# > Foreword

The competitiveness of enterprise and industry is at the heart of Europe's efforts, under the renewed Lisbon strategy for growth and jobs, to build a dynamic knowledge-based economy and society. European business must seize the opportunities created by globalisation, technological innovation and social and environmental challenges to generate the wealth on which the European social model depends.

To help achieve this, the European Commission is taking major concrete steps towards more favourable conditions for European business, as this brochure details. Among many other measures, these efforts are reflected in a drive to cut red tape through the better regulation initiative, a refocused approach to industrial policy, a priority to research and innovation, and actions to better harness the energy and inventiveness of small firms which are the engine of the European economy.

Of course, the Commission can only go so far on its own. Our efforts are built on a partnership with the business community and with the Member States so as to develop Europe as a magnet for innovative and responsible enterprise.

The competitiveness of industry within the developing digital economy is a cornerstone of the new Industrial Policy to make the EU a more attractive place for investment and of "i2010 – A European Information Society for Growth and Employment". i2010 presents an ambitious initiative that allows European enterprises to capitalise on emerging opportunities from information and communication technologies (ICT) by promoting an open and competitive internal market, increasing ICT investment in innovation and research, and emphasising ICT as a driver of inclusion and quality of life. Our goal is to create favourable framework conditions in Europe to address the fast-evolving needs of the ICT sector and of ICT user industries and - as a result - to boost the ability of all European enterprises to rise to the challenges of today's global marketplace.

We welcome this brochure as an illustration of how innovation in ICT is contributing to a European policy for a more forward looking knowledge-based economy and society.

Viviane Reding
European Commissioner for
Information Society and Media

Günter Verheugen
European Commissioner for
Enterprise and Industry

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# > Challenges for Enterprise

European business and industry must remain competitive if Europe is to maintain and improve the quality of life of its citizens. The challenges in achieving this are many and varied, reflecting the diversity of business itself.

Small and medium-sized enterprises (SMEs) form the backbone of the European economy. Accounting for 99% of enterprises, Europe's 23 million SMEs are the main source of new jobs and play a key role in enabling Europe to compete in world markets. As the knowledge economy matures, we have to equip SMEs with the capabilities and skills to grow and prosper.

eBusiness and ICT skills are now important drivers in all economic sectors. Effective use of ICT throughout the value chain enables firms to improve productivity and efficiency, and makes them more competitive. European policies aim to encourage the efficient uptake of ICT and eBusiness among European enterprises, as well as enhancing the competitiveness of the ICT sector itself.

Given its importance for competitiveness of the European economy, innovation is one of the cornerstones of the relaunched Lisbon strategy to boost growth and jobs. Here, European innovation policy seeks to build a more innovation-friendly environment throughout the EU, and to stimulate technological innovation and the setting up of innovative technology businesses. It also seeks to nurture the skills of individual entrepreneurs (or would-be entrepreneurs), including those from disadvantaged groups.

Today, there is a growing recognition among enterprises that sustainable business success and shareholder value cannot be achieved solely through maximising short-term profits. Companies of all sizes are seeking to grow in more sustainable ways, and to integrate social and environmental concerns into their business operations and their interactions with stakeholders. Hence, there is a broadening interest in corporate social responsibility, including among SMEs.

The dynamism of industry is essential for Europe to sustain and increase its prosperity while meeting wider social, environmental and international ambitions. Industry in the enlarged Europe has many strengths, but is also underperforming in key areas of productivity, innovation and research spending. Thus, "horizontal" issues are complemented by a wide range of policies and activities targeted at specific industrial sectors. These range from manufacturing industries such as aerospace, automotive, chemicals and pharmaceuticals, to service sectors such as business and financial services, distribution and retailing, utilities and tourism.

Finally, enterprise policy plays a major role in facilitating the Single Market by simplifying the regulatory environment for business and harmonising technical standards. Activities in the field of standardisation are covered in the separate *Information Society Policy Link* brochure on Standards.

# > Enterprise: Innovation and Industrial Policy

The EU's enterprise policy aims at creating a favourable environment for enterprises and business in Europe, thus creating sustainable growth and the jobs and wealth necessary to meet the Lisbon goals.

It is vital that national and European measures complement each other so as to achieve a more dynamic, innovative and attractive Europe. Following the 2004 Kok report, the EU and Member States have redoubled their reform efforts resulting in the relaunched Lisbon strategy to boost growth and jobs. Key commitments as part of these reforms include: improving the effectiveness of the Internal Market, ensuring open and competitive global markets, better regulation, reinforcing Europe's industrial base, boosting innovation, and increasing invest-ment in R&D, education and skills.

To prioritise the needs of SMEs in the new partnership for growth and jobs, the Commission is pushing for the integration of the "think small first" principle into all EU and national policies. This means assessing initiatives from the point of view of smaller businesses and ensuring SMEs' needs are prioritised. The Council, too, has given its strong endorsement to policies that offer SMEs the support and advice they need to meet today's business challenges, in clear appreciation of the fact that these challenges are often greater for SMEs than for their larger counterparts.

SME policy is founded on the European Charter for Small Enterprises, which identifies ten action lines for the Commission and the Member States in improving the business environment for SMEs. Its follow-up has generated a valuable stock of good practices which help to improve the small business environment throughout Europe. At Community level, support programmes for SMEs and entrepreneurship, among others, are being brought together under the new Entrepreneurship and Innovation Programme, part of the Competitiveness and Innovation Framework Programme (CIP) which will run from 2007-2013. In addition, an SME Envoy has been appointed to listen to SMEs and their representatives and ensure the SME dimension is better integrated in EU policies.

In October 2005, the Commission launched a new industrial policy to create better framework conditions for manufacturing industries in the coming years.

It includes seven new initiatives – on competitiveness, energy and the environment, intellectual property rights, better regulation, industrial research and innovation, market access, skills, and managing structural change – which will benefit a wide range of industry sectors. Actions include the setting up of an ICT Task Force to make recommendations for improving the competitiveness of Europe's ICT sector and the uptake of ICT in Europe.

The Commission is delivering on its better regulation promise, with an ambitious programme intended to ensure that Community legislation is clear, under-standable, up-to-date and user-friendly. Following on from the decision to with-draw more than a third of pending legislative proposals, the Commission is now focussing its efforts on improving the existing 80,000 pages of EU legislation. The new simplification policy aims to verify the proportionality of existing legislation, while proposals for future Community legislation will undergo screening and impact assessments to the same end.

Other recent developments in the enterprise and innovation policy framework include:

❖ The launch of a new, broad-based Innovation Strategy that points the way forward for accompanying industry-led innovation with public policy initiatives at national and European levels. It includes a ten-point Action Plan.

❖ With energy and environmental issues coming to the fore, the Commission has set up a High Level Group on Competitiveness, Energy and the Environment. It will advise on the links between industrial, energy and environmental policies in order to foster consistency in policy and legislative initiatives, and create a more stable and predictable regulatory framework. The Group is a joint initiative of, and is co-chaired by, the Commissioners for Enterprise and Industry, Environment, Competition and Energy.

# > Where the Information Society meets Enterprise

Information and communication technologies (ICT) play a vital role in fostering innovative products and business processes. Few sectors of the European economy have not felt their impact and incorporating electronic business into internal and external company activities is crucial to European competitiveness in sectors as diverse as electronics, finance and media. Not surprisingly, then, information society and enterprise policies are increasingly inter-related.

Collaboration is a key theme in the networked economy. New ICT solutions enable firms to collaborate more closely and more extensively – a prerequisite for more knowledge-intensive products and services. The introduction of technological solutions often requires new organisational forms to support collaboration and innovation, as well as advanced business models that meet the needs of collaborative commerce.

Community policies for the digital economy have developed rapidly over the last decade. In particular, the eEurope 2005 Action Plan targeted a dynamic eBusiness environment and pursued a package of measures in relation to e-skills, interoperability, trust & confidence, SME take-up and regulatory reforms.

The eEurope 2005 Action Plan has now been superseded by the i2010 strategy, which forms the information society component of the renewed Lisbon strategy to boost European competitiveness. i2010 is a comprehensive strategy for deploying and modernising EU policy instruments to encourage the development of the digital economy. As such it addresses the needs of both the European ICT and media sector, and 'end-users' in other industries.

From a business perspective, key measures under the i2010 programme include:

❖ A review of eBusiness policies and trends and assessment of the need for additional policy measures to remove regulatory, organisational and legal obstacles to the take-up of ICT and eBusiness.

❖ Review of standardisation for ICT.

❖ Analysis of the possible application of the public procurement directives to pre-commercial procurement and the procurement of innovation for the uptake of R&D.

❖ Launching of a public debate on radio frequency identification (RFID) and issuing of policy proposals.

Adding to the initiatives under i2010 is the review of the competitiveness of Europe's ICT sector within the ICT Task-Force, which will subsequently be considered by forums including the i2010 High-Level Group.

## Information Society Activities

*Research and Development*

Business and industry have long been a focus for European ICT research.

Under the Sixth Framework Programme (FP6), one of the main themes has been enterprise networking. Research focused on future business forms designed to exploit the opportunities offered by the technological and socio-economic revolutions of the 21st century. Key areas for research included: dynamic collaborative business networks; interoperability of enterprise software, applications and processes; new intelligent and networked products; and digital business ecosystems.

Another key theme was the development of next generation collaborative working environments as a basis for increasing creativity and boosting innovation and productivity. These environments should provide collaboration services to make possible the development of worker-centric, flexible, scalable and adaptable tools and applications.

**eContent***plus* (2005-2008) supports the development of multilingual content for innovative, online services across the EU. This information can often provide a basis for new or improved eBusiness services, including applications in industry sectors. The Programme promotes leading-edge technical solutions to improve accessibility and usability of digital material in a multilingual environment, including pan-European services, information infrastructures and showcases.

For the future, the **ICT Policy Support Programme**, part of the Competitiveness and Innovation Framework Programme (CIP), will build on the eTEN and eContent*plus* programmes and will support the aims of i2010, the new integrated strategy to boost Europe's digital economy. With a budget of €728 million, it will stimulate converging markets for electronic networks, media content and digital technologies, test new solutions to speed up the deployment of electronic services, and support modernisation of the European public sector.

Projects relevant for enterprise and industry are also found across a number of other FP6 research areas, in particular under the Strategic Objectives:

- ❖ Towards a global dependability and security framework.

- ❖ Advanced Grid technologies, systems and services.

- ❖ Embedded systems.

- ❖ Software and services.

- ❖ Semantic-based knowledge and content systems.

*Other Activities*

The **eTEN** Programme is concerned with the large-scale roll-out of public interest services, primarily in support of the i2010 initiative. Certain of these services relate to access to business information or to administrations' interactions with businesses, as well as work-related training and skills. Relevant projects are found under the eTEN action lines on eGovernment, eLearning, eInclusion and SME services.

# > Business Ecosystems for the Knowledge Economy

**Digital business ecosystems, which adapt to the needs of their users, offer SMEs a flexible eBusiness environment that will improve their efficiency and extend their business beyond local barriers.**

## Policy Context

Small and medium-sized enterprises (SMEs) are seen as the backbone of the European economy, and the best potential source of growth and new jobs. Consequently, the European Commission actively seeks to improve the financial and regulatory environment for SMEs and ensure they make the best use of ICT and eBusiness.

New business models and new ways of working are transforming the industrial world into a 'knowledge-economy'. The ICT to support both internal and external business processes is an important catalyst for this process. Being more followers than leaders of the change process, small organisations need particular convincing of the benefits of ICT and support in its implementation. The regional context is also important here: we need to identify technology strategies, supported by policies, which allow ICT to be incorporated successfully into local economic development.

Under the eEurope 2005 Action Plan, the Commission launched a number of initiatives to promote the development of a dynamic eBusiness environment. The European eBusiness Support Network (eBSN), a network of decision-makers and policy-makers, was set up to enable the exchange of good practice and to coordinate SME eBusiness support actions at regional, national and European level. A European observatory, e-Business W@tch, was established to provide information on the impact and uptake of eBusiness at sectoral level across the EU. And a variety of studies and reviews have been launched to analyse barriers and obstacles, at both European and national levels, to SMEs' take-up of ICT.

These measures are being built upon under the i2010 strategy, the information society component of the EU's renewed Lisbon agenda. This includes commitments to review eBusiness policies and trends so as to remove technological, organisational and legal barriers to ICT adoption, with a focus on SMEs. It will also develop tools to support new patterns of work that enhance innovation in enterprises and adaptation to new skill needs.

## Contribution of ICT

As SMEs conduct more and more of their business through collaborations and networks, the key focus in ICT is shifting from the individual enterprise to the supply chains of which they are a part, and to the wider 'business ecosystem'. Just as we can only get a proper understanding of nature by considering each of the species as part of an ecosystem, so we can only get a proper view of local economies by considering them as communities of interacting and evolving organisations.

This insight calls for a new approach to ICT infrastructure: one that enables businesses of all sizes, and especially SMEs, to develop, adapt and use innovative applications and services quickly and easily so as to compete in the fast-moving global economy.

Digital business ecosystems provide this leap. They are pervasive digital environments, populated by 'digital components', which evolve and adapt to local conditions. These digital components include software, applications, services, knowledge, business processes and models, training modules, contractual frameworks, and law — anything required to support firms' day-to-day business.

These challenges are being taken up under the IST Programme's work on ICT for Enterprise Networking. The Technologies for Business Ecosystems cluster comprises 13 projects addressing various aspects of the scientific, technological and socio-economic agenda surrounding this emerging field. Research follows the open systems philosophy and aims to create a coherent programme of work at European level.

## Creating the Digital Business Ecosystem

The Digital Business Ecosystem, being developed under the IST project **DBE**, is the first step towards a new approach to business networking that overcomes the limitations of current paradigms. It is an internet-based software environment in which business applications can be developed and used. The unique feature of DBE is that applications within the ecosystem are able to evolve and perform new functions that were not planned by their original developers.

DBE is an open source environment where even the smallest, specialist software developer can take part in the global marketplace for business applications. It will enable end-users to easily access and use those applications as services, and to have the benefits of intelligence, inter-action and adaptation as the software evolves in response to their own usage and that of others. Its initial target is complex commercial transactions and processes that are not easily or economically served by current state-of-the-art software technologies.

The project has released progressively more complex software implementations of the DBE. These are available from the project website under open source licences. There is also advice on how to get started and technical support for users. A learning and knowledge platform provides information about the DBE and training on its use.

## Building the Community for Digital Ecosystems Research

Given their holistic approach, digital business ecosystems require multidisciplinary fundamental research. **OPAALS**, an IST network of excellence which started in June 2006, aims to build a sustainable, interdisciplinary research community bridging the social science, computer science, and natural science domains.

OPAALS recognises that to achieve sustainable digital business ecosystems we need to understand in depth the way in which SMEs collaborate to create and share knowledge. It plans to develop an integrated theoretical foundation for research on the subject and is the first step towards a strong research community on open knowledge and open innovation.

> PROJECT DETAILS

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**DBE** - Digital Business Ecosystem
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**OPAALS** - Open Philosophies for Associative Autopoietic Digital Ecosystems
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# > Creative and Sustainable Business Networks

**Collaborative working environments offer Europe's SMEs the chance to operate successfully in tomorrow's global marketplace.**

## Policy Context

In today's knowledge-based economy, innovation relies increasingly on sharing knowledge within teams or supply chains and in applying creativity to solve problems and generate new ideas. Thus, collaboration is at the heart of the innovation process. This collaborative working may be between individual knowledge workers, between departments within a company, or between different organisations – even on different sides of the world.

EU innovation policies aim to create an environment to foster innovation and entrepreneurship. The foundations of current EU innovation policy were laid down in the Communication "*More Research and Innovation - Investing for Growth and Employment: A Common Approach*" (COM(2005) 488 final). It addressed the full spectrum of research and innovation, including non-technological aspects, and detailed the measures that will be undertaken in the coming years to support research and innovation. Alongside the 7th Framework Programme for Research & Development, it includes the Competitiveness and Innovation Framework Programme (CIP) which will support, among other measures, actions in relation to entrepreneurship, SMEs, innovation, and ICT development and use. The broad strategic framework is contained in the Communication "*Putting Knowledge into Practice: A Broad-based Innovation Strategy for the EU*" (COM(2006) 502).

eBusiness policies are also relevant here. Open and flexible business networks depend on affordable and dependable ICT infrastructure, as well as organisational and business innovation. The i2010 Strategy for Europe's Information Society has set out to modernise the eBusiness environment so that Europe is better placed to take advantage of the next generation of eBusiness solutions. Actions will be launched to develop a European network of 'Living Labs', large-scale testbeds that bring technology into real-life user environments. An overhaul of eBusiness policies is also underway to remove technological, organisational and legal barriers to ICT adoption, with a focus on SMEs.

## Contribution of ICT

Information and communication technologies are key in enabling enterprises – large and small – to collaborate and unlock creative potential. For SMEs, in particular, ICT allow them to work as virtual organisations or slick interactive supply chains, benefiting from the economies of scale normally only enjoyed by big business. Current applications include collaborative design, product development, order fulfilment and customer support. New areas for e-collaboration technologies will be to explore more sophisticated application domains so as to boost business innovation.

Many projects within the IST Programme have developed technology and applications to support collaborative working and promote them to potential users. Others have sought to integrate Europe's currently fragmented research activities into a coherent world-class programme.

### Adding Value to Collaborative Networks

**ECOLEAD**, an integrated project under IST-FP6, is developing technologies for networks of collaborative enterprises.

It foresees that in ten years time most enterprises will be part of one or more sustainable collaborative networks. These will act as breeding environments for the formation of dynamic virtual organisations (VOs) in response to fast-changing market conditions. ECOLEAD aims to make it easier for businesses to set up and operate VOs, and to enhance the added value businesses get from operating in this way.

The work focuses on three inter-related areas: breeding environments, dynamic virtual organisations, and professional virtual communities. It will ultimately provide a complete cooperation toolkit to support these dynamic networked organisations. This will, for example, support processes such as VO set-up, contract negotiation, performance measurement, collaborative problem solving, and day-to-day management.

## Encouraging Innovation and Creativity

Successful organisations generate competitive advantage through innovation and creativity. They are not innovative and creative by accident: they succeed by managing the innovation process. The IST project **CREATE** set out to increase European businesses' awareness of these issues. It studied and benchmarked a large number of methodologies and techniques to identify the 'best of breed'. Two industry sectors – home appliances and motorcycles – were used for field tests of the selected approaches.

Dissemination was an important aspect of CREATE. It produced an online handbook covering creativity management and creative techniques. A dozen case studies were included to illustrate the main messages. A programme of seminars was organised to present the project's conclusions, culminating in March 2005 with an international conference "*Create to Innovate*".

### Unlocking Creative Potential through Collaborative Working

Collaborative working environments (CWE) will be a major factor in strengthening and maintaining the EU's future competitiveness in the global marketplace. It is therefore important to establish an effective European research initiative to accelerate CWE development. **BrainBridges** aims to do this by bringing together a critical mass of regional and national funding organisations, research and industry players to develop a pan European forum for CWE research.

BrainBridges will start by building a sustainable community dedicated to knowledge exchange and the set-up of a coordinated European CWE research programme. This will be supported by a suitable networking infrastructure including an online meeting portal and collaboration platform. The results will provide a solid, common basis for policymaking and programme coordination.

## The Legal Dimension of Collaborative Working

Although networked business models are being taken up quickly by companies worldwide, these changes are not being matched by evolution in the legal framework. As a result new legal issues and barriers can arise that hamper the implementation of ICT and related business models. Through studies and consensus-building, the **LEGAL-IST** project is addressing legal issues and barriers to the adoption of new technologies and helping to shape the EU's regulatory framework.

### > PROJECT DETAILS

**BRAINBRIDGES** - Collaborative Technologies and Environments Enhancing the Seamless Creativity Process, Leveraging the Full European Potential
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**CREATE** - Creative Processes for Enterprise Innovation
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**ECOLEAD** - European Collaborative Networked Organisations Leadership Initiative
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**LEGAL-IST** - Legal Issues for the Advancement of Information Society Technologies
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# > Professional Learning for the Knowledge Economy

**Technology-supported lifelong learning is the key to providing Europe's knowledge workers with the skills needed to create a competitive, knowledge-based economy.**

## Policy Context

Structural change and productivity growth require continued investment in a highly skilled and adaptable workforce. Economies with a skilled labour force are better able to create and make effective use of new technologies, such as information and communication technologies (ICT). At the same time, advancing educational attainment makes an important contribution to social cohesion.

A Council Resolution on lifelong learning in 2002 stressed the need for all Member States to develop coherent and comprehensive strategies. Relevant actions are reflected in the work programme for Education and Training 2010, which also includes specific actions for vocational education and training (the 'Copenhagen process') and higher education ('the Bologna process'). This work programme is the education and training strand of the Lisbon strategy and aims to modernise Europe's education and training systems.

In addition, the European Employment Strategy (EES) highlights the important role of vocational education and training in delivering a competitive knowledge-based economy. Its goals include a significantly higher proportion of the workforce taking part in lifelong learning by 2010. It also encourages employers and individuals to significantly increase investment in improving the skills of the labour force.

The ICT Task Force, a stakeholder group set up under the Commission's new industry policy, is one of several initiatives that aim to help create a more favourable environment for business in the EU. Its eSkills and Employability Working Group presented its initial findings at the October 2006 eSkills Conference. The Task Force's recommendations will be used to help prepare a long-term strategy for ensuring adequate levels of eSkills in Europe. This will take the form of a Commission Communication and action plan in early 2007.

## Contribution of ICT

A strong link exists between human capital and business productivity. Investment in human capital increases productivity and is a direct source of innovation and long-term competitiveness. Continuous training is therefore a necessity, given the speed of technological innovation.

ICT has an important role to play in making continuous training or lifelong learning a reality for a larger proportion of Europe's workforce. 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. Thus, we have to think in terms of flexible individual learning solutions available on a ubiquitous basis and with complete mobility.

## A European Network for Research on Professional Learning

It is certain that technology enhances professional learning; therefore the research behind it must meet company needs. Helping to ensure such a partnership is **PROLEARN**, an IST network of excellence focussing on the improvement of professional learning in SMEs and larger companies, through taking up industrial requirements and newest research results.

PROLEARN brings together the most important research groups in professional learning, along with other key organisations and industrial partners to bridge the current gap between the academic and business worlds.

The Virtual Competence Centre (VCC) involves all consortium members in large-scale research cooperation and is encouraging exchange and transfer activities with industrial partners. In addition, the PROLEARN Academy coordinates educational activities like summer schools and PhD programmes, and outreach to the wider community through targeted workshops and publications.

PROLEARN awards, best practice examples, showcases and workshops are being used to advance European professional training in technology-enhanced environments. Roadmaps and policy guides support the charting and analysis of future trends in professional training tools, applications and scenarios.

## Research Foundations for Professional Learning

Building on research in technology-enhanced learning under earlier Framework Programmes, a number of IST-FP6 projects are probing the future of learning in a business and working context.

For instance, **TENCompetence**, an FP6 integrated project, is developing a technical and organisational infrastructure for professional competency development. Based on open source technologies, the infrastructure will allow individuals, teams and organisations to come together in networks which are actively involved in various applications and domains of knowledge.

These 'learning networks' will support the lifelong competency development of the participants from basic levels of proficiency up to the highest levels of excellence. Users will be able to gauge their ability to perform in any given domain and to effectively assess and analyse their skills. They will then receive advice and access to a network of resources that are designed to help them fulfil the requirements of, for example, a potential or current employer or a place of learning (college, university, etc.).

Another IST-FP6 integrated project, **PROLIX** is looking to align learning with business processes so that organisations can rapidly enhance the competencies of their employees in line with their evolving business requirements. PROLIX will support a complete learning process lifecycle, from the analysis of complex business situations through to the monitoring of learners' performance against defined goals. A process- and competency-driven framework is being developed to interlink business process intelligence tools with knowledge management and learning environments. The concept will be demonstrated in a series of testbeds in three different application fields.

Supporting informal learning and teaching activities for knowledge workers within their everyday working environments is the focus of **APOSDLE**, an FP6 integrated project. It will provide integrated ICT support for the three roles a knowledge worker has in the workplace, namely learner, teacher and worker.

> PROJECT DETAILS

**APOSDLE** - Advanced Process-Oriented Self-Directed Learning Environment
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**PROLEARN** - Network of Excellence Professional Learning
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**PROLIX** - Process-oriented Learning and Information eXchange
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**TENCompetence** - Building the European Network for Lifelong Competence Development
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# > A Smart Future for Manufacturing

**Making their products smarter and more customer-focused is key to the future for Europe's manufacturing enterprises.**

## Policy Context

Manufacturing is of crucial importance to the EU. The manufacturing industry employs over 34 million people, accounts for three-quarters of EU exports, and takes up over 80% of EU private sector R&D expenditure. Industry in the enlarged Europe has many strengths, but is also underperforming in key areas of productivity, innovation and research spending. European manufacturing enterprises, large and small, are having to adapt and restructure their activities in the face of globalisation and intense international competition.

Recognising these major challenges, in October 2005 the European Commission launched a new policy framework to strengthen EU manufacturing. As an important step in the delivery of the renewed Lisbon Partnership for Growth and Jobs, the new policy aims to create a favourable business environment for manufacturing in the EU, so that it can continue to develop and prosper.

The revised EU industrial policy will complement work at Member State level to support a strong and dynamic industrial base. It includes seven new initiatives – on competitiveness, energy and the environment, intellectual property rights, better regulation, industrial research and innovation, market access, skills, and managing structural change – which will benefit a wide range of industry sectors. Seven additional initiatives are targeted at specific sectors such as mechanical engineering, defence, and information and communication technologies.

Manufacturing is also a key focus under the i2010 strategy to boost Europe's Information Society as part of the Lisbon agenda. Actions identified with particular relevance to manufacturing include: a review of standardisation policy so as to accelerate the take-up of ICT-based innovations; the launch of two Joint Technology Initiatives as a new type of public-private partnership for ICT-based research; and policy proposals on radio frequency identification (RFID).

## Contribution of ICT

In today's competitive market, manufacturers have to make their products smarter and more customer-focused. One way of doing this is to design in added-value services as part of the customer offering. This is the 'extended product' approach which combines a product with services and enhancements that improve marketability. The benefits to consumers may reside more in the value-added elements than the physical product itself.

ICT will contribute significantly to these upcoming goods and products by making them 'ambient aware', i.e. the products will be knowledgeable about their geographical position (GPS), their neighbourhood (wireless networked), and always connected (mobile and broadband). Other enhancements can incorporate tangible features that make the product more intelligent, customised or user-friendly, including embedded features like maintenance awareness. Other aspects, such as services, engineering or software, are intangible and make the offering more information- or knowledge-intensive.

These capabilities can be delivered by realising, within the business environment, the vision of smart connected objects and places, also known as 'ambient intelligence'. The effect will be to enable a real-world Web that helps people (or computer systems) make smarter decisions as they encounter those objects and places in the real world.

## Embedded Systems: A Key Technology for European Manufacturing

Embedded systems – specialised computers used to control a wide range of equipment and systems – are a strategic technology for Europe. Today, embedded systems are just about everywhere: in cars, medical devices, aeroplanes, factories, electrical networks, in our living rooms and at work. They add value by bringing exciting, new functions to everyday products, and are increasingly becoming an integral and often invisible component of the world around us.

The **ARTEMIS** technology platform and proposed Joint Technology Initiative are helping to mobilise stakeholders and to build European capacity in embedded systems (see box).

Among research projects in this field, **ARTIST2** is an IST-FP6 network of excellence bringing together leading researchers in the field of embedded systems design.

### European Leadership in Embedded Systems

The **ARTEMIS** European Technology Platform for embedded systems brings together players from industry, SMEs, universities, research centres and public authorities. It is helping to create a coherent and integrated European research and development strategy for embedded systems.

The ARTEMIS Strategic Research Agenda (SRA) provides a common reference point for all stakeholders in the sector. Its principal objective is to direct research towards novel technical solutions to address the extreme complexity of new systems. Research focused on industrial priorities will cover reference designs and architectures, seamless connectivity, middleware, design methods, implementation processes and tools. More basic research will investigate new solutions to recognised problems and will explore the 'unknown', so that there is a steady flow of innovative ideas.

ARTEMIS is also concerned with optimising the innovation environment for embedded technologies. Overcoming fragmentation – in markets and R&D policies – will help to accelerate both product development and the evolution of appropriate standards and regulations.

To help implement the SRA, a Joint Technology Initiative (JTI) is proposed. This will be a public-private partnership that will allow private sector resources to be combined with national and European public funding to mobilise the necessary critical mass in embedded systems research. The regular Framework Programme instruments will also be used, mainly for the more upstream aspects.

### Ambient Intelligence Technologies for the Product Lifecycle

A cluster of 18 IST-FP6 projects is addressing the role of ambient intelligence in the product lifecycle, as part of research on ICT for Enterprise Networking.

Among the projects supported, **ILIPT** focuses on intelligent logistics for innovative product technologies. One of its goals is to support custom car manufacture rather than batch production. **SPIDER-WIN** is developing a way of managing a manufacturing supply chain of SMEs, without forcing the partners to use a common enterprise resource planning (ERP) system. **VERITAS** examined how to create virtual enterprises efficiently. And **V-CES** is developing a Virtual Cost Engineering Studio that can calculate the cost of product development and production in a networked environment.

**CO-DESNET** is disseminating the results of European research on designing and managing large-scale, collaborative demand and supply networks of production and service enterprises. **FLUID-WIN** aims to develop a platform to seamlessly integrate and transfer data amongst all the various partners in business-to-business (B2B) manufacturing networks. **E4** is investigating the application of eBusiness and extended product paradigms to SMEs in the enlarged EU.

Further projects launched as a result of final FP6 calls will explore applications for radio frequency identification and other smart tag technologies, and technology to prevent products being tampered with.

# > Visit Europe: the Global Tourism Destination

**Information and communication technologies are playing a major role in helping Europe's tourism industry adapt to change, and contribute to Europe's policy for a thriving tourism sector.**

## Policy Context

Tourism affects European society in many different ways. The tourism sector is a major industry in its own right, employing around eight million people directly and with important spin-offs for employment in other sectors. Tourism is seen as a major opportunity for job creation over the coming years, in particular in the EU's less developed and peripheral regions. Some sources estimate that travel and tourism will create 2 million jobs over the next 10 years, primarily in small and medium-sized enterprises (SMEs) which dominate the European tourism sector.

Europe's tourism industry also faces many challenges. International competition from other global regions is increasing; with demographic change more elderly people are travelling; and there is greater demand for more specialised forms of tourism and environmentally-friendly activities.

The EU has long recognised the important role of tourism in the European economy. Despite its limited powers in this area, the European Commission can play a key coordinating role, helping to ensure that Europe remains an attractive and diverse travel destination. The Commission takes account of the tourism sector's competitiveness when planning measures in other policy domains, such as transport, environment or regional policy. Thanks to its potential for creating jobs and growth and promoting local development, tourism is an activity that can play an important role in helping attain the goals of the renewed Lisbon strategy.

The European Commission presented a fresh policy approach in the 2006 Communication "*A Renewed EU Tourism Policy: Towards a Stronger Partnership for European Tourism*" (COM(2006) 134). The policy aims to use the current better regulation exercise to reduce unnecessary administrative burdens and to maintain regular contacts with key stakeholders on future policy initiatives. It also attaches importance to the boost which EU financial instruments can bring to the sector in a host of areas – regional, research, social, environment, transport, training, rural, fisheries and SMEs. The overall goal of the renewed tourism policy is to improve the competitiveness of the European tourism industry and create more and better jobs through sustainable growth.

Based on the work of the Tourism Sustainability Group, which was set up in 2004, the Commission intends to launch a European Agenda 21 for the sector in 2007. This will highlight the importance of tourism's economic, social and environmental sustainability.

## Contribution of ICT



Tourism is by nature a communications-intensive industry and has been an early user of every communications service from the telegraph onwards. In the past 30 years, the industry has been influenced by three major waves of ICT: the computer reservation system in the '70s, the global distribution system (GDS) in the '80s, and the internet from the mid '90s onwards.

The focus of eBusiness in tourism is on marketing and sales. Online booking and reservation services have been widely accepted by both leisure and business travellers. Customer relationship management is an important application, although it is not yet widely adopted by smaller firms. The dynamic development of eBusiness is likely to continue, as there are new opportunities ahead. One of the main trends is 'destination management' where destinations (regions, areas) are regarded as a kind of virtual enterprise.

### A Gateway for European Tourism

Tourism is among the most advanced sectors in its use of eCommerce. The challenge now is to make the best use of ICT tools to improve access to, and use of, existing tourism promotion resources. In particular, we need to make European tourism websites easier to access and increase users' confidence in the information provided.

The European Tourism Destinations (ETD) project funded by DG Enterprise has done just this. It has developed a web portal, VisitEurope.com, which is a one-stop access point addressing the needs of tourists. VisitEurope.com went live at beginning of 2006 and is operated by the European Travel Commission (ETC), a non-profit making organisation representing 34 national tourism organisations.

The technology underlying the portal was developed under two IST-FP5 projects: **DIETORECS** and **HARMONISE**. The challenge, essentially, was to overcome fragmentation in the European travel industry, where there are many different actors – travel agencies, airlines, tourism boards, tourist attractions – each with their own information systems and ways of working.

Both projects focused on how to make these different proprietary information systems work together. Their solution was a neutral technology platform to act as a kind of lingua franca between the different systems.

An eTEN project, **Harmo-TEN**, developed the results further and the platform was selected by the European Commission as the basis for the Visit Europe portal.

### Easy Access to Travel Information Services

Web services are beginning to be widely used to exchange messages between travel-related businesses. To exploit these developments to their full potential, it is necessary to introduce semantics so as to allow different web services to work together. Semantic descriptors can be used to describe what the web services do and how they handle data. This allows the services to be automated so that software agents can 'discover' travel web services without human intervention.

The IST-FP6 project **SATINE** has been developing the middleware needed to deploy semantically-enriched web services across the travel industry.

The SATINE tools allow SMEs to create web services easily from their existing enterprise applications. Travel sector businesses can thus extend their reach by making their semantically-enriched web services available to others. This makes it easier for them to connect with partners and opens the door to new business opportunities.

### Keeping Mountain Tourism On-Track

The eTEN project **GEOCOMPASS** has developed a map-based geo-navigational internet service for rural and mountain tourism. It offers a map-enhanced website with information about the local area covering accommodation, activities, entertainment, sightseeing, shopping and transport. Pilot services in Greece (Magnesia and Kerkini), Italy (Parco dei Nebrodi, Sicily) and Austria (Hinterstoder) were used to test, validate and refine the system. Following the end of the project in August 2006, commercial services may be launched in these and other countries.