



# MEASUREMENT OF HUMAN RESOURCES FOR ICT

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# HUMAN RESOURCES FOR ICT AND STATISTICS

- 1) ICT specialists (ICT occupations/employment)
- 2) Employment in ICT industries
- 3) ICT fields of education
- 4) ICT skills

# ICT SPECIALISTS – DEFINITION (1)

*ICT professionals and technicians (**ICT specialists**) are all persons employed in the national economy, whose principal activity comes within the following groups of the International Standard Classification of Occupations (ISCO-08):*

## **1) ICT professionals**

- **Information and communications technology professionals (25)**
- *ICT service managers (133)*
- *ICT sales professionals (2434)*

## **2) ICT technicians**

- **Information and communications technicians (35)**
- *ICT installers and servicers (7444)*

# ICT SPECIALISTS – DEFINITION (2)

- 1) **ICT professionals** conduct research, plan, design, write, test, provide advice and improve information technology systems, hardware, software and related concepts for specific applications; and design, develop, control, maintain and support databases and other information systems to ensure optimal performance and data integrity and security.
- 2) **ICT technicians** provide support for the day-to-day running of computer systems, communications systems and networks. Tasks performed by workers in this group usually include: providing assistance to information and communications systems users; installing new programs and equipment; establishing, operating and maintaining network and other data communications systems; installing, monitoring and supporting Internet and Intranet websites or web server hardware or software; modifying web pages; and performing web server backup and recovery operations.

**Note:** For more information see the ISCO website of the **International Labour Organization (ILO)**: <http://www.ilo.org/public/english/bureau/stat/isco/index.htm>

# ICT SPECIALISTS – MAIN INDICATORS

## 1) Number of ICT specialists/experts

- **Available breakdowns:** by occupation and individual characteristics of ICT specialists such as gender, nationality, age groups, highest education attainment, field of education and economic activity

- **Data source: Labour Force Survey (LFS)**

[http://www.czso.cz/csu/2014edicniplan.nsf/engpubl/250131-14-eng\\_r\\_2014](http://www.czso.cz/csu/2014edicniplan.nsf/engpubl/250131-14-eng_r_2014)

[http://epp.eurostat.ec.europa.eu/statistics\\_explained/index.php/EU\\_labour\\_force\\_survey](http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/EU_labour_force_survey)

[http://epp.eurostat.ec.europa.eu/portal/page/portal/employment\\_unemployment\\_lfs/data/database](http://epp.eurostat.ec.europa.eu/portal/page/portal/employment_unemployment_lfs/data/database)

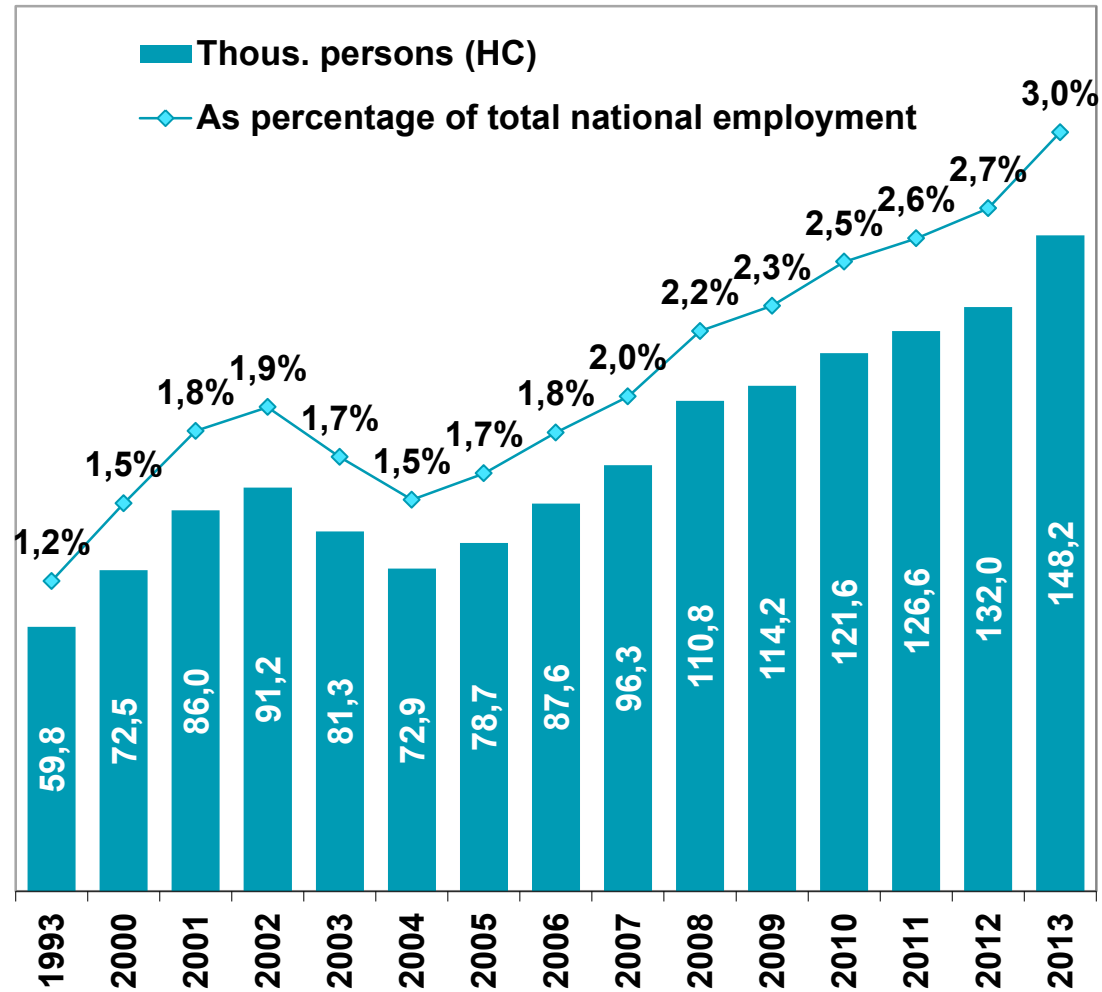
## 2) Earnings (*average and mean wages and salaries*) of ICT specialists

- **Available breakdowns:**

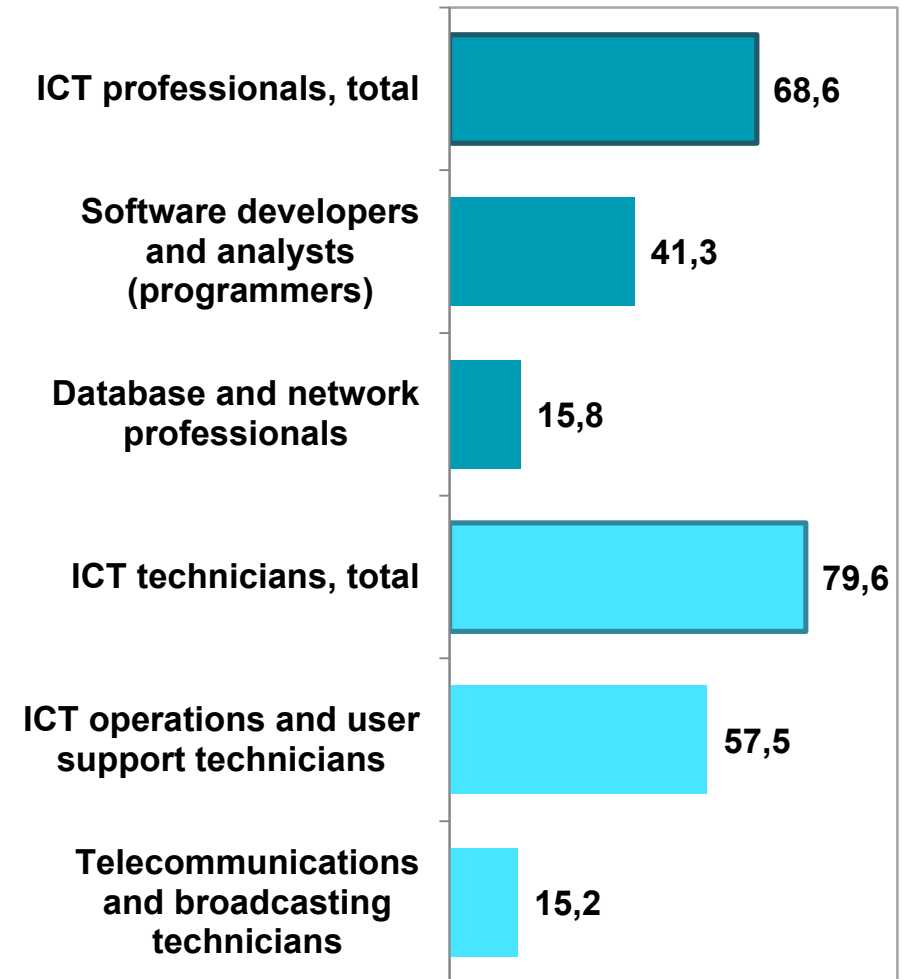
- **by occupation and individual characteristics of employees** such as gender, nationality, age, education, length of service
- **by characteristics of the ICT specialists employers (*enterprises, organizations*)** such as sector, size class or main economic activity

- **Data source: Structural Earnings Statistic (SES)** that monitors earnings of individual employees: <http://www.czso.cz/csu/2014edicniplan.nsf/engp/110026-14>

# ICT SPECIALISTS



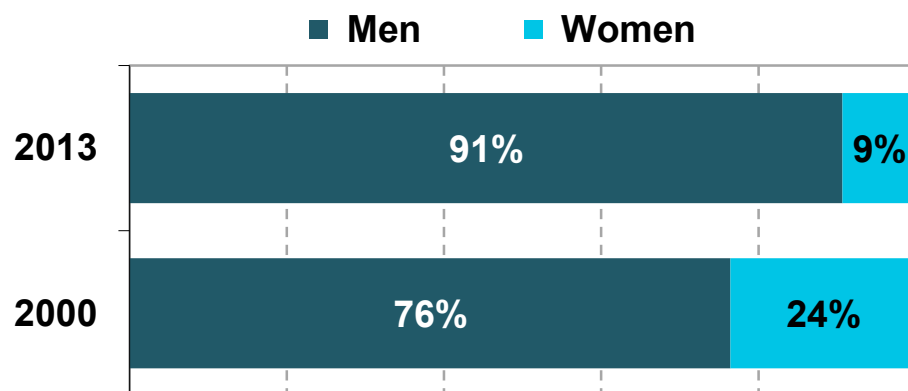
## BY OCCUPATION (THOUS.), 2013



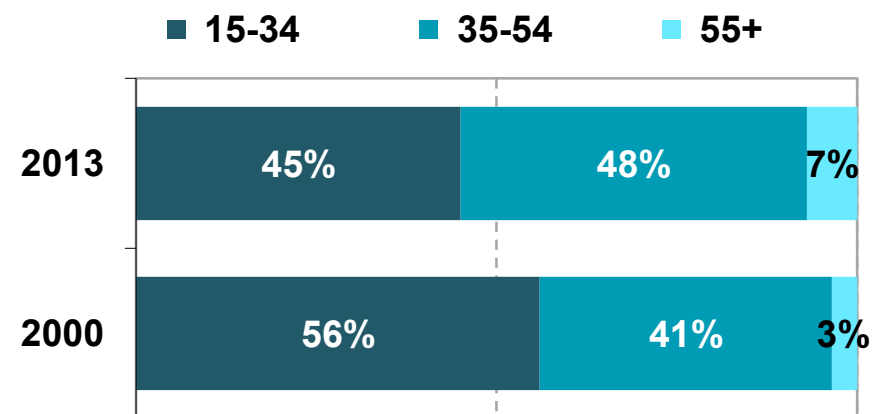
Czech Statistical Office 2014, Labour Force Survey

# ICT SPECIALISTS BY...

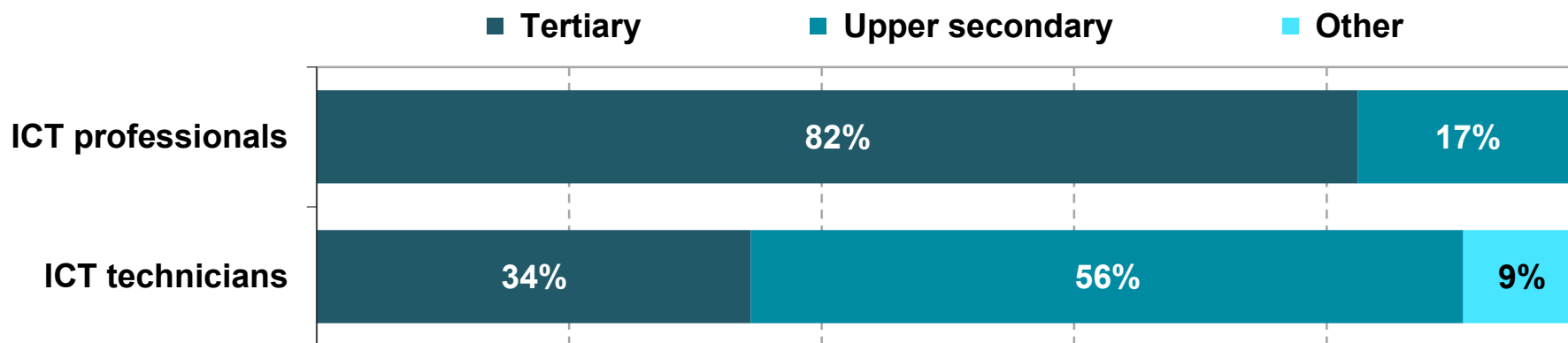
## A) GENDER (%)



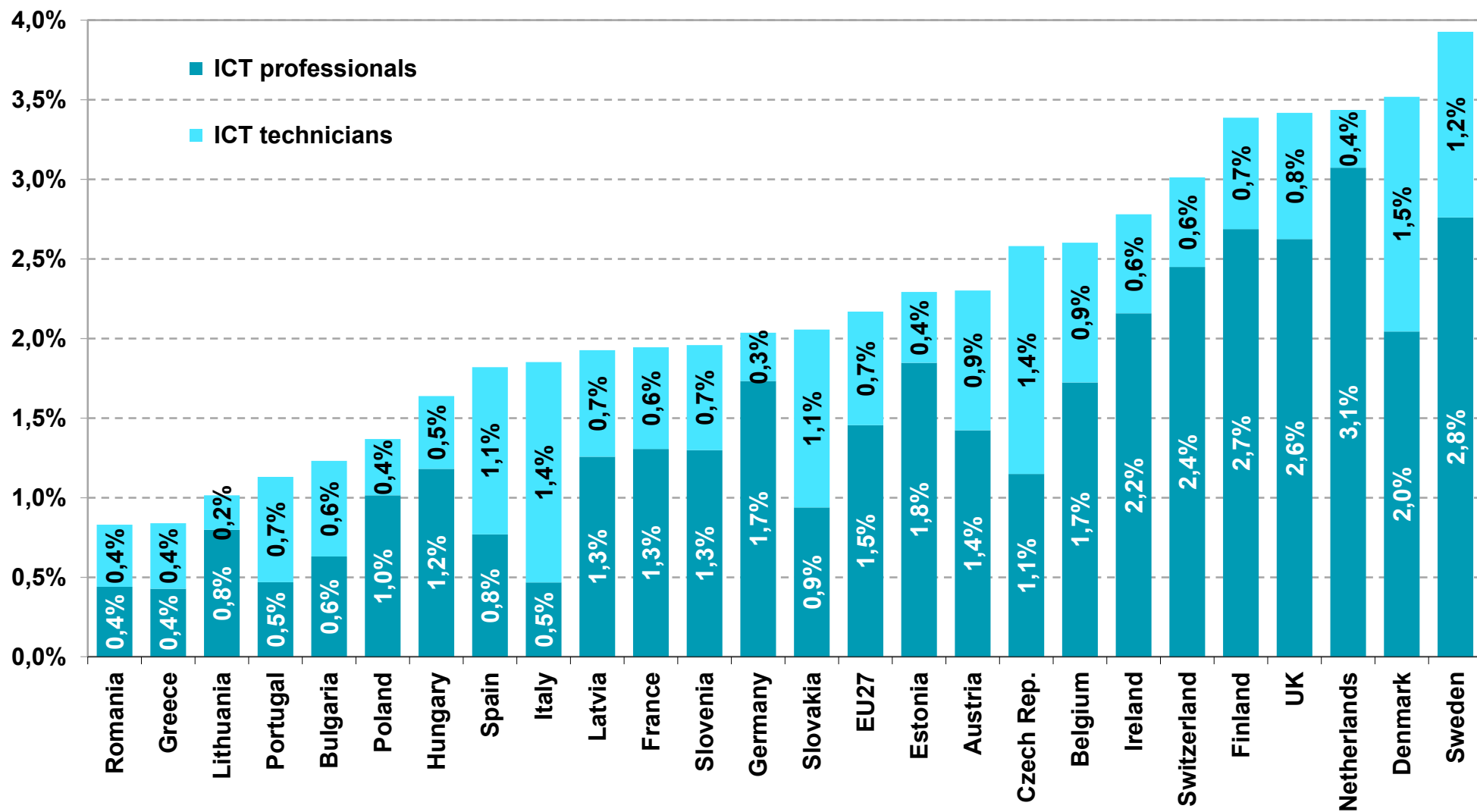
## B) AGE GROUPS (%)



## C) HIGHEST EDUCATIONAL ATTAINMENT (ISCED LEVELS), 2013



# ICT SPECIALISTS IN EU, 2011 (as % of total employment)

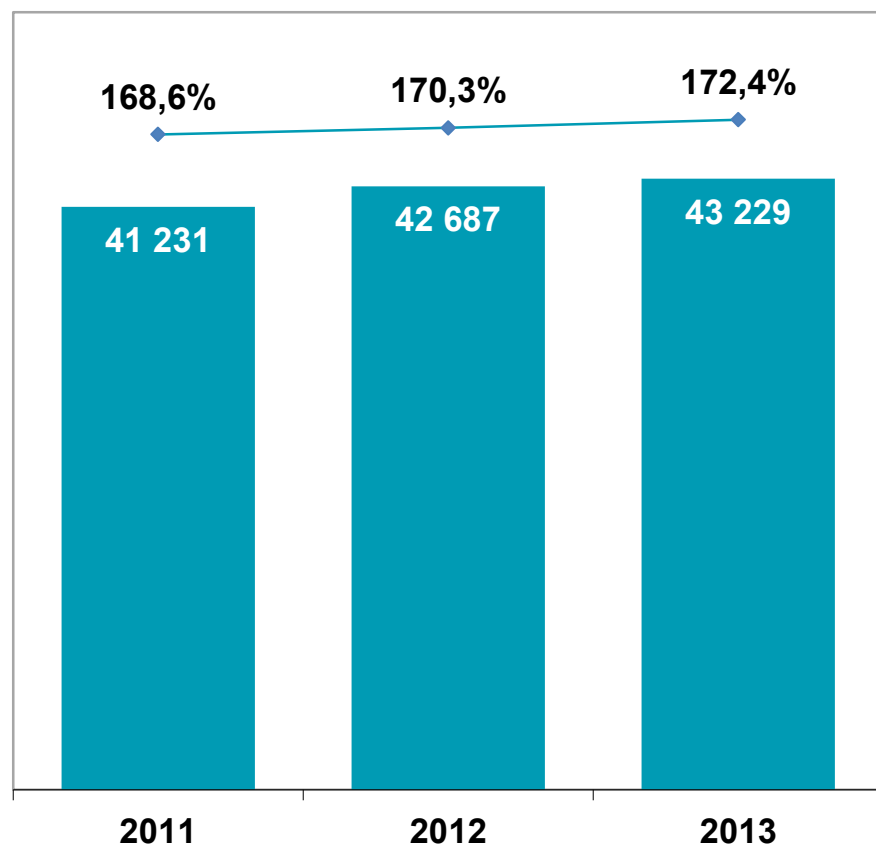




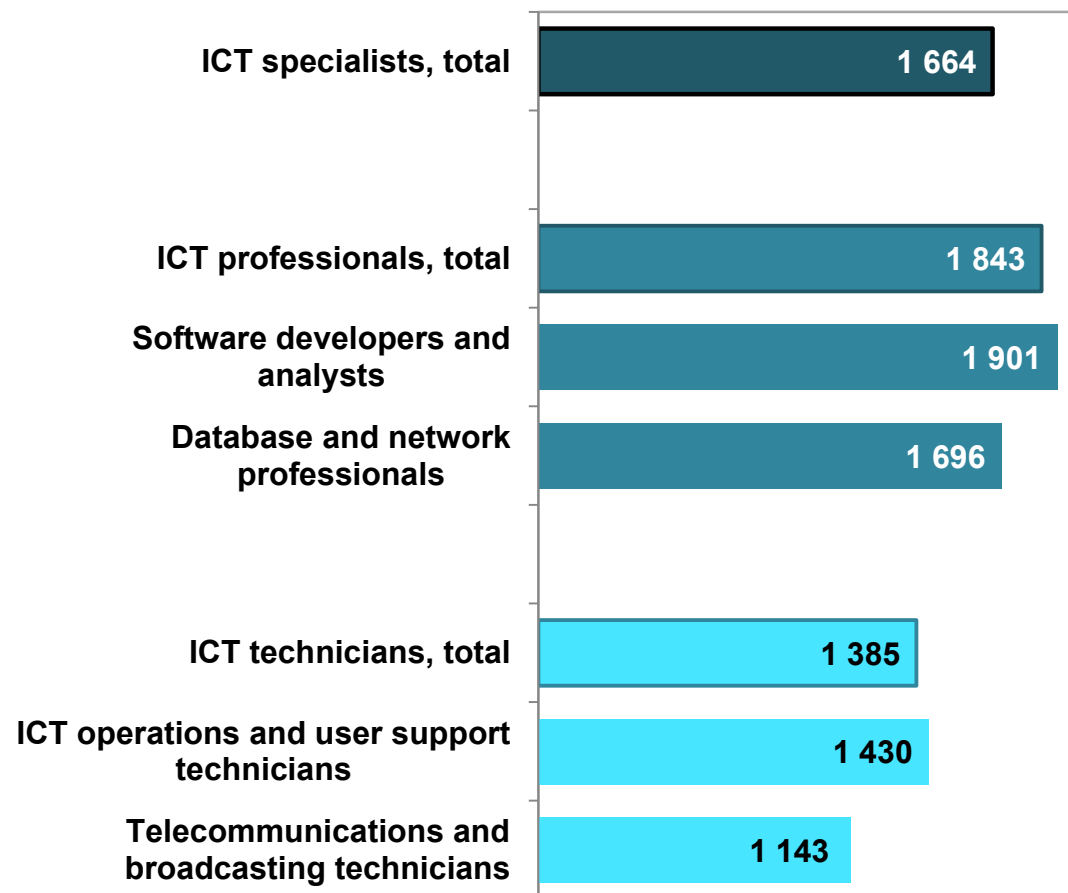
# EARNINGS\* OF ICT SPECIALISTS

■ CZK

◆ As % of average monthly wages in the Czech Rep.



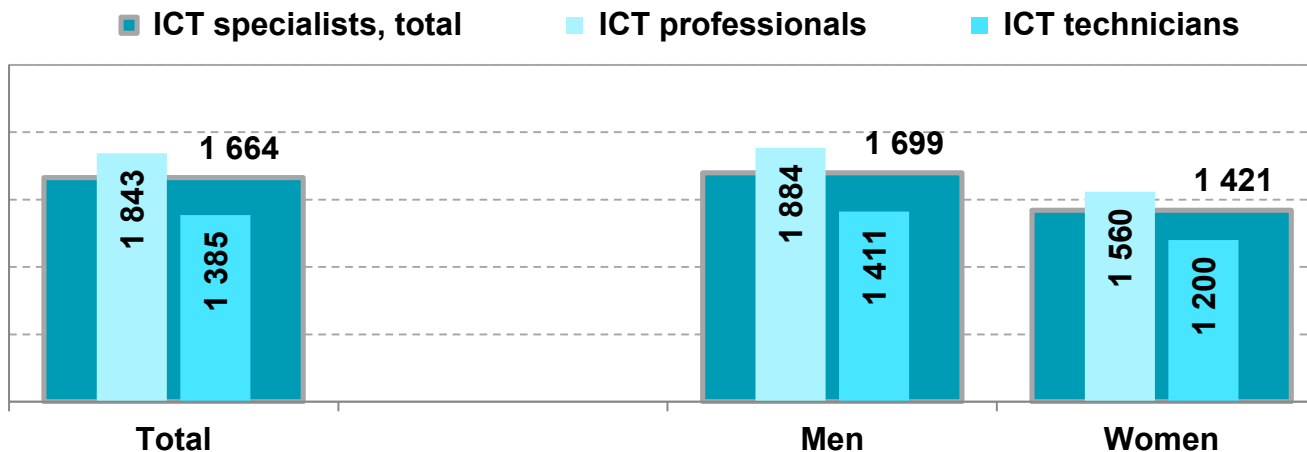
## BY OCCUPATION (EUR), 2013



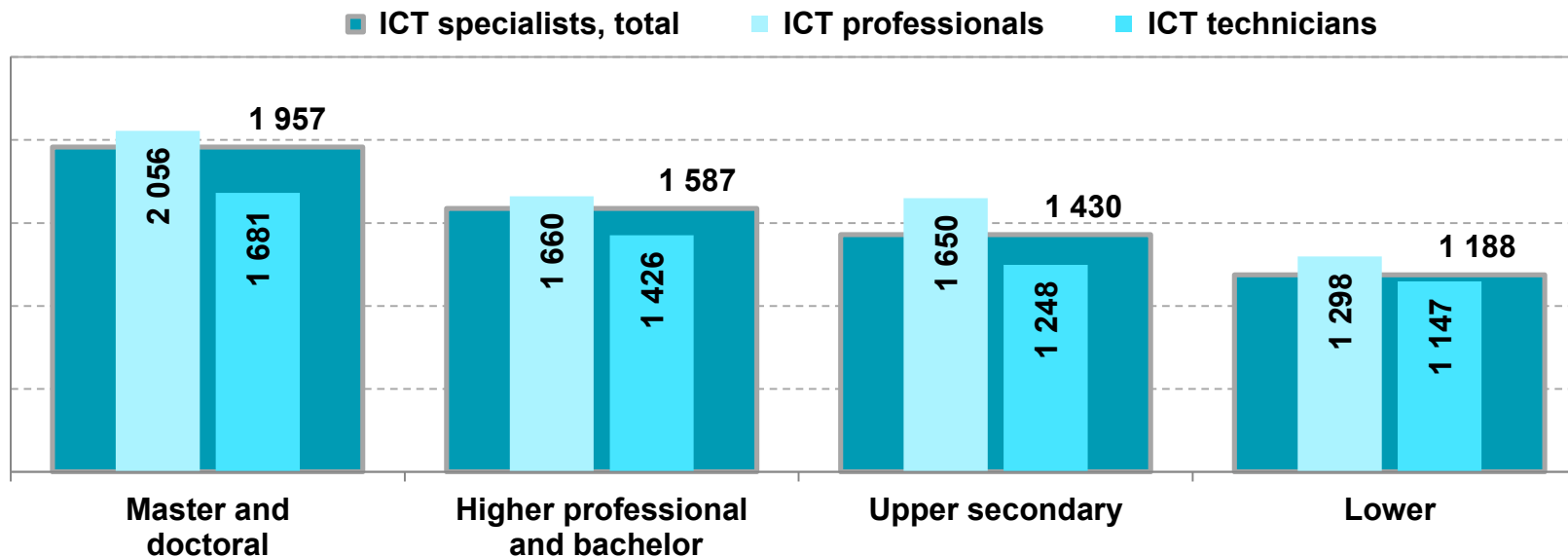
\*Arithmetic mean (average) gross monthly earnings

# EARNINGS\* OF ICT SPECIALISTS IN 2013 BY...

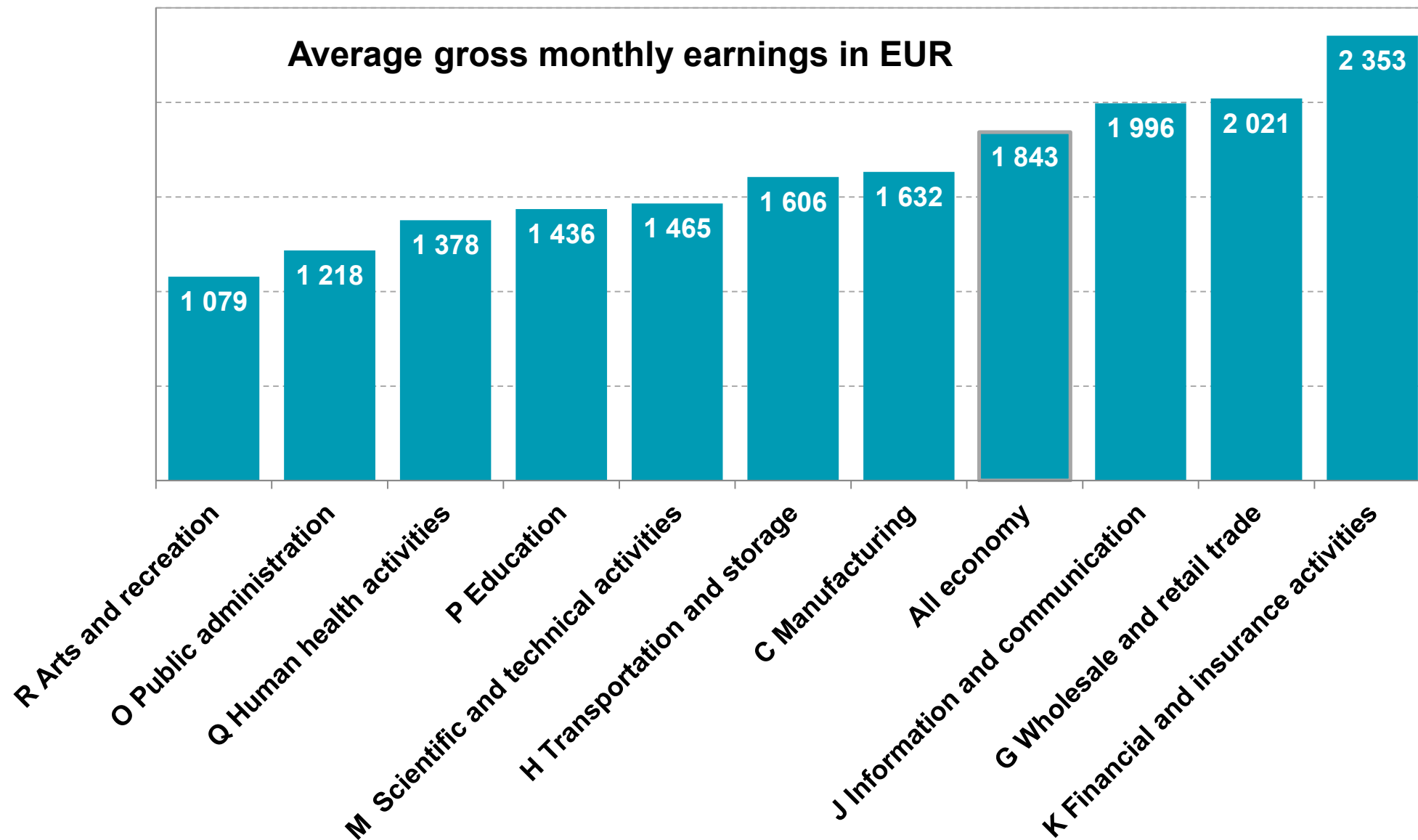
## A) GENDER



## B) EDUCATION



# EARNINGS OF ICT PROFESSIONALS IN 2013 BY INDUSTRIES



# EMPLOYMENT IN ICT INDUSTRIES (SECTOR)

*ICT SECTOR is defined (OECD 2007) as a combination of economic activities of manufacturing products (technology) or providing services primarily intended to fulfill or enable the function of information processing and communication by electronic means including transmission and display.*

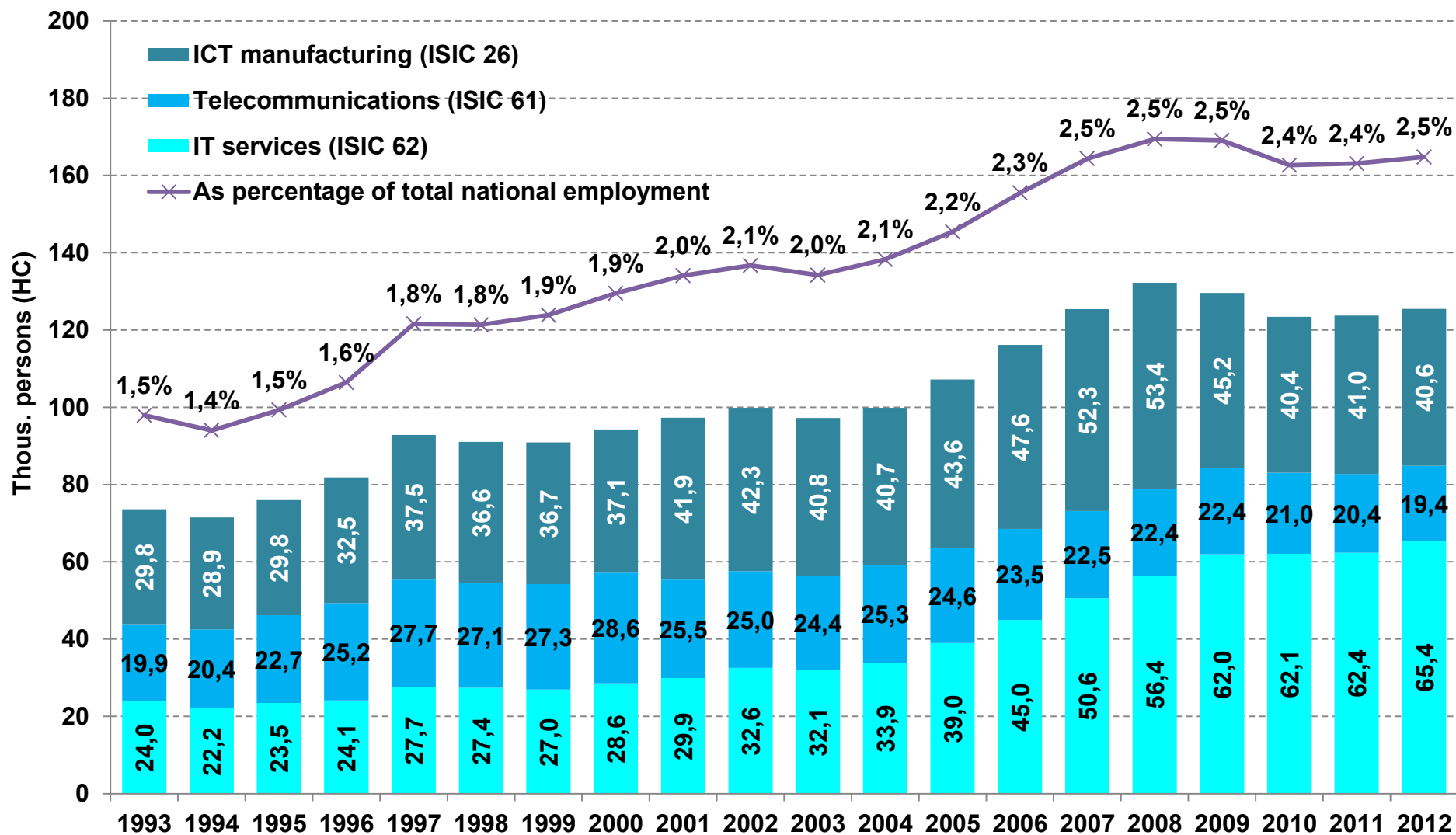
The activities in the ICT sector can be grouped into the following **four main categories based on the following ISIC Rev. 4 industries:**

- 1) ICT manufacturing industries (26.1-26.4 + 26.8)
- 2) ICT trade industries (Wholesale of ICT equipment 46.5)
- 3) Telecommunications (61)
- 4) **IT services industries** (58.2 + 62 + 63.1 + 95.1):
  - *Software publishing (58.2)*
  - *Computer programming, consultancy and related activities (62.0)*
  - *Data processing, hosting and related activities; web portals (63.1)*
  - *Repair of computers and communication equipment (95.1)*

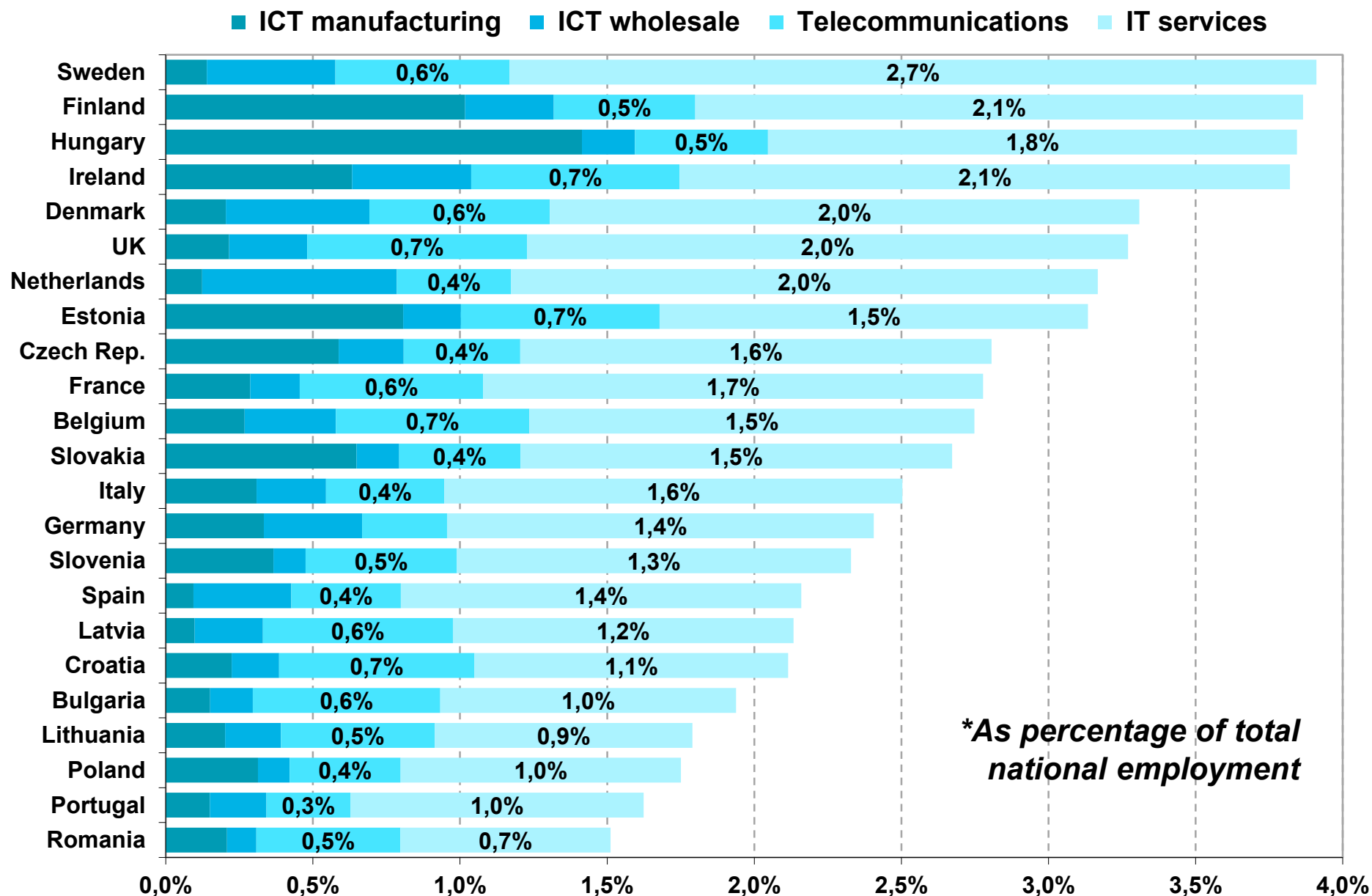
**Note:** *ICT sector together with Content and media sector was recognized by the United Nation Statistics Division as a new alternative grouping of economic activities (**information economy**) defined within the International Standard Industrial Classification of All Economic Activities (ISIC), Rev. 4.*

[http://unstats.un.org/unsd/cr/registry/docs/i4\\_information\\_economy.pdf](http://unstats.un.org/unsd/cr/registry/docs/i4_information_economy.pdf)

# EMPLOYMENT IN ICT INDUSTRIES



# EMPLOYEMENT\* IN ICT INDUSTRIES IN EU, 2012



# ICT FIELDS OF EDUCATION (COMPUTING)

- **Definition:** based on ISCED Fields of Education and *Training* Classification:
  - **48 Computing/Computer science (ISCED 1997)**
  - **06 Information and Communication Technologies (ISCED 2013):**
    - *0611 Computer use*
    - *0612 Database and network design and administration*
    - *0613 Software and applications development and analysis*

See the UNESCO Institute for Statistics (UIS) website of the International Standard Classification of Education (ISCED): <http://www.uis.unesco.org/Education/Pages/international-standard-classification-of-education.aspx>

- **Indicators:** Number of **Computing** students and graduates by educational programme and individual characteristics of students such as gender, nationality or age.
- **Data source:** Ministry of Education, Youth and Sports of the CR - the “SIMS” database (Union Information from Students' Registers) and the Eurostat Education and Training Database: <http://epp.eurostat.ec.europa.eu/portal/page/portal/education/data/database>

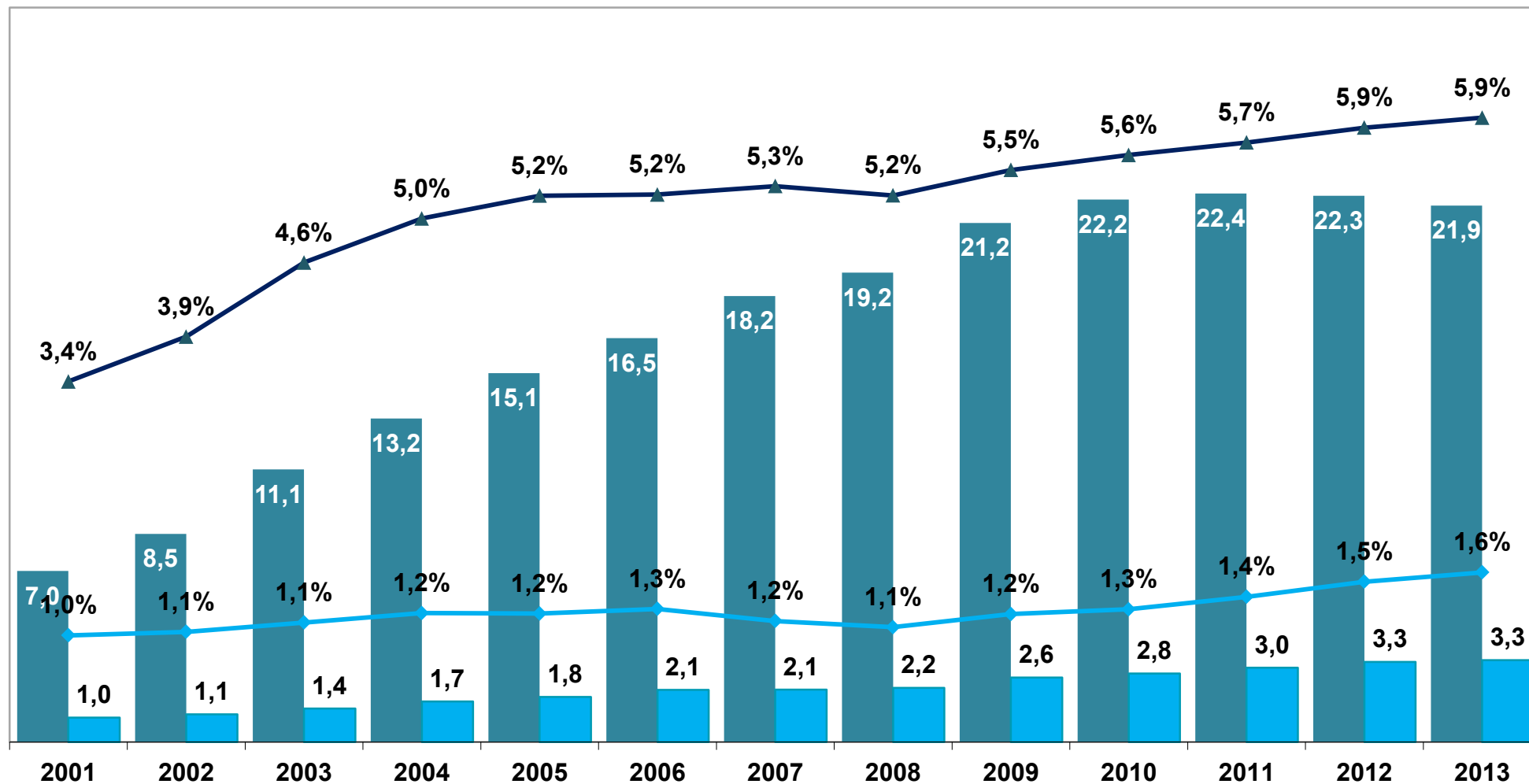
# UNIVERSITY STUDENTS OF COMPUTING

■ Total - thous. students

■ Women - thous. students

▲ as percentage of total university students

◆ as percentage of total university students - women

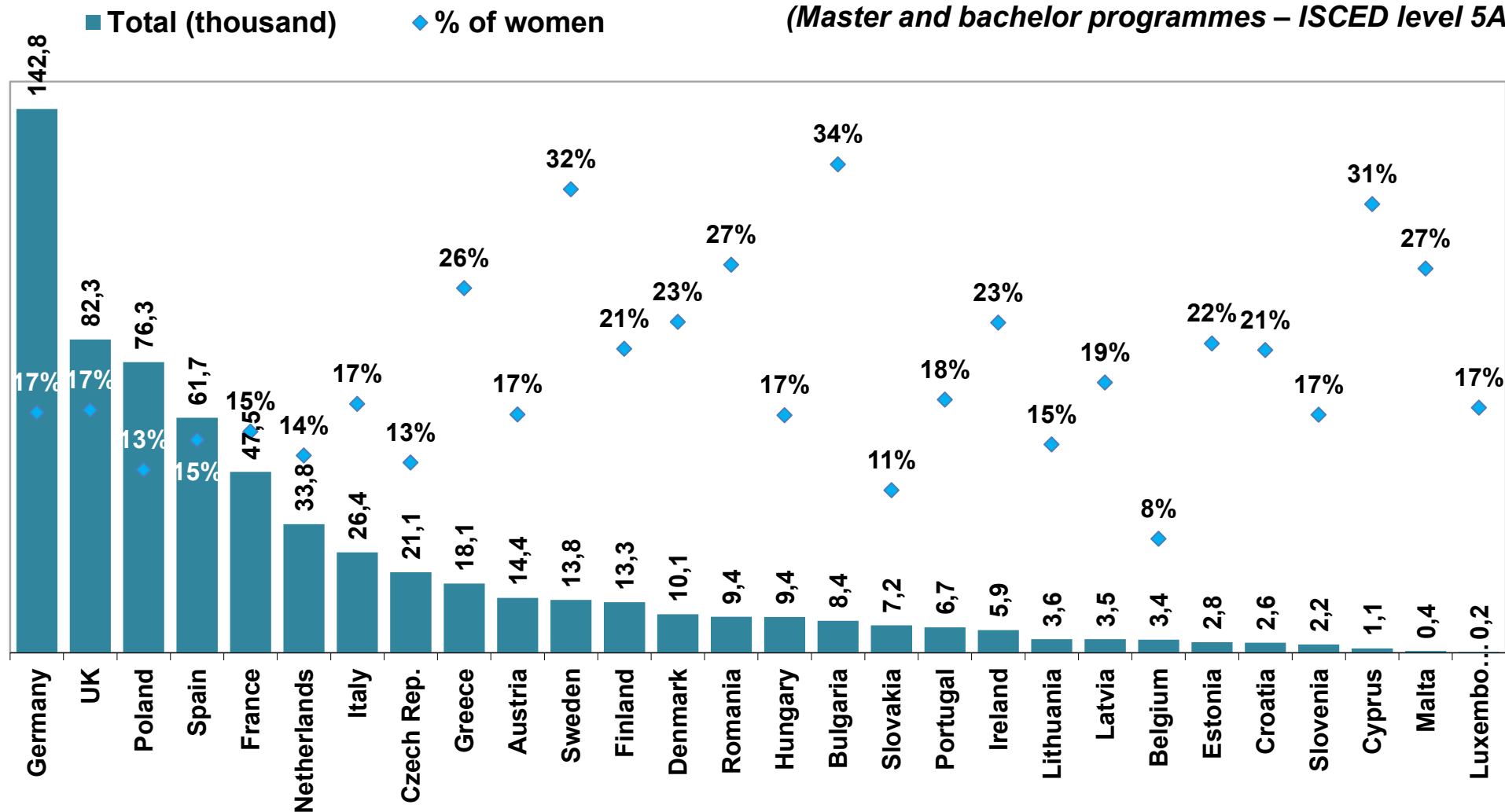




# UNIVERSITY\* STUDENTS OF COMPUTING IN EU

\*First stage of tertiary education

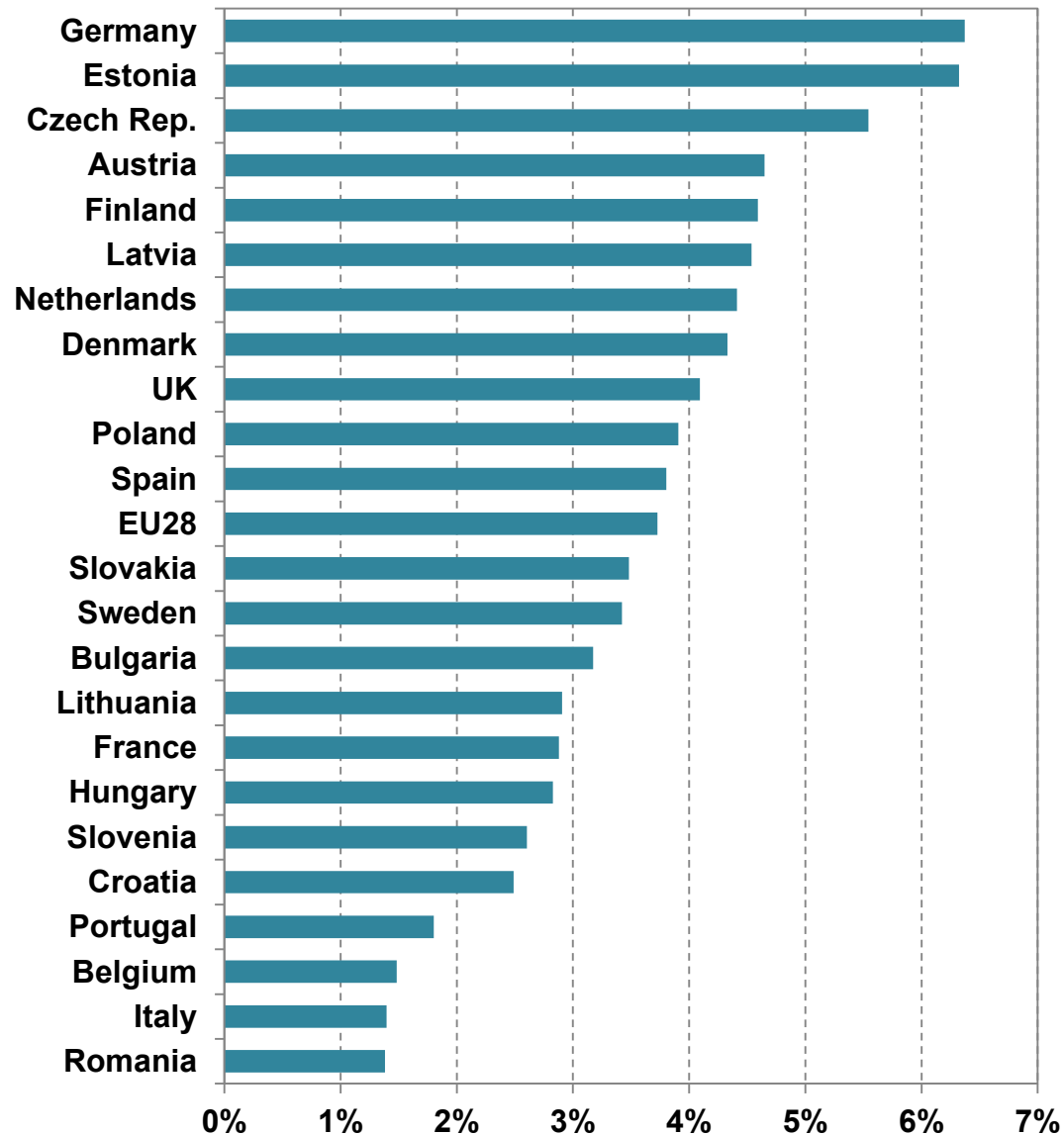
(Master and bachelor programmes – ISCED level 5A)



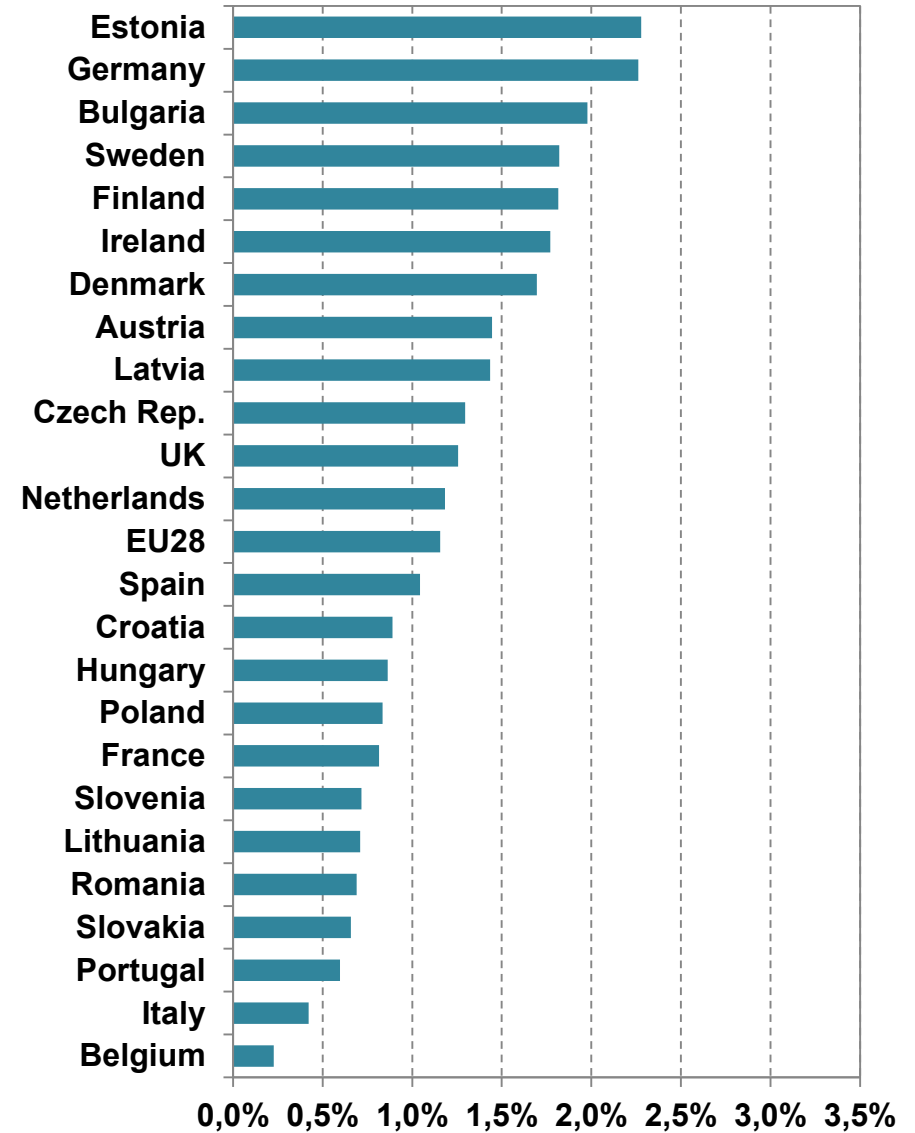
Source: EUROSTAT 2014; Education and Training Database

# UNIVERSITY STUDENTS OF COMPUTING IN EU

a) Total - % of all university students



b) Women - % of all university students



# ICT (DIGITAL) SKILLS - DEFINITION

*Based on EU Digital Competence Framework: <http://ftp.jrc.es/EURdoc/JRC83167.pdf>*

- 1) **Information skills:** identify, locate, retrieve, store, organize and analyze digital information, judging its relevance and purpose.
  - 2) **Communication skills:** communicate in digital environments, share resources through online tools, link with others and collaborate through digital tools, interact with and participate in communities and networks, cross-cultural awareness.
  - 3) **Problem solving skills:** identify digital needs and resources, make informed decisions as to which are the most appropriate digital tools according to the purpose or need, solve conceptual problems through digital means, creatively use technologies, solve technical problems, update one's own and others' competences.
  - 4) **Software skills for content manipulation:** Create and edit new content (from word processing to images and video); integrate and re-elaborate previous knowledge and content; produce creative expressions, media outputs and programming; deal with and apply intellectual property rights and licences.
- **Data source: ICT usage surveys (OECD and EUROSTAT)**

# ICT (DIGITAL) SKILLS – QUESTIONS

## 1) Information skills

- Copied or moved files or folders
- Saved files on Internet storage space
- Obtained information from public auth. websites
- Finding information about goods or services
- Seeking health-related information

## 3) A – Problem solving skills

- Transferring files between PCs or other devices
- Installing software and applications (apps)
- Changing settings of any software, including operational system or security programs

## 4) A – Basic software skills

- Used word processing software
- Used spreadsheet software
- Used software to edit photos, video or audio files

## 2) Communication skills

- Sending/receiving emails
- Participating in social networks
- Telephoning/video calls over the internet
- Uploading self-created content to any website to be shared

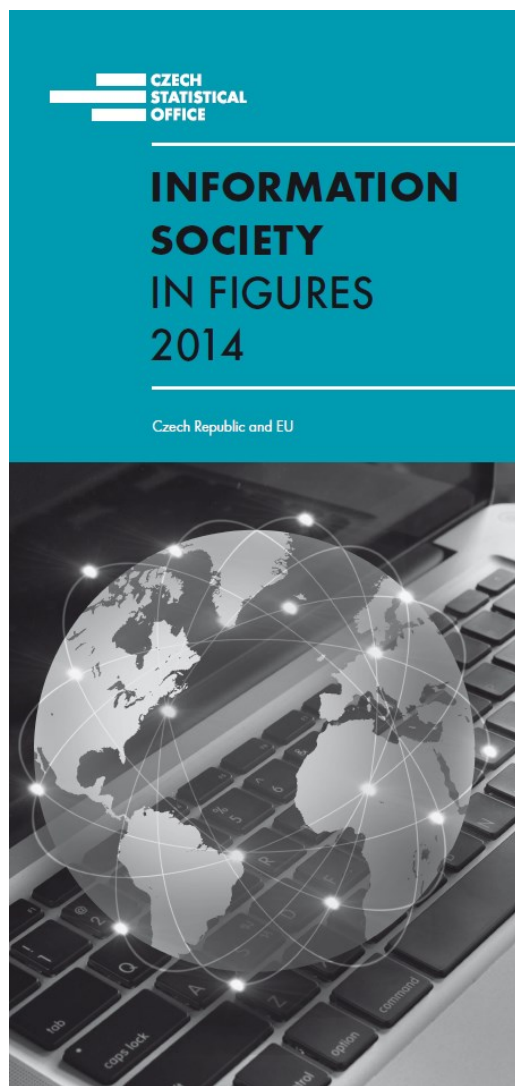
## 3) B – Familiarity with online services

- Online purchases
- Selling online
- Used online learning resources
- Internet banking

## 4) B – Above basic software skills

- Created presentation or document integrating text, pictures, tables or charts
- Used advanced functions of spreadsheet to organise and analyse data
- Have written a code in a programming language

# KEY OUTPUTS IN THE FIELD OF ICT STATISTICS

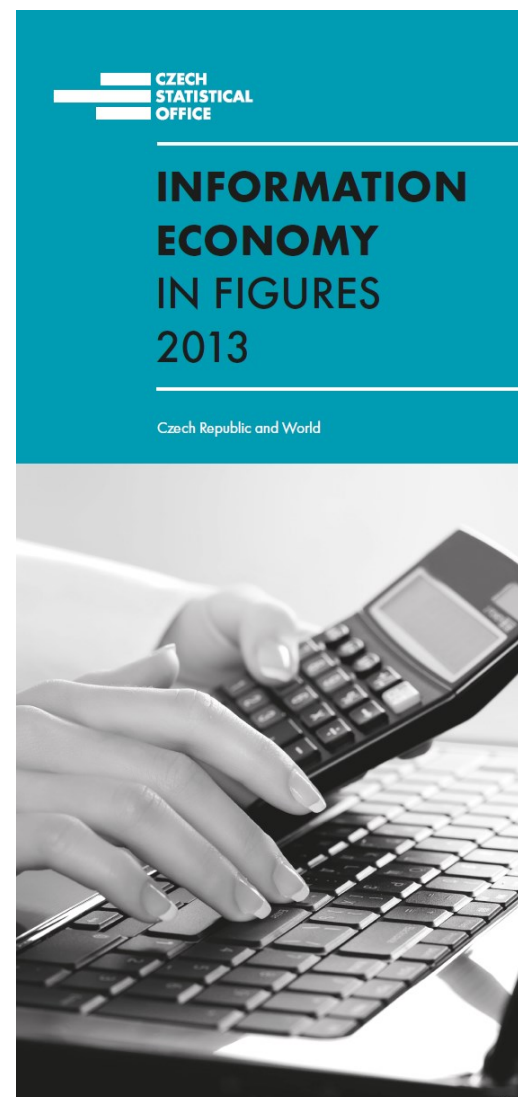


## 6 chapters:

- ICT infrastructure
- ICT & Households
- **ICT & Individuals**
- **ICT & Enterprises**
- ICT & Government
- ICT & Health

Time series

Intern. comparisons



## 5 chapters:

- **ICT Specialists**
- ICT Investment
- ICT and Science
- ICT Trade
- **ICT Sector**

Time series

Intern. comparisons

[http://www.czso.cz/csu/2014ediciplan.nsf/engpubl/061005-14-eng\\_r\\_2014](http://www.czso.cz/csu/2014ediciplan.nsf/engpubl/061005-14-eng_r_2014)

[http://www.czso.cz/csu/2013ediciplan.nsf/engpubl/9708-13-eng\\_r\\_2013](http://www.czso.cz/csu/2013ediciplan.nsf/engpubl/9708-13-eng_r_2013)



# Thank you for your attention

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