

Digital young leading innovators

platforms for new growth
in Europe?

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Europe's digital growth problem diagnosed



There are three basic channels through which **digital technologies** can impact economic growth

- A. Through the investment in digital capital by the business sector;
- B. Through productivity improvements resulting from digital investments in digital-using sectors;
- C. Through the contribution of the digital sector (equipment and services).

The lagging performance of digital as a driver for growth in Europe is evident in each of these three channels.

In the remainder we focus on C and more particularly on the contribution of the digital sector to innovation (based growth)

EU vs US ICT R&D performance

	EU	US
R&D-to-Sales ratio (RDI); all sectors	2.8%	4.6%
RDI; non-ICT sectors	2.5%	3.4%
RDI; ICT sectors	5.3%	8.7%
Share ICT in total sales	11.2%	22.0%
Share ICT in total R&D	21.5%	41.5%
RDI ICT old	5.2%	6.2%
RDI ICT young	5.9%	11.8%
Share of young firms in ICT nr firms	54%	71%
Share of young firms in ICT sales	20%	45%
Share of young firms in ICT R&D	22%	60%

Source: Own calculations on the basis of Veugelers & Cincera (2011), which uses EC-IPTS Scoreboard data on the world largest R&D investors for 2007. Young firms are born after 1975.

What if scenarios on EU's ICT R&D performance

What if	EU's RDI in ICT would be	EU's RDI in ICT gap relative to US (=100) would be	EU's overall RDI would be	EU's overall RDI gap relative to US (=100) would be
Everything remains the same	5.3	61	2.80	61
EU's ICT sector would have the same RDI performance and same weight in the overall economy as US	8.7	100	3.85	84
EU's ICT sector would have the same age composition and same young firms' RDI as US	8.2	94	3.12	68

Source: Own calculations on the basis of Veugelers & Cincera (2011), which uses EC-IPTS Scoreboard data on the world largest R&D investors for 2007. Young firms are born after 1975.

Characterizing the Digital Ecosystem



*With telecommunications liberalization, competition and Internet technologies a **new digital value chain** has arisen*

Layer I: equipment,

Layer II: network (telecoms),

Layer III: connectivity, Layer III-IV-V are the upper layers of Layer II

Layer IV: navigation and middleware,

Layer V: applications including content

This new digital eco-system is a disruption of the traditional telecommunications industry, with commoditization of the historical and incumbent Layers I and II.



The layered structure of the post-Internet ICT ecosystem

	Layer I	Layer II	Layer III
	Telecom Equipment, Semiconductors, Computer, Electronic Equipment	Telecom Operators	Internet; Software providers
Share of total ICT revenues	44%	33%	23%
World Revenues CAGR 2006-2011	6.9%	6.9%	7.7%
Share of Region in World Revenues	Asia>US>EU 62% 31% 7%	EU≥US>Asia 36% 36% 28%	US>EU27>Asia 68% 17% 15%
Capex/revenues	5%	17%	5%
RDI	7.2%	1.6%	14.1%
% Young firms in world leading innovators	56%	30%	88%
RDI Young	7.4%	1.0%	14.1%
RDI Old	7.1%	1.7%	13.8%

Source: For R&D, data are based on the EC-IPTS Scoreboard firms from ICT; Calculations on the basis of Veugelers (2011); For revenues and capital expenditures, data source is France Telecom (SG, Industrial Economics) March 2013; Data are based on largest listed ICT firms covering about 70% of the ICT sector.



Europe's R&D performance in ICT by Layer

	Layer I		Layer II		Layer III	
	EU	US	EU	US	EU	US
RDI of Region in Layer	12%	9%	1.5%	0.8%	16%	14%
Share of Layer in Region's total R&D	70%	70%	18%	1%	12%	28%
Share of Layer in Region's total Sales	31%	70%	64%	12%	4%	18%

What if	EU's RDI in ICT would be	EU's RDI ICT relative to US (=100) would be	EU's overall RDI would be	EU's overall RDI gap relative to US (=100) would be
O. Everything remains the same	5.3	61	2.80	61
1. EU's ICT sector would have the same layer composition as US	11.5	128	3.48	75

The EU digital innovation landscape

While the manufacturing component in Layer I has been mostly outsourced to Asia, the US has a strong dominant position in Layer III-V. This holds particularly in the pivotal intermediation layer, where they hold almost exclusively the world market.

Europe is retrenching in Layer I; With the exception of some small niche players in the application layers, its strongest position is in Layer II (operators) **Layer II**, composed of incumbent Telecoms (Big 5: AT&T, FT, DT, NT, BT) and the original & new entrants (Vodafone,...), contains the networks that carry the bits of information. Layer II does not do much R&D, but does the heavy investments in physical infrastructure;

In the layer of platform, content and application providers, the EU is weakly present. This layer has the highest R&D intensity, this is also where the growth is and it is the “youngest” layer.

Europe’s struggling R&D position in the digital eco-system is therefore related to its sectoral and age composition and its failure to redirect towards new digital sectors.

Why are European firms less present as young leading innovators in new digital markets?



Veugelers (2011), New ICT markets, Bruegel Policy Contribution, provides an analysis for a selection of new digital markets (examples: RFIF, Automotive embedded software...)

There is no clear evidence that Europe's **public R&D investment** is inadequate and would be a barrier to innovation and market development. **The problems are typically identified further down the commercialisation path.**

The case studies confirmed the well known problems of accessing risk financing and the more fragmented IP and regulatory landscape in Europe.

But a major problem for firms in Europe is, being hampered to **access early lead customers** willing to take the high risk of first adoption, to **largescale** customise their innovations.

The current fragmentation in the EU public sector **procurement** practice is in all new digital markets distinguished as an important barrier.

The various faces of the digital single market

Mapping regional ICT eco-systems in Europe

Some stats from Amadeus data on number of firms in ICT sectors from 124 NUTS2 regions in large EU countries (DE, FR, UK, IT, NL)

Very much Bruegel work in progress, not yet quotable

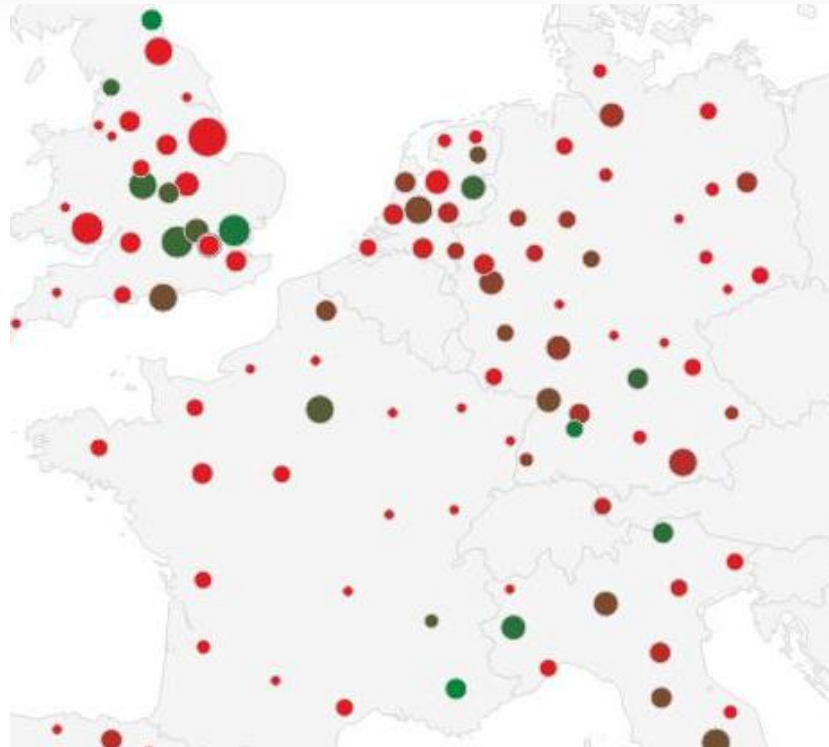
Compared to all sectors: ICT sectors (OECD definition) are more intensive in young firms and especially in gazelles (OECD definition)

- Share of ICT among all **large** firms : 3.7%
- Share of ICT among all **young** firms : 3.9%
- Share of ICT among all **gazelle** firms : 6.2%

Regional concentration is higher in ICT compared to all sectors; Especially young firms in ICT are regionally concentrated and even more so for gazelles in ICT;

- Hall = 0.013; NE H all: 75
- HICT**large** = 0.028 ; NE ICT **large**: 36
- HICT**young** = 0.033 ; NE ICT **young**: 30
- HICT**gazelles** = 0.044 ; NE ICT **gazelles**: 23

Some stats from Amadeus data on number of firms in ICT sectors from 124 NUTS2 regions in large EU countries (DE, FR, UK, IT, NL)



- the size represents the share of total young firms in ICT among the total number of young firms in a region.
- the color of the bubbles represents the share of gazelles in ICT among the total number of gazelles in a region,

Some stats from Amadeus data on number of firms in ICT sectors from 124 NUTS2 regions in large EU countries (DE, FR, UK, IT, NL)



Work in progress

	Young ICT	Gazel ICT	Larg ICT	Large All	Young All	Gazel All
YoungICT	1					
GazelICT	0.91	1				
LargeICT	0.03	0.08	1			
LargeAll	0.17	0.27	0.80	1		
YoungAll	0.89	0.76	-0.02	0.08	1	
GazelAll	0.92	0.84	0.03	0.15	0.95	1

Some stats from Amadeus data on number of firms in ICT sectors from 124 NUTS2 regions in large EU countries (DE, FR, UK, IT, NL)



RA in YOUNG ICT	RA in GAZEL ICT	RA in LARGE ICT
Ile de France	Ile de France	Shrop (UK)
Oberbayern	Piemonte	Champagne
Utrecht	Koln	Outer London
Koln	Lazio	Dresden
Hamburg	Provence	S.York
Dusseldorf	Lombardie	Surrey
Berlin	Berlin	Auvergne
Lombardie	Inner London	Languedoc
Berks, Bucks&Oxon	Berks, Bucks&Oxon	Gloucs
Lazio	Hamburg	N. York
Darmstad	NordHolland	Saarland
Inner London	Utrecht	Derbs



Regions with an above average share of **RA large ICT**

Share in large ICT firms: 76%

Share in young ICT firms: 13%

Share in ICT gazelles: 11%

Avg RA young ICT: 0.34

Avg RA gazelle ICT: 0.22

Regions with an above average share of **RA young ICT**

Share in large ICT firms: 17%

Share in young ICT firms: 82%

Share in ICT gazelles: 80%

Avg RA gazelle ICT: 1.74

Avg RA large ICT: 0.38

Avg RA large TOT:0.64

$$RA \text{ large ICT}_{regio} = (NF_{largeICT}_{regio}/NF_{largeICT}_{all})/(NF_{regio}/NF_{all})$$

$$RA \text{ youngICT}_{regio} = (NF_{youngICT}_{regio}/NF_{youngICT}_{all})/(NF_{regio}/NF_{all})$$



Regions with an above average share of RA gazelle ICT

Share in large ICT firms: 21%

Share in young ICT firms: 70%

Share in ICT gazelles: 88%

Avg RA young ICT: 1.68

Avg RA large ICT: 0.46

Avg RA large TOT:0.72

Failing digital eco-systems in Europe?

More work needed

Data coverage extensions&cleaning; ICT sector by layer; innovation-intensity of firms, firms'performance; Regional characteristics...

Characteristics of competition in the digital eco-system



Barriers to entry; Entrants-incumbents “co-optition”

Strong incumbency and two-sided network effects advantage large players;

But as technology changes rapidly, incumbent size advantages may also be quickly depreciated. New entrants offering radical innovations can quickly surpass existing entry barriers. This feature constantly challenges incumbent positions.

The relationship between new firms and incumbents is often seen as one of competition, but there is also ample evidence of cooperation between start-up innovators and more established firms.

Take overs of small start-ups is happening extensively in Layers IV-V, with the major platform providers taking over start up application providers.

Critical role of competition policy and regulation



- **Platform competition;**

Increasingly, competition and cooperation in the new ICT ecosystem takes place between and within **platforms**.

- Examples of platforms are operating systems such as Microsoft Windows, Unix, Linux and Google Chrome. In the mobile sector, there are Google's Android, Apple's iPhone.

Compatibility and within- and between-platform competition are important determinants of the (potential) total value creation in these markets. They are also important for determining which part of the ecosystem captures most of this value, and the incentives for platform providers, developers, equipment providers, telecom providers or customers to invest in innovation.

As Europe lacks players that can become dominant platform leaders, it has a strong incentive to push for open and compatible models, as these will be more beneficial for both European customers and European firms developing applications within the platforms

Implications for digital policy making: principles

Policy authorities, should appreciate the dynamics of the digital ecosystem

The inherently multiple dis-equilibrium processes associated with cross layer mobility and fast developing new technological opportunities raises big challenges for competition and regulation policy making for the sector.

What is clear is that a standard static equilibrium approach will not do. A more dynamic equilibrium approach requires taking into account incentives for investing in new technologies.

Implications for digital policy making: specifics



When setting **regulations** & endorsing standards, they should be designed with a technology-neutral and open perspective, supporting multiple innovation paths, which will allow new future innovators to continue to compete.

Competition policy: dynamic competition effects shaping the future working of digital innovative markets should be much higher on their radar in merger and anti-trust cases. This includes not only assessing dynamic efficiency effects of involved parties, but also the impact on entry and dynamic efficiency effects of new potential avenues;

Public procurement in those sectors where the public actors can act as pivotal users (e-government, e-health, e-education...), with public procurement supporting multiple avenues and assessing impact on new potential avenues.

Support for eco-systems?

Still need more evaluations of causal effects from public support; funding vs framework conditions,

In any case, focus on reducing the initial systems failure (temporary early stage support) and multiple avenues

Some concluding remarks

At this stage of the analysis, with still too many unknowns about whether and which interventions are effective for digital markets, policy should engage in **close monitoring of emerging technologies and markets: DIGITAL MARKET MONITORING**

NOT DISCUSSED HERE, but EQUALLY, if not more IMPORTANT:
how to improve the uptake of digital technologies in digital using sectors to create growth and jobs

Thank you for your attention !