enriches the organisational environment and becomes a basis for communication and learning. Provided the appropriate culture is established, knowledge can be readily shared among individuals working alone, by teams working on a project, and across the organisation as a whole.

The breadth of these links underlines the importance of knowledge management as the "glue" in the knowledge economy. From organisational and technological perspectives, knowledge management underpins strategic issues, many of which are addressed under related areas of the IST Programme. So, for example, it is central to understanding models of mobile and ubiquitous work ("e-work"); to the way in which enterprises can transform themselves into smart, knowledge-driven, agile organisations; and to how individuals themselves learn within the modern organisation. It also has implications for how organisations within a value network can associate dynamically in response to new market

opportunities. Another key linkage is to the emerging study of new techniques of information visualisation.

A variety of commercial tools for knowledge management are already available, such as text databases, and groupware and intranet tools with varying degrees of interactivity. In general, these employ relatively weak models for acquiring and representing inter-related text documents (via hypertext links, for example) that can be distributed and navigated through web browsers and repository servers. But current commercial tools make relatively little use of knowledge engineering, reasoning or intelligent systems techniques, and draw on sometimes primitive understanding of how individuals socialise and collaborate in complex and changing environments. Much remains to be done, in the area of RTD, in relation to knowledge acquisition and representation and the implementation of user-friendly knowledge management systems.

Within the IST Programme, knowledge management is a generic activity spanning all of the work in Key Action II. The aim is to develop novel knowledge management solutions that empower individuals and organisations to be more creative, innovative and responsive. The emphasis is on practical, easy-to-use solutions that exploit novel, intelligent knowledge management technologies, applications and methods. Many of these cut across functional or organisational boundaries making it possible to extract and recombine knowledge within and between organisations.

Further info
IST Action Lines:

IST-2000 IL.1.2

Commission Contacts:
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Knowledge management for
e-commerce and e-work
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Passports for mobile workers

As Europeans become more mobile they are changing jobs more frequently and are more likely to work in another member state. When changing job the migrating worker is required to present a whole variety of documents to the local municipality or to the future employer, such as birth certificate, notice of change of address or examination certificates. They also have to cope with different rules and regulations than they are used to in their home country. Local civil servants may have problems with documents which are in a foreign language or an unfamiliar format, or are incompatible with local requirements in other ways.

Thus, administrative requirements can present major obstacles to mobility. Public administrations are also disadvantaged, for example through delays when documents need to be translated. And for employers, administrative problems can limit the workforce's flexibility and obstruct in recruiting qualified staff.

The FASME project aims to improve the user-friendliness of European public administrations in their dealings with mobile workers. A system of data exchange for mobile worker's data is being developed based on JavaCards. The JavaCard technology will allow the storage and processing of data as determined when manufacturing the card but will also allow changes to the card's functionalities and data to be made easily later on. This means that new applications can be added upon request in any office with a card writer-reader terminal while allowing the cardholder to retain possession of the card.

The individualised JavaCard will be able to authenticate the cardholder and to encrypt and decrypt the personal data. It will then be able to transform the data according to the requirements of the receiving country and to record the

registered data as produced by the civil servants at the new destination. Cryptographic functions will safeguard the citizen's right to privacy and so form an importance aspect in public acceptance. Three scenarios will be supported initially: "change of workplace", "change of personal address" and "registration/cancellation of cards".

FASME is addressing all aspects of the process, from business models and social and legal aspects of the technology, through to technical specifications and prototype systems. User needs are at the forefront: these are being identified through a series of workshops with civil servants and end-users from different European countries. The workshops inform the development of business process models for the administrative activities created by the migration of workers between one member state and another.

The outputs will be a generic infrastructure and applications hardware, software and process design facilitating the use of JavaCards in administrative procedures. Prototype implementations are planned in Newcastle (UK), Köln (Germany) and Grosseto (Italy), as a first step towards Europe-wide deployment.

Smart card technology will help workers move around more easily



Further info		
IST Action Lines:	IST-1999 I.4.1	Systems enhancing the efficiency and user-friendliness of administrations Administrations IST-1999 10882 gerald.santucci@cec.eu.int
Project References:	IST-2000 I.3	
Commission Contacts:	FASME	
Web:	Gérald Santucci www.cordis.lu/ist/ka1/administrations/home.html	

Gone e-fishing!

In the digital economy no industry is immune from change. Even sectors that are traditionally considered low-tech and rather conservative, such as agriculture, forestry, fisheries and mining, are waking up to the tremendous opportunities presented by e-business. Although computers might still be a rare sight on farms or fishing boats, new approaches and business models, such as electronic brokerage and auctions, are raising significant interest.

INFOMAR, an Esprit project, successfully demonstrated strategies and tools for introducing e-commerce and information systems into European fish markets. The fishing industry, like other agricultural and extractive sectors, makes relatively limited use of IT. There is little advance information about catches and, as the product is highly perishable, the markets are prone to sudden gluts and shortfalls of fish, leading to wild fluctuations in prices and dissatisfied customers. If the information flow is separated from the physical flow of fish then it can be directed to potential buyers in time to influence their purchasing decisions.

INFOMAR developed three business applications called FishCast, FishTrade and FishCatch. FishCast is an electronic information service allowing fish markets to exchange supply and price data over the internet. FishTrade gives professional buyers the opportunity to purchase fish through markets around Europe even though the produce itself might still be on a vessel at sea. It is primarily a mediation system, allowing

the market-maker to make trading agreements over the internet. Sophisticated trading algorithms and parameters can be set so that the mediation process can be automated. FishCatch enables vessels at sea to communicate securely with their agents and markets so that they can participate in FishCast and FishTrade.

The Infomar trading system has numerous advantages, the most significant of which is improved market stability. With supply data available in advance, buyers can plan their purchases with certainty thus avoiding the wild swings in price that can occur in relatively isolated local markets. Participation from remote buyers means that demand is distributed over a wide geographical area, resulting in higher net values at less volatile prices. In particular, it allows higher price catches to be considered by a wider range of buyers than attend the daily markets in person.

For the buyers, the internet auction allows them to see what is coming into the market and trade from the comfort of their own offices rather than having to attend the auction in person or ring around their agents. And having better market information enables them to make better informed trading decisions.

Similar projects in non-IT intensive sectors are being supported under the IST Programme. CHAINFEED, for example, is developing a virtual supply chain for the European agri-food business, and INTERDEV is investigating a collaborative working environment for the agricultural sector.

Further info		
IST Action Lines:	IST-2000 II.3	Management systems for suppliers and consumers IST-1999 10625 Esprit 22201 IST-1999 10918 paul.timmers@cec.eu.int
Project References:	CHAINFEED INFOMAR INTERDEV	
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Web:	www.ispo.cec.be/istka2/c3 www.ispo.cec.be/ecommerce/clusters/transaction.html www.schelfhout.com	