



## Information and Communications Technology

When compared with the US, Japan, and China, Europe is generally considered an economic laggard in terms of the overall strength and competitiveness of its Information and Communications Technology (ICT) sector. In most high-growth ICT sub-sectors such as computer software, hardware, and Internet services, the US, Japan, and China consistently outperform European countries. Many experts attribute the ICT gap to the rising costs of European inputs, a declining skill base, and an uneven fiscal environment at the member state level. Other experts point to Europe's chronic shortage of entrepreneurs possessing the know-how to create Europe's next generation of global ICT enterprises. Nonetheless, the ICT sector is at the very core of the envisioned European knowledge-based society, and therefore, the EU puts substantial effort in making this sector more competitive.

### European Union Response to Closing the ICT Gap

The European Union's main course of corrective action is built around a series of policy initiatives aimed at creating a pan-European innovation system. At the top level is the Lisbon Agenda, followed by the i2010 project and the Framework R&D program. Each of these programs has to help in transforming Europe's innovation architecture away from the creation of national champions in favor of more pan-European enterprises.

### Lisbon Agenda 2010

In 2000, European Heads of State and Government met in Lisbon, Portugal and enshrined into law the strategic goal of making the EU the "most competitive and dynamic knowledge-based society in the world". Unfortunately, at the halfway mark, the goals of Lisbon appeared to be more distant than at the start of 2000 and European GDP growth remained sluggish and below 2 percent. The common criticism of Lisbon was that the agenda was unfocused and the implementation strategy poorly understood by member states. Thus, at the midterm review of the Lisbon Strategy, it was clear that action had to be taken to salvage the goals. In its Communiqué "Working together for growth and jobs: A new start for the Lisbon Strategy", the Commission highlighted the importance of ICT in bringing about Europe's knowledge-based society and underlined the need to strengthen investment in and the use of new technologies – ICT in particular – by both the private and public sectors. Consequently, in June 2005, the i2010 initiative was launched as a key element of the Lisbon Strategy.

## **i2010**

In 2005, i2010 became the follow-up of the eEurope Action Plan which was launched in December 1999 to support the Lisbon Agenda's ICT goals. The aims of eEurope were the increase of broadband (high-speed connectivity) availability and the creation of a reliable legal framework to stimulate demand for e-business, e-education, e-health, and e-government services. An overall evaluation of eEurope will be published in 2008. Currently, its successor, the initiative i2010, sets the strategic framework for ICT policies in the EU and aims at achieving "world class performance in research and innovation in ICT by closing the gap with Europe's leading competitors". Three policy priorities are outlined in order to achieve this: 1) create an open and competitive single market for information society and media services within the EU; 2) increase EU investment in research on ICT by 80 percent; 3) promote an inclusive European information society, making the information society accessible for all EU citizens. The i2010 initiative is currently undergoing a mid-term review and an updated strategy will be presented in the spring of 2008.

## **Framework Programs for Research and Development**

The Framework programs (FPs) have been the main budgetary instruments by which the EU consolidates funding for pan-European basic scientific research. The 7<sup>th</sup> FP became fully operational on January 1, 2007 and will run until 2013. The 7<sup>th</sup> FP is designed to build towards the creation of a "European Research Area", which should take the EU one step further in the direction of a knowledge-based economy and society. The maximum overall funds available for the 7th FP is proposed to be €50.521 billion, with a total of €9.1 billion allocated specifically to the ICT sector. Further, as financial markets and institutions tend to be reluctant to invest in pure R&D projects, the European Commission and the European Investment bank, in June 2007, signed a Risk-Sharing Finance Facility (RSFF), that should reduce the risk of R&D based loans.

The European Commission has indicated its desire for the Lisbon Agenda goals to align more closely with the Research Framework's scientific objectives. However, any moves to openly coordinate the political economic goals of Lisbon with the scientific goals of the Framework Programs will likely generate stiff resistance from the scientific community. The scientific community's overriding concerns will be based on the overt politicization of science. Also, the business community may object to a more explicit form of industrial policy aimed at the European level.

## **Industry Response**

On average, European business leaders have not invested a great deal of faith in the EU-led policies mentioned above. While European business leaders are generally supportive of the principal goals as outlined by the above leading initiatives, they remain less

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confident that the appropriate action will filter down to the member state level. In November 2007 the Commission proposed an overhaul of the EU electronic communications sector, including the establishment of a European regulator with veto rights on decisions of National Regulation Authorities (NRAs). This proposal has been met with severe hostility both from the individual member states, the European Regulators' Group (ERG) representing the NRAs, and the telecommunication industry itself.

The reality is that in many sectors European based enterprises are increasingly off-shoring ICT manufacturing and services to lower cost regions or centers of excellence offering high-tech skill sets that generally exceed Europe (*i.e.* Singapore, Kuala Lumpur, Bangalore). Also, European based businesses often choose to concentrate their policy making activities at either the national or the global level. At the global level, there has been strong lobbying for multilateral trade pacts in the World Trade Organization (WTO), for intellectual property rights harmonization led by World Intellectual Property Organization (WIPO), and for standards coordination by international bodies such as the Institute of Electrical and Electronics Engineers, Inc. (IEEE) and the International Standards Organization (ISO).

### **Main Centers of ICT Excellence**

ICT development ecosystems tend to work most effectively when concentrated in a high-tech region such as Silicon Valley, USA, or the “Silicon Fen” in Cambridge, England, fen being an old English word for valley. Since the early 1970s, several member states have worked to cultivate similar world-class innovation centers. While the EU has not maintained a formal policy on regional clustering, in many cases EU structural funds have been used to build vital infrastructure services in transportation, communications, and education. In addition to EU structural funds, the main source of capital for new ventures in innovation cluster regions is non-European venture capital. The European Commission has recognized the need to grow venture markets in hopes of strengthening European sources of capital for further technology-rich expansion. The following list reflects some of the most successful ICT innovation clusters in Europe today.

- Cambridge, England
- Dublin, Ireland
- Sophia-Antipolis, France
- Munich, Germany
- Stockholm, Sweden
- Tallinn, Estonia

One of the more promising areas of ICT development is among the EU member states that joined in 2004. Lower wage rates combined with a growing skill base are helping to position several Central European states to compete with high-tech manufacturing centers

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in Asia. Poland, the Czech Republic, and Hungary are among the high-tech manufacturing leaders. Increasingly, they see themselves leveraging their modest scientific resources at the university level to attract corporate R&D support from abroad. At this time “new” EU member states remain heavily dependent on foreign sources of capital, necessitating a more rapid development of higher risk European venture funding.

### **EU Performance in Specific ICT Sectors**

In 2007 the ICT-sector at large represented 5.3 percent of the total EU25 GDP. Turnover for the EU ICT services sector increased by 4.4 percent in 2006 and 5.9 percent during the first half of 2007. The ICT markets are expected to grow by nearly 3 percent in the EU25 - both in 2007 and 2008 - and the Commission expects ICT to generate 1.4 million new jobs in the next three years to 2011. The Central and Eastern European markets are expected to grow even faster. The French and UK ICT services industries showed the highest growth rates at 8 percent in the first half of 2007. Computer services grew more than twice as quickly as telecommunications services. However, according to a study by the Commission’s Directorate-General for Enterprise and Industry, the European ICT sector is currently in a strong phase of the business cycle, but notices that new orders in the ICT manufacturing industry already decreased during the first half of 2007, which could be a sign for an upcoming slowdown in growth, both for ICT manufacturing and ICT services.

### **Mobile Communications**

#### *GSM*

In 1993, the European mobile industry banded together to launch the Global System for Mobile Communications (GSM) platform. At present GSM remains the global standard, with over 2 billion users representing over 83 per cent of mobile users in total. GSM is often cited as a textbook case where a regional approach to standardization can be leveraged to set the platform standards for a very lucrative technology market, and it should be noted that the European Commission played a positive role in facilitating this. Leveraging the GSM platform, Europe created and sustained a new category of global mobile telecom giants such as Vodaphone, Orange, Nokia, Ericsson, Alcatel, and Siemens.

#### *3G – Licensed Spectrum*

However, what worked in one era may not necessarily be replicated in the next. On the heels of GSM’s global dominance both government and industry in Europe collaborated at both the EU and member state level to throw their weight behind the third mobile technology called W-CDMA. In 2000, member states auctioned the first wave of 3G licenses, raising billions of Euros for national treasuries. Unfortunately, the time taken to get 3G technology on the market, combined with lower than expected end user demand for the next generation of services, have worked to seriously degrade the value of those

licenses. Additionally, the US decided to take on the European W-CDMA standard directly by launching CDMA-2000. The CDMA-2000 standard is a threat to Europe's global mobile dominance, earning a strong backing from industry and government consortia throughout the Asia-Pacific region, most notably in Japan.

#### *WiFi/WiMax – Unlicensed Spectrum*

In addition to facing competition on the licensed 3G mobile front a new generation of unlicensed spread spectrum technology may further erode Europe's mobile dominance. This new generation 802.11/16x technology, also known as WiFi (<100M radius) and WiMax (<30km radius), is gaining momentum as a 3G competitor for wide area high-speed data. For the most part, WiFi/WiMax technology originates in the US and is generally considered a technology with increasingly disruptive characteristics. The main consideration for Europe is how to maximize the benefits to both consumers and operators of both 3G and WiFi/WiMax. At the policy level, the principal question is how to most effectively regulate spectrum rights. The dilemma facing European policy makers is that spectrum rights are allocated at the national level, which is an obvious barrier to creating truly pan-European mobile telecom operations. Addressing this problem for the long-term is expected to be a highly contentious process with hundreds of billions of Euros of investment at risk.

#### **VOIP**

A technology that has had its break through quite recently is "Voice over Internet protocol" (VOIP). VOIP technology is considered to be highly disruptive as it greatly lowers the cost of voice telephony by migrating services to a commodity Internet environment.

At the beginning of 2004, the European Commission and the European Regulators Group (ERG) launched their first major consultation on the future of VOIP in Europe. The European Commission sees great potential for VOIP to lower both retail and wholesale communication costs in Europe, but only if national regulatory authorities agree to a more harmonized approach to telecommunications regulation in Europe. The European Regulators Group (ERG), bringing together all national regulatory authorities (NRAs) decided in 2005 to a hands-off approach to VOIP regulation at the European level until further developments occurred in this market. One of the most visible developments in this market is caused by the Luxembourg based company Skype. The global success of their VOIP product has refocused the world's attention on European technology and the potential of this market. At current, reforms of the EU's regulatory framework are being discussed, and are expected to take effect by 2010.

#### **Broadband**

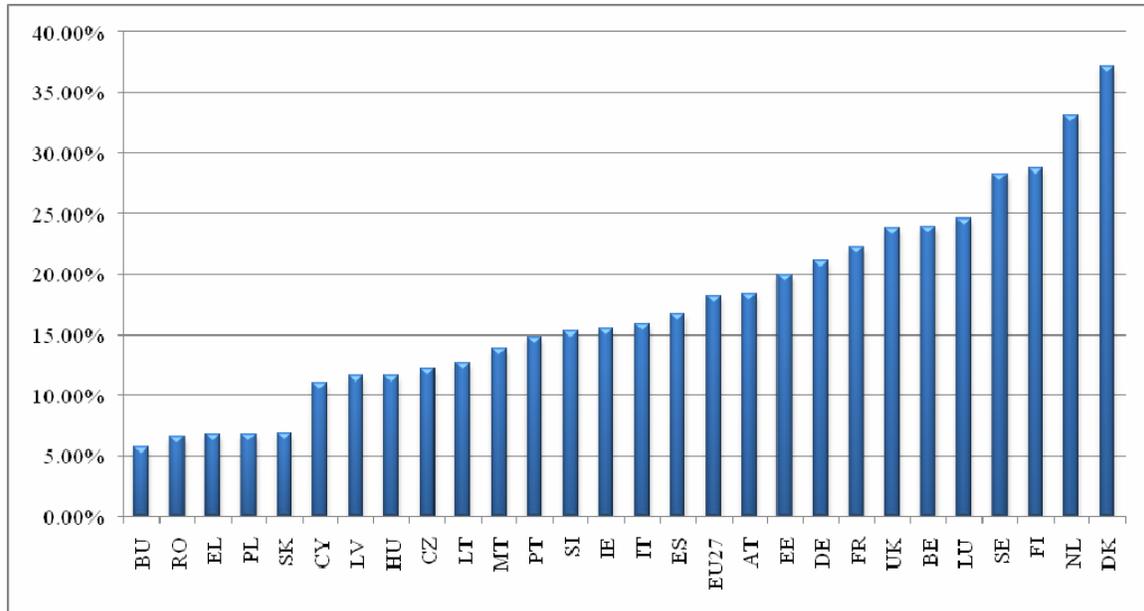
One of the chief objectives of eEurope 2005 was a widespread introduction of broadband at affordable prices. Until now, the fixed broadband market is an area where Europe has

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generated mixed success. While Nordic countries remain among the most wired in the world, Europe's southern and central neighbors generally still have low broadband penetration rates (number of broadband lines per 100 citizens). In July 2007, the average EU penetration rate was 18.2 percent, up 3.3 percentage points from 14.9 percent the year before. The table below shows the penetration rate for all EU member states as for July 2007.

Table 1: EU Broadband penetration rate (July 2007)



Data source: Commission, Information Society and Media Directorate-General (COCOM07-50 FINAL)

The EU's policy towards broadband (which can be found in the eEurope policy and the New Regulatory Framework for Telecommunications) has stressed a preference for competition rather than regulation. However, as in the United States and other primary markets, dominant operators have significant market power and have the ability to raise entry barriers for new broadband suppliers. In large member states, the majority of fixed broadband access is provided via DSL, with cable playing a much lesser role. Alternative access models are being pursued in Italy and the Netherlands, where partnerships between municipalities and service providers aim to bring high speed fiber connections to residences and small businesses.

### **Knowledge Enterprise: The Airbus Example**

Airbus is one of the best examples of how ICT has become integral to European business success. The Airbus business model relies heavily on advanced ICT solutions to solve

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incredibly complex system engineering challenges by tapping an interconnected web of global talent. The aerospace sector has always been a voracious consumer of ICT. Three decades ago Airbus took the lead in applying CAD/CAM technologies to designing “digital airframes” from the ground up. This unique approach transformed the commercial aviation sector and was subsequently adopted by its rival Boeing. The design software CATIA is developed by the French and used by both Airbus and Boeing. Also, Airbus’s on-demand global supply chain network uses precision inventory, shipping, and human management systems developed by European ICT firms such as SAP to keep Airbus at the forefront of knowledge enabled manufacturing.

## Conclusion

To sum up, the European Union faces a complex set of structural challenges in order to improve its competitive position relative to other advanced economic regions, mainly in East Asia and in North America. However, to the EU’s credit, it is projecting its economic, social, and technological goals with a new level of clarity and urgency. There are both costs and benefits to elevating Europe’s ICT strategy to the political level, but as the competitive gap widens, most European leaders feel they have little choice. The services directive that the European Parliament and the Council adopted at the end of 2006 will need to be implemented in 2009 and could have its impact by allowing for a more competitive environment, thereby strengthening the performance of the European ICT sector.

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