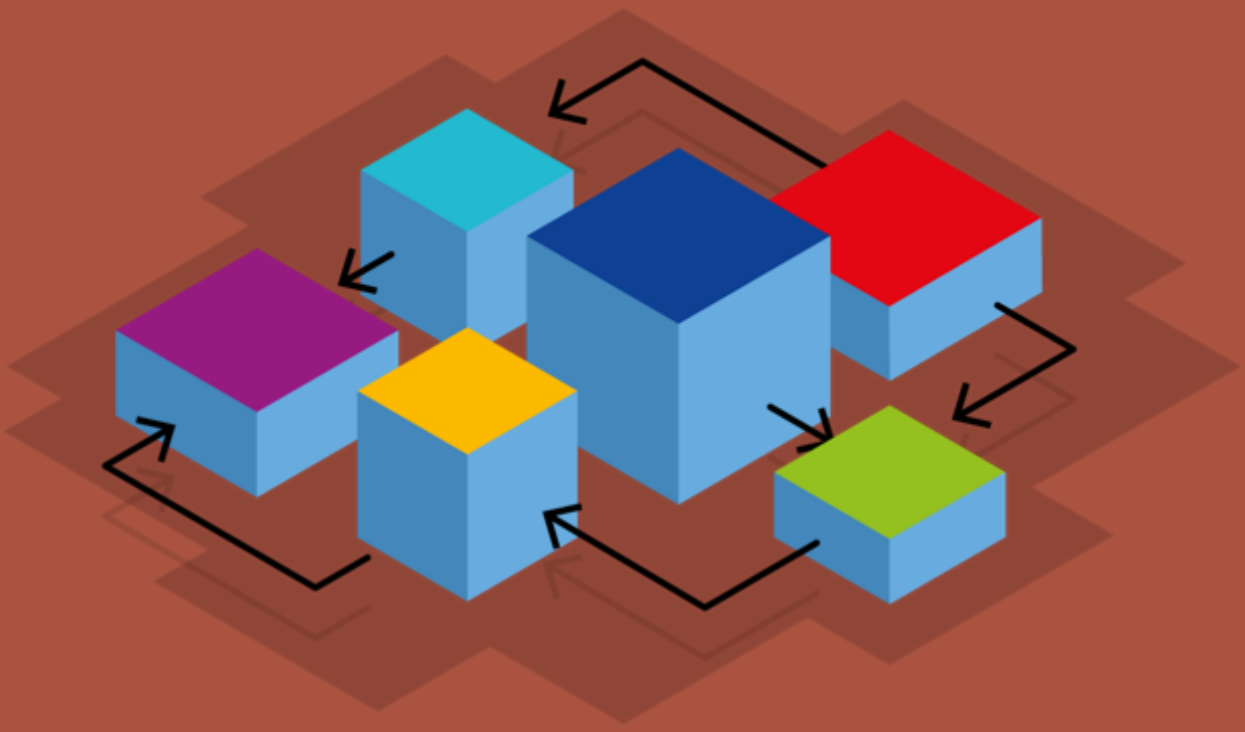
European Commission



European Cluster Observatory

REPORT

Priority Sector Report: Digital Industries

Prepared by:

Christian Ketels and Sergiy Protsiv

Center for Strategy and Competitiveness Stockholm School of Economics

February 2017

Internal Market, Industry, Entrepreneurship and SMEs

European Cluster Observatory in Brief

The European Cluster Observatory is a single access point for statistical information, analysis and mapping of clusters and cluster policy in Europe. It is primarily aimed at European, national, regional and local policy-makers and cluster managers and representatives of SME intermediaries. It is an initiative run by the 'Clusters, Social Economy and Entrepreneurship' unit of the European Commission's Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs and aims to promote the development of more world-class clusters in Europe, notably with a view to promoting competitiveness and entrepreneurship in emerging industries and facilitating SMEs' access to clusters and internationalisation activities through clusters.

The ultimate objective is to help Member States and regions to design smart specialisation and cluster strategies that will help companies to develop new, globally competitive advantages in emerging industries through clusters, and in this way to strengthen the role of cluster policies in boosting Europe's industry as part of the Europe 2020 Strategy.

In order to support evidence-based policy-making and partnering, the European Cluster Observatory provides an EU-wide comparative cluster mapping with sectoral and cross-sectoral statistical analysis of the geographical concentration of economic activities and performance. The European Cluster Observatory provides the following services:

- **a biannual 'European Cluster Panorama' (cluster mapping)** providing an update of and extension to the statistical mapping of clusters in Europe, including for ten related sectors (i.e. cross-sectoral) and a correlation analysis with key competitiveness indicators;
- **a 'European Cluster Trends' report** analysing cross-sectoral clustering trends, cluster internationalisation and global mega trends in industrial transformation; identifying common interaction spaces; and providing a forecast for industrial and cluster opportunities;
- **a 'Regional Ecosystem Scoreboard'** setting out strengths and weaknesses of regional and national ecosystems for clusters, and identifying cluster-specific framework conditions for three cross-sectoral collaboration areas;
- **a 'European Stress Test for Cluster Policy',** including a self-assessment tool accompanied by policy guidance for developing cluster policies in support of emerging industries;
- **a showcase of modern cluster policy practice, provided in the form of advisory support services to six selected model demonstrator regions**. The services offered include expert analysis, regional survey and benchmarking reports, peer review meetings and policy briefings in support of emerging industries. The policy advice also builds on the policy lessons from related initiatives in the area of emerging industries;
- **the European Cluster Conferences** 2014 and 2016, which bring together **Europe's cluster policy-makers and stakeholders** for a high-level cluster policy dialogue and policy learning, and facilitate exchange of information through, e.g. webpages, newsletters and videos.

More information about the European Cluster Observatory is available at the EU cluster portal at: http://ec.europa.eu/growth/smes/cluster/observatory/.

This work has been carried out under a service contract for the European Commission's Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs. It is financed under the Competitiveness and Innovation Framework programme (CIP) which aims to encourage the competitiveness of European enterprises. The views expressed in this document and the information included in it do not necessarily reflect the opinion or position of the European Commission.

Table of Contents

1. Introduction

Digital Industries are one of the key thematic orientations of applications and selected cluster projects for new industrial value chains (INNOSUP-1) under Horizon2020 and of the thematic priorities of regional smart specialisation strategies.

The European Cluster Panorama 2014 defined Digital Industries in a broad sense covering several related segments of cluster categories. The definition was built up using the IT Hardware and Communications as the two base sectors and extending it with a variety of related industries from eight other cluster categories (see Methodology and Findings Report for a Cluster Mapping of Related Sectors for more details).

This core of Digital industries comprises services related to information technologies as well as manufacturing of modern computer hardware and devices for various application contexts. As an increasingly cross-cutting technology information technology has become an important element of most areas of economic activity. The linkages of this 'Digital Industry Core' to other technologies and industries are the key interest of this report.

Overall, the 'Digital Industry Core' is built by the IT sector. Especially, it includes activities from the following areas[1]:

- Manufacturing of computers and hardware components
- Programming and publishing of software
- Provision of digital communication infrastructure
- Computer related consultancy services

One of the dominant trends in the digital sector is the shift from hardware to software, and within the software area from product to service. Another key element has been the rapid move from stationary systems like PCs to multiplatform, wireless user interaction. Digital industries are a highly dynamic sector not only by growing fast itself but also transforming the ways of production in most other industries. This finds its expression in the considerable cross-sectoral linkages presented in the following chapter.

[1] *See Annex A for a full list of used NAICS respectively SIC codes.*

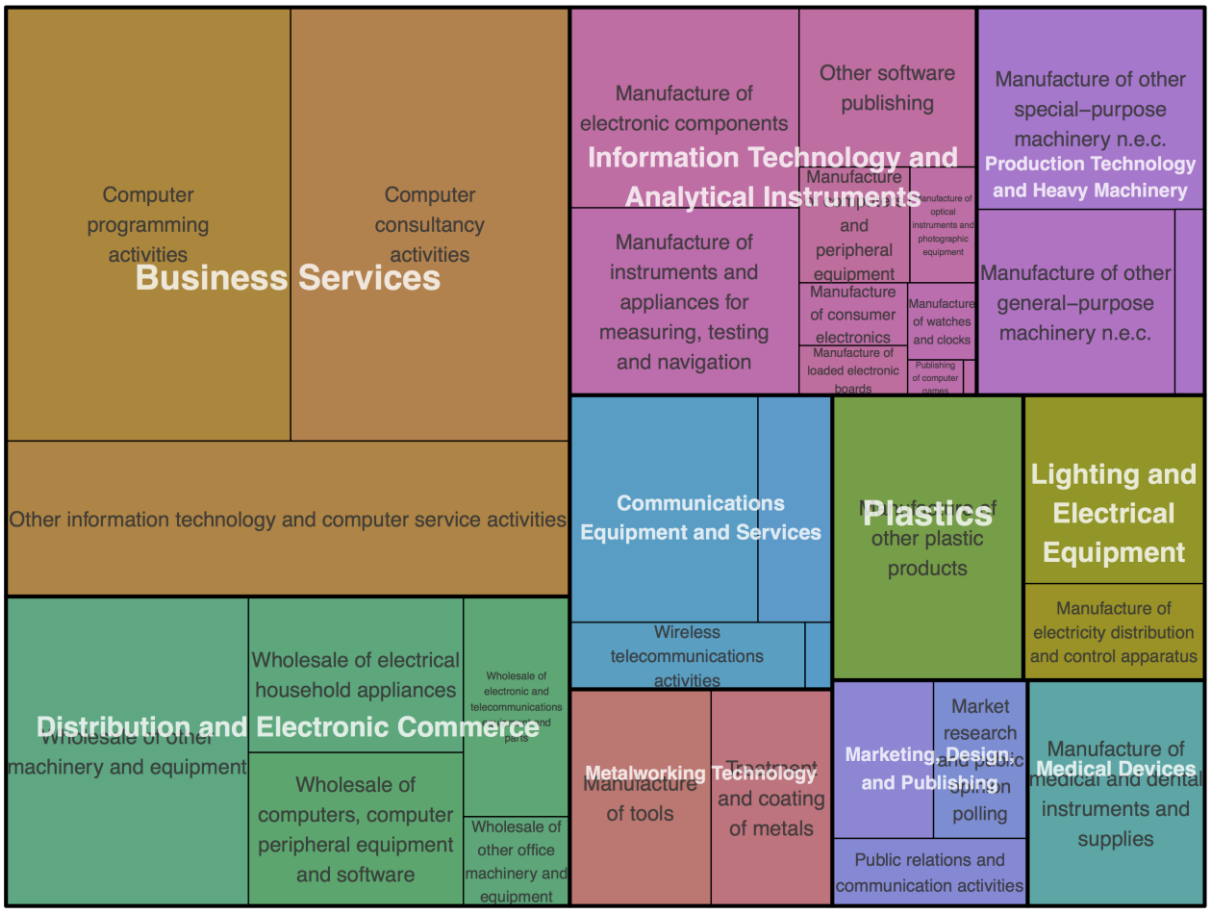
2. Overview

Table 1: Basic Facts on Digital Industries

Indicator	Level in 2014	Change since 2008	Share of overall economy
Employment	9 994 767	1.70%	3.43%
Establishments	1 906 785	16.10%	3.39%
Average Wage	44 949	3.74%	139.84%
Gazelle Employment	148 834	N/A	3.54%

3. Composition

Figure 1: Digital Industries industry composition[2]



[2] *The size of the different boxes is proportional to industry employment*

Table 2: Occupational profile of employment in Digital Industries

Occupation	Employment	Employment share	Overall employment share
Officials, Managers, Professionals, Technicians	5 193 200	62.0%	43.9%
Information and Communications Technology Professionals	1 434 900	17.1%	1.7%
Business and Administration Associate Professionals	654 500	7.8%	6.7%
Science and Engineering Professionals	539 900	6.5%	2.9%
Science and Engineering Associate Professionals	486 600	5.8%	3.6%
Information and Communications Technicians	467 800	5.6%	0.9%
Business and Administration Professionals	461 300	5.5%	3.3%
Other	1 148 200	13.7%	24.9%
Craft, Trade, Operators, Assemblers	1 834 900	21.9%	21.7%
Metal, Machinery and Related Trades Workers	627 200	7.5%	3.9%
Other	1 207 700	14.4%	17.8%
Clerks	793 000	9.5%	9.0%
Service, Sales, Elementary	549 900	6.6%	25.4%

4. Current Patterns and Leading Regions

Table 3: Europe's top locations[3] in Digital Industries

#	Region	Region Name	Largest City	Employ-ment	LQ	Avg. Wage, PPP	Annual Growth	Gazelle Empl. Share	Stars
1	NO01	Oslo og Akershus	Oslo	69 058	2.38	68 867	15.2%	1.0%	4
2	DE14	Tübingen	Tübingen	70 901	2.12	56 532	3.1%	4.6%	4
3	SE11	Stockholm	Stockholm	86 538	1.62	63 546	5.4%	2.8%	4
4	IL03	Haifa District	Haifa	44 155	2.67	24 280	9.2%	0.0%	3
5	DE11	Stuttgart	Stuttgart	215 739	2.44	66 434	11.4%	0.7%	3
6	AT13	Wien	Wien	68 743	1.91	48 125	26.4%	1.9%	3
7	DK01	Hovedstaden	Copenhagen	65 200	1.82	58 260	-5.2%	1.1%	3
8	UKJ1	Berks, Bucks and Oxon	Oxford	102 599	1.77	70 758	-0.2%	0.1%	3
9	CH04	Zürich	Zürich	64 523	1.73	75 473	-12.7%	0.6%	3
10	CH02	Espace Mit-telland	Bern	59 442	1.72	79 363	-7.8%	0.6%	3
11	DE21	Oberbayern	München	151 964	1.67	66 720	1.4%	0.8%	3
12	DE71	Darmstadt	Frankfurt am Main	118 021	1.58	60 303	-0.7%	0.7%	3
13	DEA1	Düsseldorf	Düsseldorf	133 607	1.42	58 197	1.4%	1.4%	3
14	DEA2	Köln	Köln	101 449	1.36	57 550	2.8%	1.1%	3
15	FR10	Île de France	Paris	341 822	1.31	60 221	8.3%	2.1%	3
16	UKJ3	Hants and Isle of Wight	Southamp-ton	51 900	1.29	57 369	6.0%	0.1%	3

[3] *We sort locations here and in all following sections by the number of stars, followed by LQ*

Figure 2: Leading regions in Digital Industries

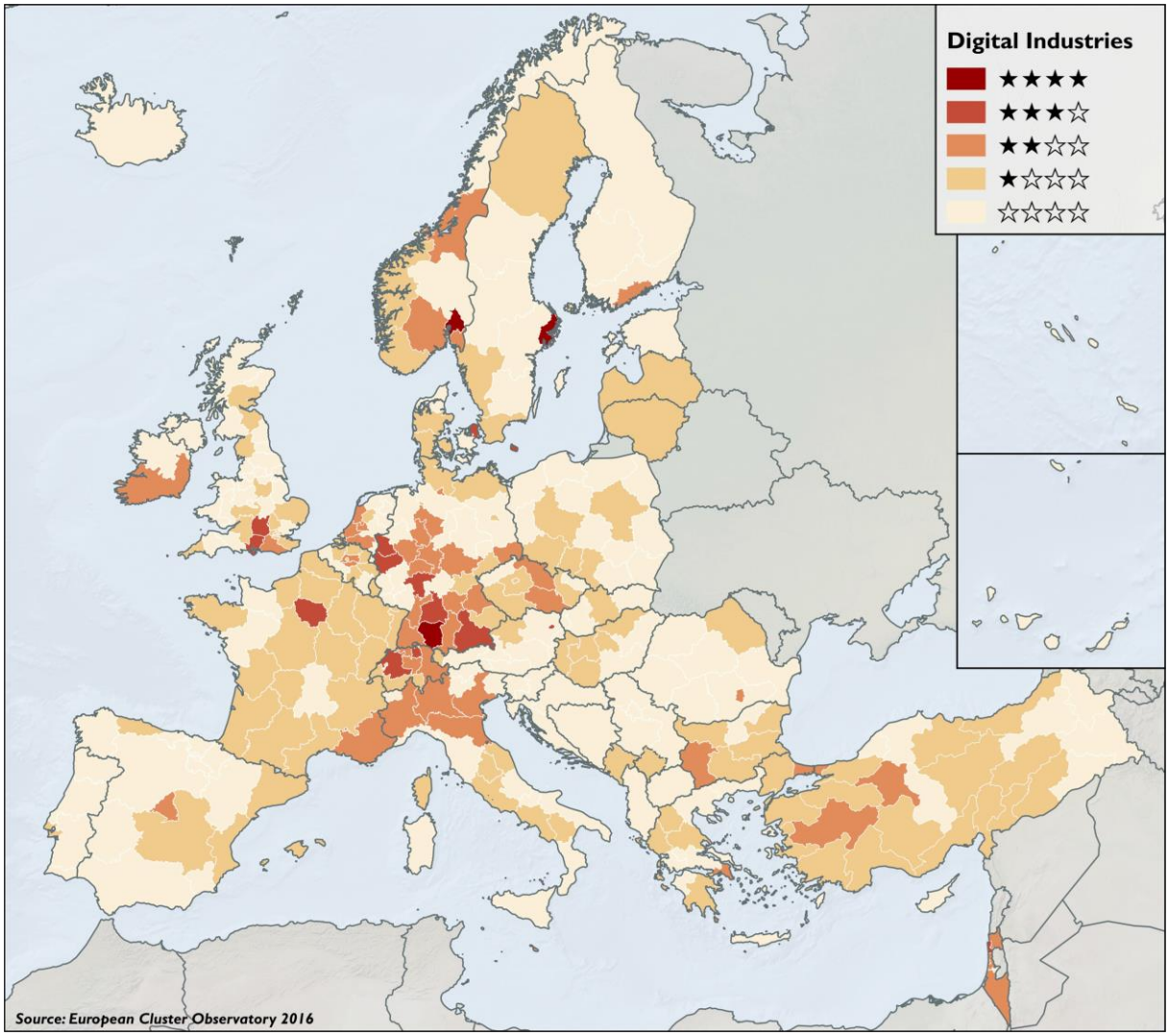
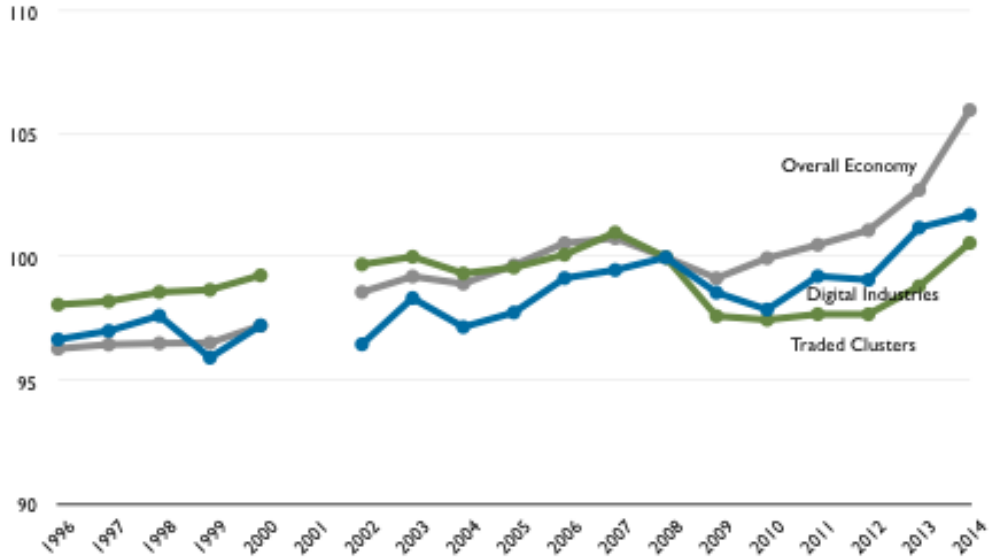


Table 4: Strategic profiles of top locations in Digital Industries

Region	Region Name	Largest City	Top 3 Occupations
NO01	Oslo og Akershus	Oslo	25 Information and Communications Technology Professionals 24 Business and Administration Professionals 35 Information and Communications Technicians
DE14	Tübingen	Tübingen	72 Metal, Machinery and Related Trades Workers 31 Science and Engineering Associate Professionals 21 Science and Engineering Professionals
SE11	Stockholm	Stockholm	25 Information and Communications Technology Professionals 33 Business and Administration Associate Professionals 24 Business and Administration Professionals
DE11	Stuttgart	Stuttgart	72 Metal, Machinery and Related Trades Workers 43 Numerical and Material Recording Clerks 31 Science and Engineering Associate Professionals
AT13	Wien	Wien	25 Information and Communications Technology Professionals 33 Business and Administration Associate Professionals 35 Information and Communications Technicians
DK01	Hovedstaden	Copenhagen	25 Information and Communications Technology Professionals 35 Information and Communications Technicians 24 Business and Administration Professionals
UKJ1	Berks, Bucks and Oxon	Oxford	25 Information and Communications Technology Professionals 33 Business and Administration Associate Professionals 24 Business and Administration Professionals
CH04	Zürich	Zürich	25 Information and Communications Technology Professionals 21 Science and Engineering Professionals 12 Administrative and Commercial Managers
CH02	Espace Mittelland	Bern	25 Information and Communications Technology Professionals 73 Handicraft and Printing Workers 72 Metal, Machinery and Related Trades Workers

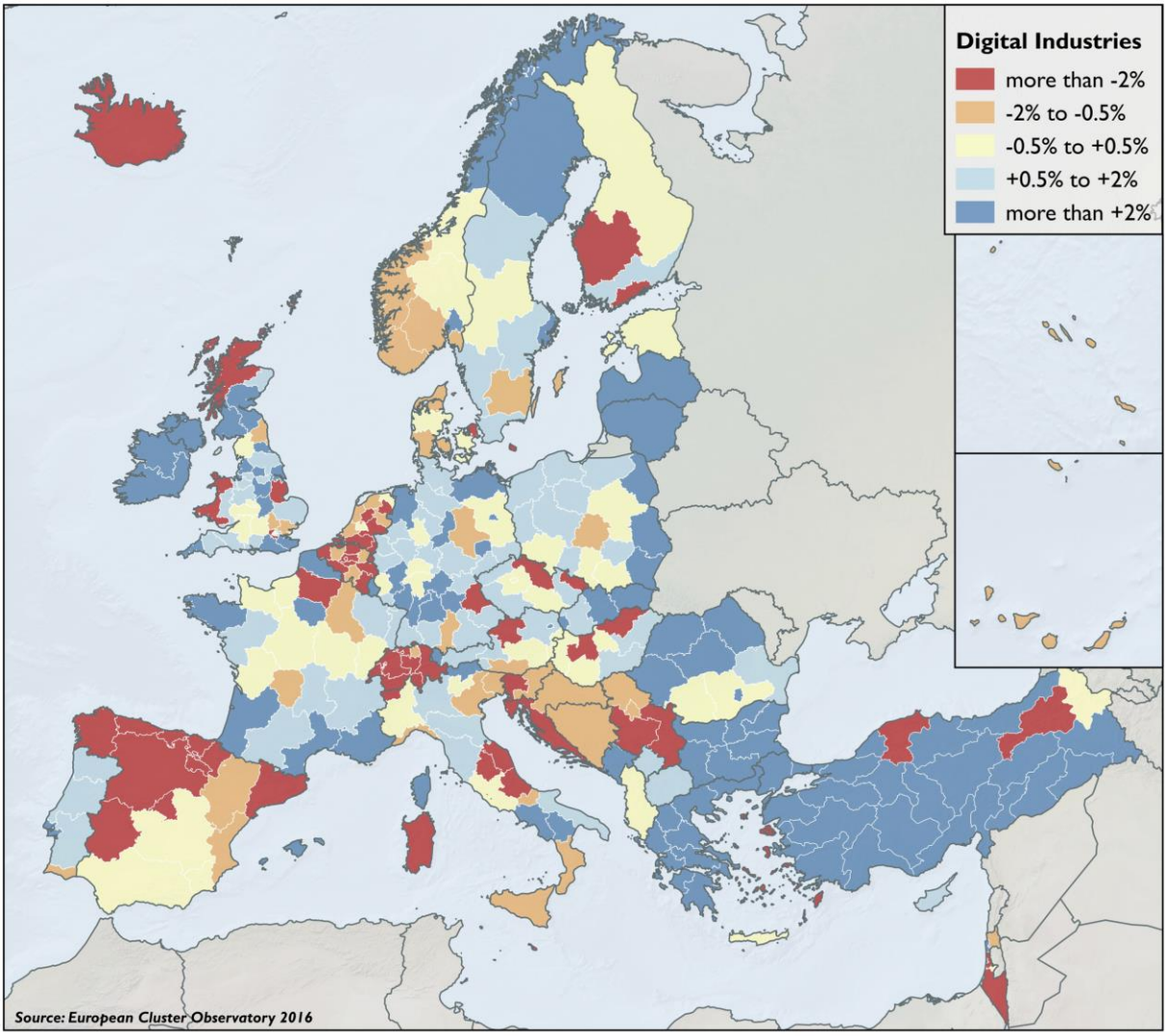
5. Evolution

Figure 3: Employment over time, 1996-2014 (2008=100)



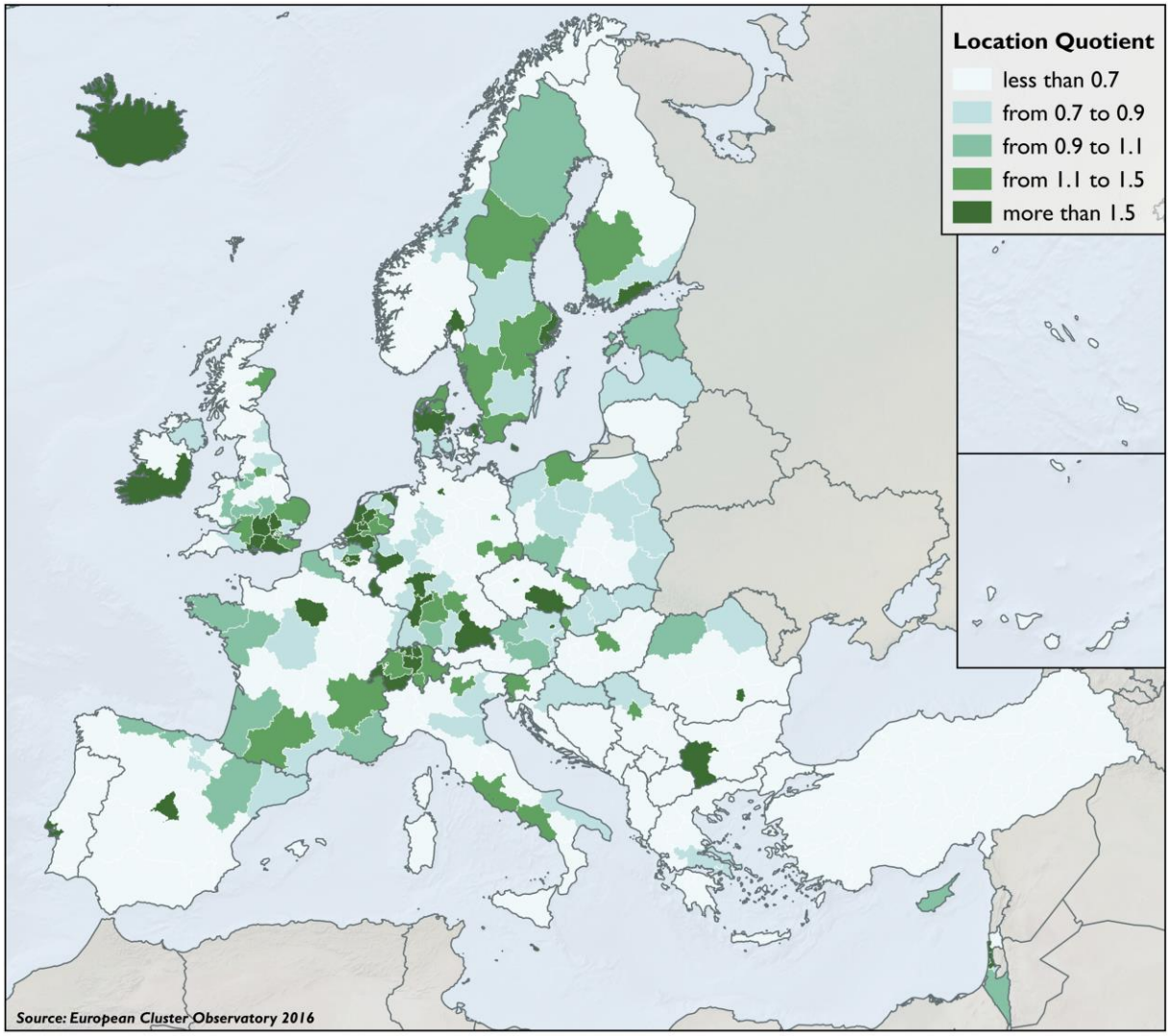
Note that there is a break in time series in 2008: all data prior to this date was sourced from the dataset in prior version of the European Cluster Observatory and adjusted to be compatible with the current dataset.

Figure 4: Annual Growth in Digital Industries (2008-14)



6. Sub-cluster Profile: Digital Business Services

Figure 5: Regions most specialised in Digital Business Services



7. Selected Cluster Initiatives in Digital Industries

Advanced cluster policies conducive to successfully implement regional innovation strategies do not only provide funding to cluster initiatives or cluster organisations but rather offer a broad set of policy choices to support the entire framework conditions of the actors in given regions. Such a policy approach aims to improve cluster-specific business environments that provide optimal conditions for companies in related industries to raise their productivity and innovation. Creating platforms for collective action within clusters through cluster organisations can help companies from different sectors to innovate better and exploit their business opportunities. Cluster organisations can in turn also be a major partner for the government to design and implement effective policies for upgrading cluster-specific business environments. However, strong cluster organisations are necessary, managing their cluster in an excellent manner and being able not only to take up but to proactively influence the regional social and economic development, fully integrated in all relevant communities, the policy making, the industrial, the academic, and other relevant ones.

Being awarded with a quality label of the European Cluster Excellence Initiative is a justification for strengths. In the following sector-related cluster initiatives are listed where the cluster organisation is holding such a label. Furthermore, two of the GOLD-labelled cluster initiatives are shortly described to give an idea of their set-up and interesting activities and their effects.

Cluster Management Excellence Label GOLD – Proven for Cluster Excellence

Name	Country	www
BrainsBusiness ICT North Denmark	Denmark	http://www.brainsbusiness.dk/
Cap Digital	France	http://www.capdigital.com/
Cluster TIC Galicia	Spain	http://www.clusterticgalicia.com
Future Position X	Sweden	http://fpx.se/
Kosice IT Valley	Slovakia	http://www.kosiceitvalley.sk
Pole SCS	France	http://www.pole-scs.org/
Silicon Saxony e. V.	Germany	http://www.silicon-saxony.de/home.html
Systematic	France	http://www.systematic-paris-region.org/
TICE.PT	Portugal	http://www.tice.pt
VDC Fellbach	Germany	http://www.vdc-fellbach.de/

Cluster Management Excellence Label SILVER – Dedicated to Cluster Excellence

Name	Country	www
Agrupación Empresarial Innovadora del Sector de la TIC de La Rioja (AEI AERTIC)	Spain	http://www.aertic.es
Baden-Württemberg Connected e. V.	Germany	http://www.bwcon.de/
Canarias Excelencia Tecnológica (CET)	Spain	http://www.canariasexcelenciatecnologica.com/
ClujIT	Romania	http://www.clujit.ro/
Cluster de Empresas TIC, Electrónica y Telecomunicaciones de Aragón	Spain	http://www.tecnara.es
ELINCLUS - Electronic Innovation Cluster	Romania	http://www.elinclus.ro
Estonian ICT Cluster	Estonia	http://www.itl.ee
GEOkomm e. V.	Germany	http://www.geokomm.de/
INFINIT	Denmark	http://www.infinit.dk
Info Pólus Software Innovation Pole Cluster	Hungary	http://www.infopolus.hu/
Innoskart	Hungary	http://www.innoskart.eu/
InnoZent OWL e. V.	Germany	http://www.innozentowl.de/
IT FOR WORK	Germany	http://www.it-for-work.de/
IT Security - Bavarian IT Security & Safety Cluster	Germany	http://www.it-sicherheit-bayern.de/
iTech Transilvania Cluster	Romania	http://itech.aries-transilvania.ro/
Latvian IT Cluster	Latvia	http://www.itbaltic.com
LeClust'R Numérique	France	http://www.leclustr.org
Mazovia Cluster ICT	Poland	http://www.klasterict.pl/
Polo di Innovazione ICT	Italy	http://www.poloinnovazioneict.org/
Service Cluster Denmark	Denmark	http://www.serviceplatform.dk/

Košice IT Valley – developing the IT industry for improving the quality of life in Eastern Slovakia

	Website	www.kosiceitvalley.sk
	Established	2007
	Cluster participants (2015)	Industry 29, R&D 12, Others 10
	Region	Košický kraj (region Košice, south-east Slowakia)
	Cluster Manager	Pavol Miroššay

The vision of Košice IT Valley cluster initiative is to create a regional partnership of IT companies, education institutions and regional authorities that will contribute to the extension and quality increase of educational programs, the creation of a broad portfolio of job opportunities for qualified work force and the elaboration of a common strategy. This is necessary for achieving prosperity of the region of Eastern Slovakia and thus ensuring gradual increase of quality of life of its citizens.

The mission is

- to create a business friendly environment stimulating all forms of cooperation and innovation within the region of Eastern Slovakia and thus strengthening the sustainability and competitiveness of the local IT companies globally,
- to bring jobs with high added value to the region in close cooperation of all parties involved,
- to offer educational programs needed for these jobs and motivate the youth to study and work in IT and Robotics,
- to contribute to the elaboration and implementation of knowledge economy and information society strategies using the concept of „learning region“ and to implement a digital ecosystem.

Activities concentrate on education, innovation and collaboration. Over the years the original main focus on education stays as one of the priorities, but the scope of the cluster itself has gone beyond. Innovations, research and development and support of collaboration within the cluster and support of investments become an integral part of the cluster.

In the development of the IT industry in the Košice region the cluster initiative Košice IT Valley plays an important role. The association today forming the cluster initiative was established in 2007 as a joint initiative of educational institutions, government and leading IT companies. In 2015 Košice IT Valley was certified with the “Cluster Management Excellence Label GOLD” as the first cluster organisation in central Europe. The cluster initiative managed to support the creation of 9000 new working places in IT in less than 10 years of its existence by reaching 10 000 employees in early summer of 2016. The cluster organisation and the cluster members operate a variety of educational, R&D and collaboration activities in the region of Eastern Slovakia and thus enable the development and growth of the IT sector in Slovakia.

Virtual Dimension Center Fellbach - leading competence network for Virtual Engineering

VIRTUAL DIMENSION CENTER	**Website**	www.vdc-fellbach.de
	Established	2002
	Cluster participants (2015)	Industry 46, R&D 20, Others 13
	Region	Baden-Württemberg, Germany
	Cluster Manager	Christoph Runde

The Virtual Dimension Center (VDC) is Germany's leading competence network for Virtual Engineering. Technology and service providers, users, research institutions and multipliers work together in the VDC network along the entire value chain of Virtual Engineering - namely in 3D simulation, 3D visualisation, product lifecycle management (PLM), and Virtual Reality (VR). The VDC members gain improved innovation activity and a higher productivity by acquiring additional information and cost advantages.

The VDC is a highly diversified virtual reality network that addresses a huge variety of industrial sectors with specific workshops and information, such as automotive, commercial vehicles, aerospace, chemical industry, textiles, architecture, medicine, geography and city planning as well as manufacturing systems engineering. The VDC organises more than 40 events (workshops, exhibitions, congresses) per year to address all mentioned industries.

One important means for technology transfer are the “VDC whitepapers”. A “VDC whitepaper” describes virtual reality technologies, their applications and potential benefits of use for certain industrial sectors (as mentioned) or for a certain application field (such as styling, design, marketing, factory planning). The whitepapers grant an excellent overview and serve as an entry point for those that are interested in virtual reality. The VDC has produced more than 20 whitepapers during the last years.

Another example for the work of the cluster management is the virtual reality and virtual engineering demonstration centre. Various hardware and software demonstrators are permanently visible and can be tested by the companies. It is also possible to schedule appointments for special demonstrations by VDC members in the show rooms.

Furthermore, the cluster management organisation is part of the project “Digital Lotse BW” (digital pilot Baden-Württemberg) that supports companies for the digitisation of planning and development processes. Only by means of extensive preliminary simulations and visualisations expensive development errors can be avoided and development processes can be kept competitive. Automotive industry, mechanical engineering, plant engineering, aerospace and others are relevant industrial sectors with highly complex products being strong locally in Baden-Württemberg. As part of this project, small and medium-sized companies are informed free of charge about new business opportunities, they are provided with information and contacts in the field of digitised development processes and kept informed about trends in the areas of virtual reality, augmented reality and digitised development processes.

Appendix: Industry Definition

Industry Code	Industry Name
22.29	Manufacture of other plastic products
25.61	Treatment and coating of metals
25.73	Manufacture of tools
26.11	Manufacture of electronic components
26.12	Manufacture of loaded electronic boards
26.20	Manufacture of computers and peripheral equipment
26.30	Manufacture of communication equipment
26.40	Manufacture of consumer electronics
26.51	Manufacture of instruments and appliances for measuring, testing and navigation
26.52	Manufacture of watches and clocks
26.70	Manufacture of optical instruments and photographic equipment
26.80	Manufacture of magnetic and optical media
27.12	Manufacture of electricity distribution and control apparatus
27.90	Manufacture of other electrical equipment
28.24	Manufacture of power-driven hand tools
28.29	Manufacture of other general-purpose machinery n.e.c.
28.99	Manufacture of other special-purpose machinery n.e.c.
32.50	Manufacture of medical and dental instruments and supplies
46.43	Wholesale of electrical household appliances
46.51	Wholesale of computers, computer peripheral equipment and software
46.52	Wholesale of electronic and telecommunications equipment and parts
46.66	Wholesale of other office machinery and equipment
46.69	Wholesale of other machinery and equipment
58.11	Book publishing
58.21	Publishing of computer games

58.29	Other software publishing
61.20	Wireless telecommunications activities
61.30	Satellite telecommunications activities
61.90	Other telecommunications activities
62.01	Computer programming activities
62.02	Computer consultancy activities
62.09	Other information technology and computer service activities
70.21	Public relations and communication activities
73.20	Market research and public opinion polling

For further information, please consult the European Cluster Observatory Website:

http://ec.europa.eu/growth/smes/cluster/observatory/

This work has been carried out under a service contract for the European Commission's Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs. It is financed under the Competitiveness and Innovation Framework programme (CIP) which aims to encourage the competitiveness of European enterprises. The views expressed in this document and the information included in it do not necessarily reflect the opinion or position of the European Commission.