

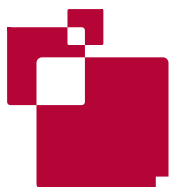
MEMO TO THE NEW DIGITAL AGENDA COMMISSIONER

REINHILDE VEUGELERS AND BRUNO VAN POTTELSBERGHE

Highlights

- The European Union has made tangible progress on ICT policy, for example by encouraging broadband take-up. However ICT's contribution to EU growth is disappointing: ICT largely accounts for the EU's lagging productivity and growth performance relative to the United States.
- Europe continues to lag behind because of the insufficient contribution of the ICT-producing and, especially, the ICT-using sectors. There are no signs that Europe will start catching up, and progress is hampered by the lack of a single market for ICT, and by lagging ICT research and development.
- To address ICT single market failings, the Digital Agenda Commissioner should concentrate more on emerging ICT products and services. With an invigorated creative-destruction process, new markets can replace old markets or force them to adapt.
- To better support R&D and innovation, more public support should be given through tailored programmes to high-risk innovative projects conceived by new ICT companies, which are the missing link in the EU's ICT-growth nexus.

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STATE OF AFFAIRS

In its *i2010 strategy 2005-2009*, the European Union, as part of the Lisbon Strategy, set out an ambitious mission to make information and communication technologies the driving force of a more innovative, competitive, connected and greener EU economy. To this end, the Directorate-General for Information Society had three broad policy instruments at its disposal: i) EU regulation to boost a liberalised and single market for business and users in the telecoms sector and media services; ii) funds and programmes to stimulate ICT research and innovation; and iii) programmes to promote the diffusion and uptake of ICT technologies. It is fair to characterise this *i2010* policy as being pro-competitive and pro-consumer. This policy is slated to be continued in the future, as indicated by the 'Digital Agenda for Europe' and 'EU2020' communications.

In its most recent communications to the European Parliament and EU Council, the Commission hailed the main achievements of the *i2010* strategy. One can hardly disagree with the fact that several tangible results have indeed been achieved in Europe, especially regarding accessibility for consumers and society at large. In terms of mobile phone penetration, Europe is clearly a leader, with the number of active mobile phones being higher than the active population. Increasing numbers of Europeans are online, and higher rates of broadband connectivity have led to more intense use of online services.

The picture is however less rosy if we look at the contribution that ICT has made to the growth of the EU economy. Recent economic studies all reach a similar conclusion, namely that ICT is largely responsible for the EU's lagging growth performance relative to the United States¹. There are three

basic channels through which ICT can impact economic growth:

- Directly, through the investment in ICT capital by the business sector;
- Indirectly, through productivity improvements resulting from ICT investments in ICT-using sectors;
- Through the contribution of ICT-producing sectors (equipment and services).

For the latter two channels, e-entrepreneurship and innovation in ICT-producing and ICT-using sectors are pivotal.

The lagging performance of ICT as a driver for growth in Europe is evident in each of these three channels. Significant progress has been achieved only on ICT investment. But on the contribution from ICT-producing sectors and particularly from ICT-using sectors, Europe continues to lag behind, with no sign of catching up. In particular, ICT-using services have been the locus of the most profound productivity gap compared to the US, most notably in the retail and wholesale sectors. The lagging performance of the EU in ICT-producing and ICT-using sectors can be associated with a lagging performance on *innovation*, and a limited *creative-destruction* process in these sectors. Fast-growing entrants with ICT-enabled innovations can displace inefficient firms and challenge incumbents. They are a crucial missing link in the EU's ICT-growth nexus.

An evaluation of progress in the two main EU ICT policy areas, namely (i) a single market for ICT and (ii) research and development and innovation in ICT, does not produce much good news. Despite progress, there is still no ICT single market in Europe, with mobile communication prices varying on a scale from one to five from lowest

1. See, for example: Van Ark, B. and R. Inklaar (2005) 'Catching up or Getting Stuck? Europe's Troubles to Exploit ICT's Productivity', Research Memorandum GD-79, University of Groningen. Other studies have been produced by, for example, the OECD and the London School of Economics.

(Denmark) to highest (Spain). Paradoxically the lowest prices are observed in countries with a high GDP per capita, making the differences even sharper from a social-inclusion perspective. Similarly average monthly broadband subscription prices in 2008 varied on a scale from one to 2.5 from lowest (Greece, the United Kingdom and Finland) to highest (Slovakia).

On **support for R&D**, ICT has managed ever since the EU's Second Framework Programme for Research and Technological Development (FP2, 1987-91) to capture the lion's share of EU FP funds (almost 30 percent). With the big increase in the total research budget since the start of FP7 (2007-13), the EU is spending more than €9 billion on ICT R&D support. Evaluations of FP ICT projects have indicated as weak points that: (i) few of the organisations participating in FP projects are also core nodes in global ICT networks; and (ii) few young, dynamic ICT enterprises are part of the FP ICT projects.

Beyond research support, ICT is also represented in **innovation support** for the private sector through the EU's Competitiveness and Innovation Framework Programme (CIP) and other programmes such as the Future and Emerging Technologies programme (spending €100 million programme annually), European Technology Platforms and Joint Technology Initiatives (including, for example, Artemis (embedded systems) and ENIAC (nano-electronics)), and recently a European Institute of Technology Knowledge and Innovation Community on ICT labs.

Despite the relatively substantial EU public support for ICT R&D, *private* spend on R&D and innovation in Europe continues to lag behind that of competitors. That Europe is less innovative in the ICT sector, relative to, for example, Japan, is illustrated by patent data. An analysis of applications for insurance patents filed at the World Intellectual

Property Organisation through the Patent Cooperation Treaty (PCT) shows that the EU is much less specialised in ICT than South Korea, Japan, China, or, to a lesser extent, the US. This can be related to the low R&D spending in the European ICT ecosystem, although there are marked differences across the different layers²:

- 1 Equipment suppliers (such as computer hardware, microprocessors and telecoms equipment);
- 2 Telecoms/network operators (such as fixed and mobile core and access operators and cable TV operators);
- 3 ICT services, Internet, software and content providers.

Layer 1 is the most important in terms of R&D spending. In the EU, the biggest sector for ICT R&D is telecoms equipment. In this sector, EU companies such as Nokia, Alcatel and Ericsson are competitive with US firms such as Cisco, Motorola and Qualcomm, with which they have similar R&D intensities. In semiconductors and computer hardware, another major spend in ICT R&D, Europe is, however, poorly represented.

Also, the Internet and software providers in Layer 3 are heavily R&D-intensive. Although the EU does have home-grown companies, they are less R&D-intensive, and the EU does not have big names like the US firms Amazon, eBay, Google, Microsoft, Oracle and Yahoo. Computer-services companies in Layer 3 are only moderately R&D-intensive compared to some other ICT firms.

Layer 2 is the most sensitive part of the eco-innovation system. Being responsible for about 70 percent of the total ICT sector's capital expenditures, companies in this layer are much more capital-intensive than other layers (with the exception of semiconductors). EU companies are somewhat less capital-intensive than their non-EU

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2. A forthcoming Bruegel publication will provide a more detailed analysis of the R&D and market performance of the different layers of the ICT eco-system, comparing the EU and non-EU countries.

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counterparts, but the difference is small. The return on capital invested is, however, low in this layer compared to other layers in the system. Layer 2 companies are the least R&D-intensive companies on average in the ICT innovation ecosystem.

In a nutshell, there has been in the past a strong policy emphasis on infrastructure and consumers, at the expense of a relatively weak focus on the potential growth effect of ICT, with little consideration of entrepreneurship and new business creation from the ICT sector. Europe fails to nurture young entrepreneurial companies that have the potential to grow fast and reach international markets, particularly among the services, software and content providers. The telecoms/network operator business is still highly fragmented in Europe and is populated by incumbent operators that are highly capital-intensive but do not appear to be particularly strong in terms of R&D.

CHALLENGES

The main failing of Europe's ICT sector is that it is not contributing to growth, at least in comparison to the US ICT sector over the past decade. If ICT is to contribute in a sustainable fashion to EU citizens' welfare in the long term, as the Lisbon Strategy and its successor, EU2020, herald, your major challenge will be to turn ICT into a growth factor in Europe. This means: (i) wherever ICT innovations are generated, inside or outside the EU, the best available ICT technologies should be effectively absorbed by EU business, government and final users; and (ii) the EU ICT ecosystem should improve its innovative and growth performance, which includes exploiting the sales and production advantages available worldwide.

How to improve the productivity effect from ICT investments in ICT-using sectors: flexible markets and complementary firm practices.

The economic studies on productivity effects from ICT have observed a wide heterogeneity across sectors and countries. Particularly poor-performing *countries* and *sectors* are those characterised by restrictive product-market regulations, as in the retail sector. Other bad practices for an ICT-growth nexus are restrictions on competition, especially entry and exit barriers, and lack of third-country competition. Restrictive labour-market regulations are another barrier, blocking the recruitment of new IT-skilled employees. But even within ICT-using sectors, substantial *firm-level* differences remain in the ICT-growth nexus. US firms, even if they are operating in the EU, reap higher productivity returns from their ICT investments compared to EU-owned firms. Economic analysis suggests that firms need to have other complementary, firm-specific strengths to turn their ICT investments into growth, such as the quality of management and organisational practices.

How to improve the innovativeness of the ICT sector itself: connectedness, competition and competence.

The performance of the ICT sector itself depends not only on the strength of each level in the ecosystem, but also on their connectedness. This holds particularly as continued technological shocks blur the boundaries between the levels. But also, and *a fortiori*, the interaction with the fourth level in the ecosystem – consumers and users – is important. Customers are increasingly becoming a fully-fledged part of the eco-system, not just consuming, but also supplying content and co-developing innovations. The ecosystem with the best connections to users will be dominant in the Web 2.0 wave.

The innovative performance of the ICT ecosystem also depends on the supportiveness of its environment. This includes the regulatory setting, the strength of universities and public research

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institutes supplying basic ICT knowledge and skills, and the availability of financial capital providers, among other factors. Two main factors seem to hamper innovation in Europe, particularly compared to the US and Asia. The first is the highly fragmented market that is still mostly national in its essence (especially in the case of network operators) and prevents the exploitation of economies of scale while limiting the degree of competition, hence reducing the incentive to innovate. Second is the access to innovative capacity and skills. ICT-skilled experts are in short supply in Europe, and there are no real grounds for optimism about the future if one looks at educational choices. Indeed, the share of engineers (and software engineers) in particular in total higher education studies in Europe displays a negative trend, and is much smaller than in emerging countries, Japan or South Korea.

RECOMMENDATIONS

As the new Digital Agenda Commissioner, this note should have (hopefully) convinced you to change the course of past policymaking and to set out your own agenda for improving the EU’s ICT-growth nexus. This implies that you should move beyond a focus on infrastructure, and focus your attention on the growth effects that can arise from ICT investments. And rather than ensuring that consumers have access to currently available technologies at short-run competitive prices, your emphasis should be on shaping the conditions for innovation and new business creation, thus ensuring for users continued access to the best technologies possible at long-run competitive prices. To this end, integrated EU ICT markets, effective competition and greater innovation capacity need to be your targets.

A better connected Digital Agenda DG

Building innovation capacity, creating a more integrated single market and ensuring effective

competition require that you coordinate with your fellow commissioners, especially the commissioners for single market, competition, industry and the skills agenda. Rather than establishing institutional structures for this cross-DG coordination, the most effective approach will be to develop good relations built on common objectives. Particularly natural for you, as the former competition commissioner, is coordination with this complementary DG. Finding a better balance in competition cases, moving from static efficiency and incumbent market-power considerations towards a greater focus on dynamic efficiency (innovation) effects and the viability of competitive new markets, is particularly important for ICT technologies, which are able to change faster than regulators can typically handle.

You have two important instruments at your disposal: single market regulatory powers and R&D funds. Both of these instruments need to be put to better use than before.

A new single market agenda

Significant progress remains to be made towards creating a truly single market for ICT products and services, so that effective competition can take place at the EU level and firms can access large markets for their innovations. Regulatory intervention is hard to get right given the speed of technological change in ICT. Intervention should therefore, more than in the past, target a long-term level of competition that is more conducive to innovation. Establishing a single market for *new* emerging ICT products and services will probably be easier than further integrating established old markets. But with an invigorated creative-destruction process, these *new* integrated markets can replace old markets or force them to adapt.

In any case, as we still know very little about which demand and supply barriers might be block-

ing an integrated EU market, and which policy interventions are most effective, a system of ICT market monitoring needs to be put in place to continually assess progress on market integration. The probing sector enquiries by DG Competition could be an example here.

Increasing the growth impact of the EU's ICT R&D funds

First, players from all layers of the ICT ecosystem, including content providers and users, should be more strongly integrated into FP programmes (particularly in the European Technology Platforms). In addition, the FP programmes should be more open to international partners wishing to conduct frontier research in the EU. Finally, new ICT hubs with new players that can challenge the old incumbent networks should be nurtured. FP programmes should allow for more experimentation and nurturing of competition between alternative approaches.

When it comes to support for innovation (rather than R&D), your intervention should be even more 'innovative'. The Future and Emerging Technolo-

gies programme may look 'innovative', but its emphasis on large EU-wide networks is not appropriate. In particular, the highly risky radical innovative projects conceived by new ICT companies, which are the missing link in the EU's ICT-growth nexus, need public support to help bridge the gap to markets. For this, large network structures are not the best format. An EU-ICT young innovative companies ('YICs') programme, based on the successful US Small Business Innovation Research programme would make more sense.

Skilled labour

When it comes to supporting the EU's innovative capacity in ICT sectors and making ICT investment more growth-enhancing in ICT-using sectors, there is a need to ensure an adequate supply of ICT-skilled labour in Europe. This can be achieved in two ways. First, finding ways to re-invigorate the ICT-based engineering diploma would make it more attractive to young students. Second, Europe should be a welcoming environment for talented third-country individuals in the field of ICT.