



e-Competence in Europe

Analysing Europe's Gaps and Mismatches
for a Stronger ICT Profession



CEPIS
Council of European Professional
Informatics Societies



CEPIS

eCOMPETENCE
BENCHMARK



Grand Coalition for Digital Jobs

About the Grand Coalition for Digital Jobs

The European Commission is leading a multi-stakeholder partnership to tackle the lack of digital skills in Europe and the thousands of unfilled ICT-related vacancies across all industry sectors.

The Secretariat of the Grand Coalition has been established to support the initiatives of the European Commission's Grand Coalition for Digital Jobs.

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Acknowledgements

This project was made possible by the participation of many hundreds of research respondents. We are particularly grateful for the support and expertise of CEPIS Member Societies across Europe.

Disclaimer

The outputs described in this report outline the uptake of the European e-Competence Framework (e-CF) powered tool 'CEPIS e-Competence Benchmark' developed by CEPIS.

The CEPIS e-Competence Benchmark has identified the e-competences of over 2,000 ICT professionals from 31 countries across greater Europe. The sample of respondents per profile and per country cannot be considered statistically representative and therefore the survey results analysed in the European report are to be considered as qualitative.

Statement of Originality

This deliverable contains original unpublished work except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation or both.

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**e-COMPETENCE MISMATCHES
EXPLORED**

e-Competence Mismatches are Threatening Europe's Economy

There is no doubt that ICT has become the backbone of Europe's economy; the demand for ICT personnel keeps growing steadily in spite of the crisis that affected most of the economy. However, Europe currently is not producing the talent with the right skills. There are simply not enough skilled ICT professionals to meet current demand and the situation is getting worse year after year.

CEPIS, with the essential support of the national informatics associations and computer societies that are its members throughout greater Europe, has undertaken this landmark research to produce and assess an up-to-date picture of the actual e-competences of ICT professionals across Europe.

The results of this pan-European initiative provide an insight into the level of professional competence and a snapshot of the profession in each country as well as an aggregated European perspective and recommendations for action to mature the profession and bridge the gaps facing Europe now and in the future.



Experts predict that over 900,000 ICT jobs may be unfilled by 2020 in Europe.¹

Identifying and analysing the e-competences of ICT professionals across Europe can help tackle ICT skills mismatches and shortfalls that threaten Europe's competitiveness and productivity:

- Employers, industry (including SMEs and entrepreneurs), policy makers, and educators can better anticipate the skills requirements of the labour market.
- ICT professionals benefit directly from having a better understanding of their e-competence levels. This encourages them towards continuous professional development, and retraining for new or advanced career paths.

The lack of e-skilled professionals threatens ICT's ability to act as a catalyst for growth, innovation, and competitiveness.

There are essentially two explanations for this shortfall of ICT talent.

On one hand, the number of ICT students across the continent is stagnating, and it is even decreasing in some countries.

On the other hand, competence mismatches are a major issue for all sectors as technology evolves quickly and creates new demand for competences.

¹ European Commission, 'e-Skills for Jobs in Europe – Measuring Progress and Moving Ahead', 2014

About the CEPIS e-Competence Benchmark

Over 2,200 ICT professionals across greater Europe participated in this research, which was carried out using the CEPIS e-Competence Benchmark. This is an online assessment tool that is powered by the European e-Competence Framework (e-CF), the common language for ICT competences that can be understood by all.



Participants indicated their proficiency level in each of the 36 e-CF competences and provided personal information such as their gender, age, education, and career profile.

Each respondent received a personalised competence gap analysis that shows their e-competences and how they rate against those required for a specific professional profile.



This e-competence gap analysis enables current and future ICT professionals:

- to identify their levels of e-competence compared to a recognised European framework
- to assess the e-competences that may need improvement
- to identify how to progress into a future ICT role



National & European Reports

The information gathered through the CEPIS e-Competence Benchmark was used to produce a detailed European report along with an analysis on a country level leading to 8 national reports.

Each country report provides an in-depth analysis of the level of professional competences and a snapshot of the profession in the country.

<http://www.cepis.org/benchmarkresults>

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INTRODUCING
THE CEPIS e-COMPETENCE
BENCHMARK

This research uses the CEPIS e-Competence Benchmark, a free online self-assessment tool, to enable current and future ICT professionals to measure their e-competences against the European requirements for their chosen career, or even desired career.



The CEPIS e-Competence Benchmark has been deployed across Europe as a means to implement the European e-Competence Framework, demonstrating to individuals and organisations how it can be of immediate and practical benefit.

The European e-Competence Framework, the Engine of the CEPIS e-Competence Benchmark



The European e-Competence Framework (e-CF) is the engine running behind the CEPIS e-Competence Benchmark.

The e-CF is a set of ICT competences that are commonly understood across all countries in Europe and beyond.

This framework identifies 36 ICT competences which are all used in this tool along with the 23 professional job profiles developed by CEN.

It is a durable framework that is updated regularly to adapt to new technology, jobs, and business developments.

This framework is neutral and free to use, and is being adopted by a growing community of users in Europe and overseas.

The e-CF is supported by the European Commission and it is developed through the CEN (European Committee for Standardization) Workshop on ICT Skills.

It is a balanced EU-wide multi-stakeholder network of experts representing the ICT industry, academic institutions, vocational training organisations, ICT professional associations, and research institution.

CEPIS is actively engaged in the standardization of competences in ICT and has chaired the CEN Workshop on ICT Skills since 2003.

An Effective Tool to Track Competence Mismatches

The CEPIS e-Competence Benchmark is the ideal tool for ICT professionals to assess and monitor the development of their e-competences.



By taking the CEPIS e-Competence Benchmark, ICT professionals can:

- Get a personal competence analysis report
- Match their e-competences to common ICT job profiles
- Benchmark themselves against the European e-Competence Framework
- Identify training and professional development opportunities
- Communicate their competences across borders by expressing their competences against the European e-Competence Framework

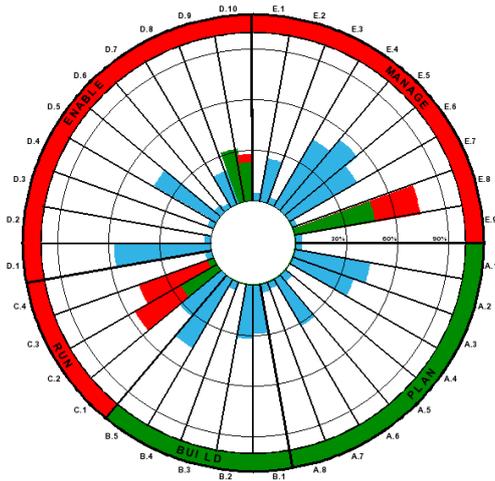
How the CEPIS e-Competence Benchmark Works

1. Log on www.cepisecompetencebenchmark.com, create a personal account, and enter information about your education, job profile, and other demographic data.
2. Select the ICT profile that matches your current role.
3. Complete the competence questionnaire: select your proficiency level for each e-competence, choosing from 'None', 'Basic', 'Intermediate' and 'Advanced' options.
4. Access your personal competence analysis report. It provides a detailed analysis of your e-competences and how they rate against those required for a specific career profile.

Try the CEPIS e-Competence Benchmark on www.cepis.org/ecompetencebenchmark

The Personal Competence Gap Analysis Report

The personal report is like a compass that ICT professionals can use to guide their professional development. The results are presented in a graphical radar and a proximity index.



The Graphical Radar

The graphical radar shows the respondents' competence level for the chosen IT career profile.

The radar is split in 36 sections (one for each competence) and the results are colour-coded as follows:

- **Green:** e-competences required by the IT profile and held by the respondent
- **Red:** e-competences required by the profile that the respondent is lacking
- **Blue:** e-competences held by the respondent that exceed those required by the profile

View report	Your proximity to this profile
 ICT SECURITY SPECIALIST	69.66 %
 SYSTEMS ANALYST	66.79 %
 BUSINESS ANALYST	66.67 %
 DATABASE ADMINISTRATOR	65.06 %

The Proximity Index

The proximity index shows which of the 23 IT career profiles matches closest to the IT professional's e-competences.

A 100% proximity index means that the competence declared by the respondent completely satisfies the requirements for that profile.

The proximity index uses an algorithm that produces a score, based on the knowledge and experience reported, for each of the 23 profiles. These scores are then compared with what is required for each profile and expressed as a percentage match.

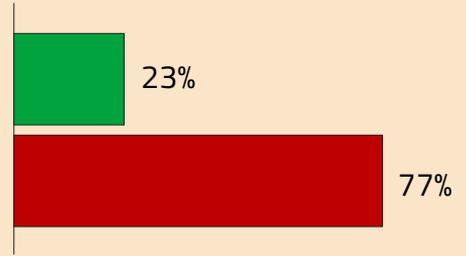
Moreover, the results also indicate the competences that the individual should seek to improve, as well as the competences that exceed the level required for the given profile.

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EUROPEAN RESULTS OVERVIEW

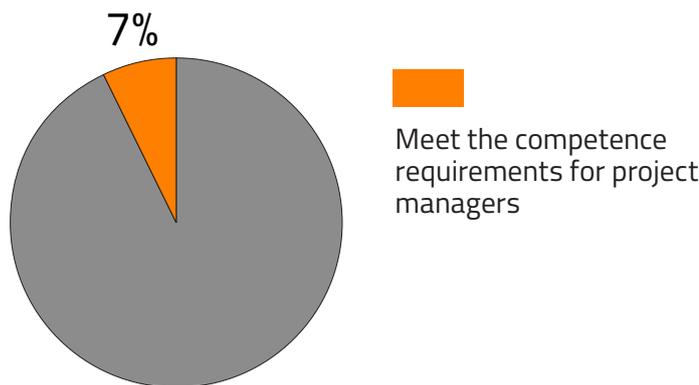
Key Findings

ONLY of respondents had the competences associated with their jobs
23%



What the Career Profiles Reveal

Project Manager was the most popular job profile among participants. However, less than 1 out of 10 respondents match the e-competences needed for that role.



Technical Specialist is the job profile for which most professionals matched the required e-competences.

Studies show that this is not the profile most likely to be needed in Europe in the coming years.²

Database Administrator was the least popular choice among the 23 career profiles.



15%

of all ICT professionals who participated in this study were female

The highest rate of female ICT professionals was found in Norway (21%), and the lowest rate was recorded in the Netherlands and Spain (10% in both countries)

ICT provides crisis-resistant employment



The majority of surveyed ICT professionals hold full-time positions (78%)



Over a third (36%) work in large organisations

² European Commission, 'e-Skills for Jobs in Europe – Measuring Progress and Moving Ahead', 2014

Highlights from the European Report

This section presents extracts from the European report.

For the full report and further details on the elements below please see: www.ce-pis.org/benchmarkresults

Competence Mismatches Are An Issue For Most ICT Professionals in Europe

Almost 80% of ICT professionals who responded to the survey did not have the e-competences required for their chosen ICT career profile. This means that continuous professional development for ICT professionals is essential to sustain their employability and to combat the mismatches that can threaten Europe's essential future labour supply.

The analysis shows that Technical Specialist and ICT Trainer are the roles where most of the respondents have the required competencies in Europe. Project Manager was the most popular job profile among participating professionals. However, only 7% of the respondents match the e-competences needed for that role.

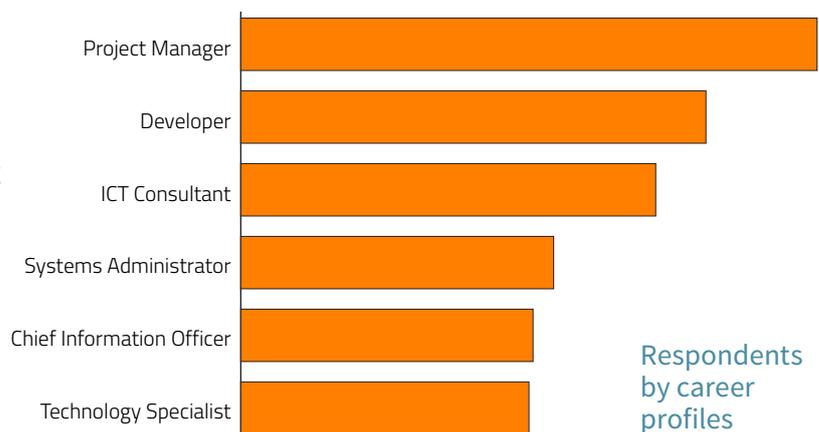
Even in the current challenging economic climate, the vast majority of respondents hold full time positions (78%). That shows the great potential for stable employment in ICT. 11% of the respondents were either students, retired or unemployed

ICT Offers Stable, Crisis-Resistant Full-Time Employment

Today's Most Popular ICT Profiles are not those Needed in the Future

The most popular profiles among respondents were Project Manager (14%), Developer (11.3%), ICT Consultant (10.8%), and Systems Administrator (7.6%).

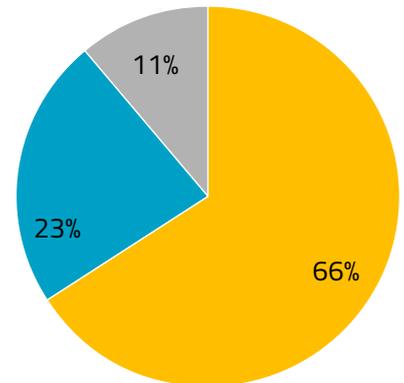
However, these are not the profiles anticipated to be in the highest demand in the coming years.



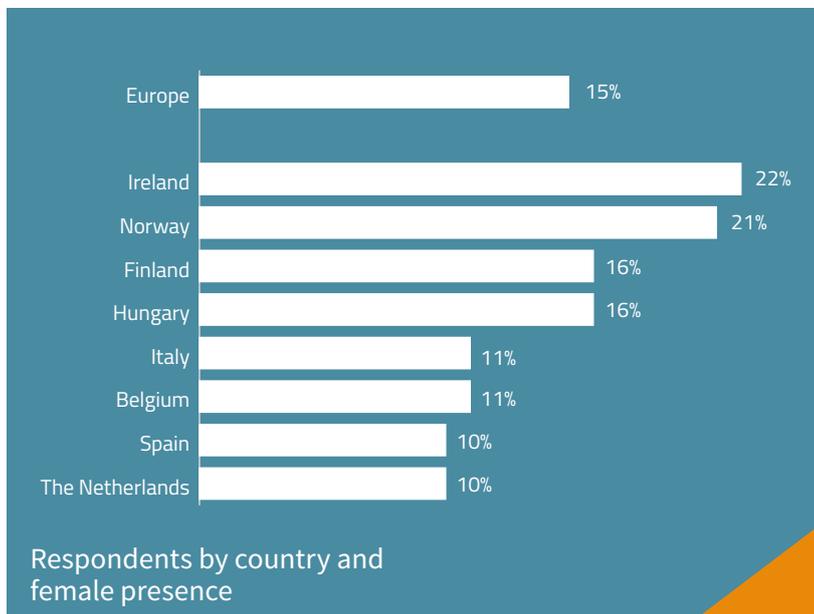
Lack of Focused ICT Development Persists Among ICT Professionals

ICT professionals have a high level of formal education but not always in ICT: 66% of those who participated stated that ICT was the main focus of their education, highlighting that one third of the ICT professionals in the sample come from a non-ICT-focused background.

This may be due to a lack of supply of suitably qualified ICT professionals to meet market needs, but these findings also show that there is a need for defined career paths as well as formal training and certification.



Respondents by % ICT-focused education



Respondents by country and female presence

Too Few Women Work in ICT

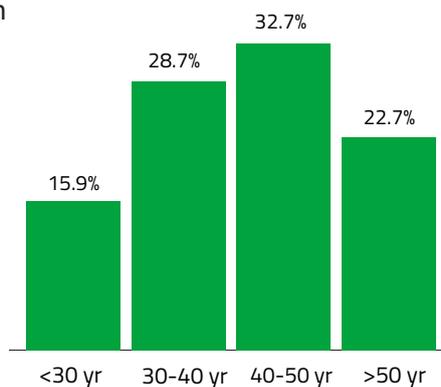
With only 15% of ICT professionals being female, there is further evidence that attracting women to the profession is badly needed.

The profiles showing the most female professionals were Project Managers and ICT Trainers on average across Europe, but female representation remains very low even for these profiles at just 20%.

Increasing the share of women in the ICT profession can greatly contribute to closing the digital jobs gap, and more efforts must be made to change the perception of ICT among young girls and women.

Lack of Young Talent is a Bottleneck for the Profession

The average European ICT professional is 42 years old. And with only 16% of respondents under the age of 30, there is a clear need to further promote the ICT profession among young people to ensure adequate supply of upcoming ICT professionals.



Respondents by age

Company Size Impacts e-Competences

The research found that some competences are more prevalent in micro and small organisations compared to medium and large organisations.

Micro and small organisations scored better competence level on average in many competences such as sales management and technology watching, among others.

However they performed more poorly in risk management, documentation production, and process improvement.

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**NATIONAL RESULTS
AT A GLANCE**

Compared to their European colleagues, Belgian ICT professionals had better results in competences such as Design & Development (+3.6%) and Process Improvement (+2.1%). However, their competences lagged behind the European average for User Support (-6.0%), Architecture Design (-5.6%), Education & Training Provision (-5.2%).

Belgian ICT professionals are the youngest among European countries. The average ICT professional in Belgium is around 37 years old, while the European average is 42 years. With 10% female ICT professionals on average, Belgium has the lowest rate of female representation across Europe. Close to 90% respondents in Belgium have at least a degree level qualification. Only 18% of ICT professionals in Belgium work in micro or small enterprises, while 41% work in larger companies.

BELGIUM

Only 23% of Belgian ICT professionals have the competences associated with their jobs.



FINLAND

Overall only 22% of Finnish ICT professionals meet the competence requirements associated with their roles.



Only 13% of the Finnish ICT professionals are Technical Specialists, but 28% actually hold the competences for this role. Meanwhile 10% of Finnish ICT practitioners declare themselves to be an ICT Consultant, but only 1% have the required competences.

The Business Analyst profiles show the highest rate of graduates and fourth level qualifications among Finnish ICT professionals. National experts link these high rates to a focus on innovation and business solutions which are partly incorporated into new educational programmes.

The large majority of Finnish ICT professionals hold full-time positions (85%), which is higher than the European average of 78%. The highest rate of full-time employees are among Test Specialists (93%), Database Administrators (95%), and Digital Media Specialists (100%). With regards to education, 78% of Finnish ICT professionals have at least a degree level qualification, 8% less than the European average.

In general, Hungarian ICT professionals show significant competence gaps compared to the European average, in particular for Change Support (-14.6%) and Product or Project Planning (-10.0%).

63% of Hungarian ICT professionals obtained a fourth level qualification. This is significantly higher than the European average of 40%, and it is linked to the fact that ICT higher level education is completely free of charge in Hungary.

The average Hungarian ICT professional is around 48 years old, notably higher than the European average age of 42 years. Less than 10% are under 30 years old, as many active young ICT professionals are often compelled to leave Hungary to find employment. Female representation in the Hungarian ICT profession is low, as in the rest of Europe, but a higher number of women (29%) were found among ICT Trainers.

HUNGARY

Less than a fifth (17%) of ICT professionals actually hold the competences needed to perform in their jobs.



Irish ICT professionals have higher competence levels than their European colleagues in Change Support (+11.4%), Solution Deployment (+11.2%), Service Delivery (+10.4%), and Documentation Production (+9.6%).

ICT professionals tend to work in larger structures in Ireland compared to the rest of Europe. The average size of Irish organisations is close to 3,000 employees, while this figure is around 1,800 employees in other countries. More than 40% of all Irish respondents have an education in which ICT was only a side subject or not significant in their studies.

Close to a quarter of ICT professionals (22%) are female in Ireland, this is the highest rate among the surveyed countries. And up to a third of Technical Specialists (29%) are females, a significant jump compared to the European average of 12% for this profile.

IRELAND

The Irish results show that just 24% of all practitioners have the necessary competences for their role, a slightly better score than the European average.



ITALY

Competence levels of Italian ICT professionals are in line with the European average, with just 23% having the required competence levels for their jobs.



The largest gaps compared to the European results appears for Product & Project Planning (-7.1%), Risk Management (-5.8%), and Project & Portfolio Management (-5.1%). On the other hand, Italians had better scores for User Support (+6.2%), Change Support (+4.3%), and Systems Integration (+3.9%).

A very low, or non-existent, rate of professionals under 30 was found for a number of profiles, such as ICT Trainer, Business Analyst, and Account Manager, among others. Only 26% of Italian ICT professionals have a fourth level qualification (master's degree or doctorate), the lowest rate in Europe, as many undergraduates and bachelor students interrupt their studies to take up ICT part-time jobs.

Italy is lagging behind other European countries with regards to female representation: women represent only 11% of ICT professionals, while the European average is 15%. ICT professionals tend to work in smaller enterprises given the larger number of SMEs in Italy. 30% of them are employed in micro or small enterprises, while the European average stands at 24%.

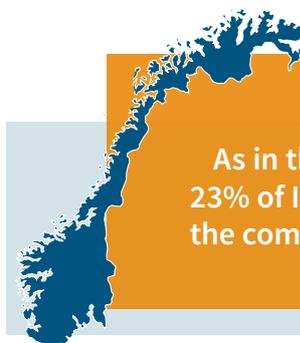
Norwegian ICT professionals have lower scores in Service Delivery (-3.5%), Systems Integration (-3.1%), and Problem Management (-3.0%) compared to the European average. However, a positive variance appeared IS & Business Strategy Alignment (+8.5%), Product or Project Planning (+7.6%), Risk Management (+6.6%) and Business Change Management (+6.4%).

The percentage of female ICT professionals in Norway is significantly higher than in the rest of Europe. Women in Norway represent 21% of ICT professionals, while the European average is at 15%. Developer is one of the most popular career profile with close to a 40% female participation rate.

95% of Norwegian respondents hold full-time positions. This is the highest rate among the surveyed countries, and it is significantly higher than the European average of 78%. One of the reasons behind this result is the fact that the Norwegian work force is protected by the Working Environment Act, which, among other things, regulates the use of temporary labour.

NORWAY

As in the rest of Europe, only 23% of ICT professionals meet the competence requirements for their roles.



In Spain, the largest competence gaps appear for Purchasing (-3.8%), ICT Quality Strategy Development (-3.2%), Sustainable Development (-2.7%), and Solution Deployment (-2.1%).

On the other hand, Spanish professionals are performing better than their European colleagues in User Support (+8.7%), Problem Management (+6.4%), and Information & Knowledge Management (+6.0%).

Close to 50% of ICT professionals work for large enterprises in Spain, only 17% work in micro or small enterprises. The European average shows a slightly different situation: 24% of respondents work in micro/small enterprises and 36% work in large organisations with more than 1,000 employees.

In Spain, most ICT professionals (85%) have an IT-focused background; this is the highest rate among the surveyed European countries.

SPAIN

Only 19% ICT professionals actually have the competence for their declared roles, this is a lower score than the European average of 23%.



THE NETHERLANDS

Close to a third (27%) of Dutch professionals match the competence requirements for their roles, which is more than the European average.



The best results were found for competences such as ICT Quality Strategy Development (+11.5%), Business Change Management (+10.3%), IT Governance (+7.8%), and Information Security Management (+7.7%). However, Dutch ICT professionals underperformed in Design & Development (-8.9%) and User Support (-7.6%).

Dutch ICT professionals are the oldest among European countries. As in other countries, for the Netherlands there is a need to attract younger people to the ICT profession without losing the experience of the older age group. The Netherlands also shows the lowest rate (10%) of women across Europe along with Belgium and Spain.

The education level of ICT professionals in the Netherlands is the highest in Europe. 96% have at least a degree level qualification and 50% have obtained a fourth level qualification (master's degree or PhD). This is due to the accredited 'RI' that requires BA or higher education levels.



To find out more on e-competence gaps and the ICT profession in your country, visit:
<http://www.cepis.org/benchmarkresults>

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**CONCLUSIONS
& RECOMMENDATIONS
FOR ACTION**

At a time when Europe needs to increase its competitiveness, productivity and become a stronger player in a global economy, ICT is an obvious enabler of growth that underpins all sectors of the economy. But Europe isn't reaping the full benefits of an agile, mobile and ICT-skilled workforce, largely due to a lack of ICT professionalism. Based on this research CEPIS puts forward the following conclusions and key recommendations:

Attract Young Talent by Promoting ICT Professionalism



Encouraging more young people to start ICT careers is essential to safeguard the profession and Eu-

rope's competitiveness. As current ICT professionals age and the demand for skills increases, the stream of young talent is insufficient to meet the demand for qualified professionals. Less than 16% of professionals assessed were in the under 30 age bracket.

Promoting ICT Professionalism is the clear answer to many of the challenges Europe is facing today. Establish a common body of

foundational knowledge, increasing understanding of competency, improving education and training and promoting established codes of ethics/conduct will help build the digital economy Europe needs.

Campaigns such as the e-Skills for Jobs Campaign can also play a major role in changing the image of IT; such campaigns should be continued and regularly organised.



The European e-Competence Framework is Alive and it Works

Through this research the European e-Competence Framework (e-CF) has been put through its paces by thousands across Europe. The results show that it is a valuable tool for categorising and defining e-competences, its viability has been tested and proven in this research. It should be continually developed and disseminated across Europe.

The future of the e-CF is bright but should be multilingual as well as more granular. Higher levels of granularity in future versions of the e-CF would translate into more precise outputs for the individual, at the organisational level as well as provide policy makers with the information the need for future-proofing policy decisions.

As the e-CF becomes a European Norm, its national adoption as a veritable lingua franca will be linked to ensuring it can be understood by all in their own languages.

Never Stop Skilling



Continuous professional development, targeted to existing and anticipated e-competence gaps is of high importance for the ICT profession. This research found that ICT professionals in Europe often scored their lowest levels of e-competences in the Enable area.

Many come into IT without having it as major focus of their education, more come from a totally different field. As a result, a worrying number of practitioners do not have the competences needed for their current role.

As IT increasingly underpins all sectors of the economy, the fallout of IT project failures poses a major economic as well as societal risk. Skilling, re-skilling and upskilling is the answer for those in employment and those who should be filling the gaps.

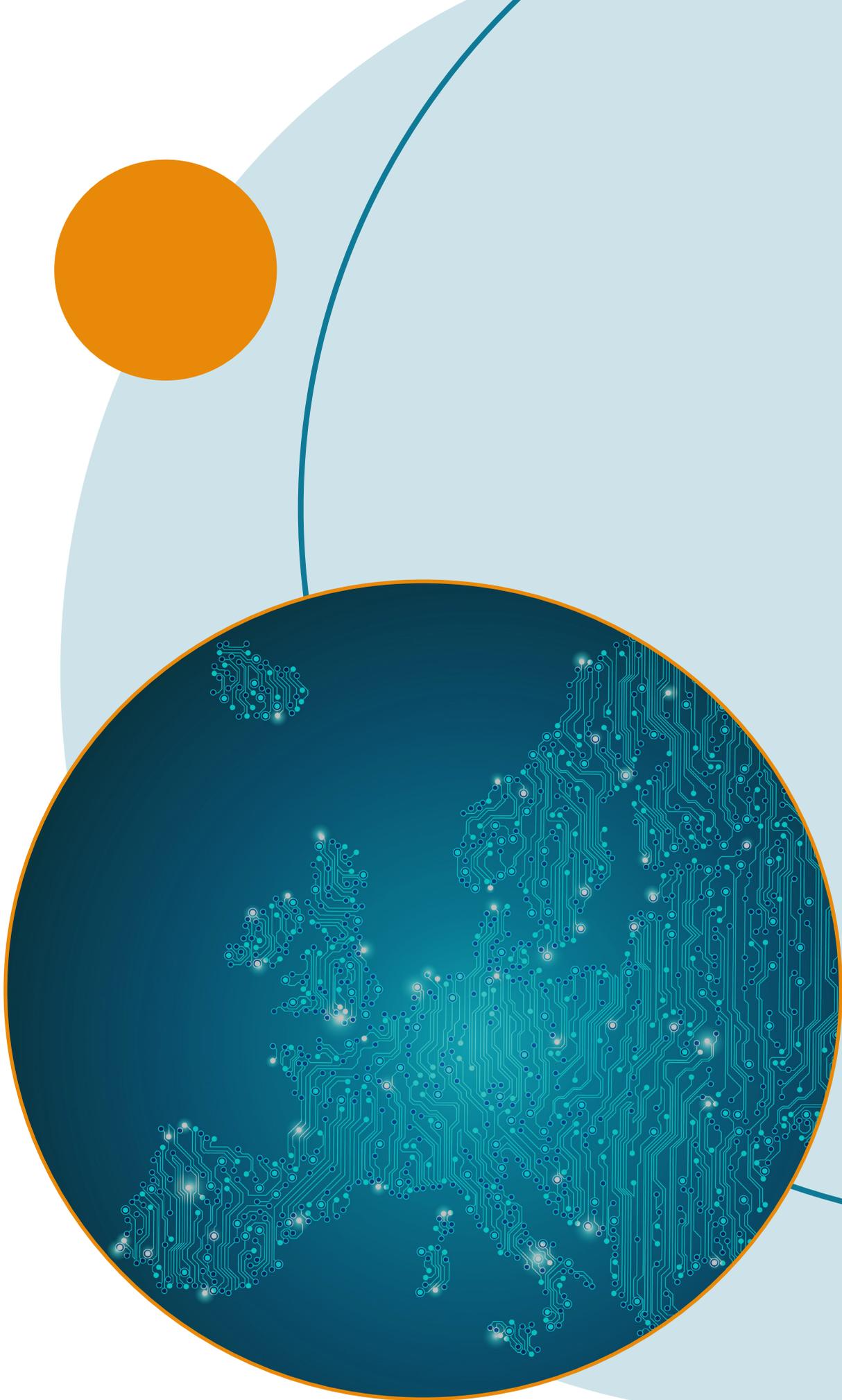
GET THE GIRLS



All countries urgently need to address the gender imbalance and increase the participation of women in ICT careers. A European Girls in ICT Day that builds on the success of national level events could raise awareness of what an ICT career really is.

National Digital Champions should be encouraged to include gender balance as part of their mandate in promoting digital skills. Promoting inspiring role models that demonstrate the creativity, versatility and flexibility of the careers in ICT can also help change the image of ICT for young girls.

Member States should provide fiscal incentives for companies to adopt gender equity as part of their organisational culture, hiring practices and career advancement programmes.



About CEPIS



CEPIS
Council of European Professional
Informatics Societies

The Council of European Professional Informatics Societies (CEPIS) is a non-profit organisation seeking to improve and promote a high standard among informatics professionals in recognition of the impact that Informatics has on employment, business and society. CEPIS represents 33 Member Societies in 32 countries. Established in 1989, CEPIS has grown to represent over 450,000 informatics professionals through its members in Europe and beyond.

CEPIS is responsible for many achievements that benefit both users and IT professionals. CEPIS was tasked by the European Commission to find a solution to tackle digital illiteracy in Europe, which resulted in the creation of ECDL, now a leading international computer skills certification programme.

It has also led the development of the ICT Professionalism agenda through its Professionalism Task Force, leading to a European Framework for ICT Professionalism for the European Commission, and more recently on the international dimension of ICT Professionalism.

As an organisation that seeks to improve and promote high standards among IT professionals, CEPIS is actively engaged in the standardization of competences in ICT and has been chairing the ICT Skills Workshop of the European Committee for Standardization (CEN) since 2003. Achievements in wide range of activities include education, women in ICT, and green ICT with a view to contribute to the promotion of informatics for the benefit of society and economy.

The Members of CEPIS

Austria

Oesterreichisches Computer Gesellschaft (OCG)

Belgium

Federation of Belgian Informatics Associations (FBVI-FAIB)

Bosnia and Herzegovina

Association of Informatics in Bosnia and Herzegovina

Bulgaria

Union of Automation and Informatics (UAI)

Croatia

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Cyprus Computer Society (CCS)

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Finnish Information Processing Association (TIVIA)

Germany

Gesellschaft für Informatik e.V – German Informatics (GI)

Germany

Informationstechnische Gesellschaft im Verband der Elektrotechnik Elektronik Informationstechnik (VDE)

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Hungary

John von Neumann Computer Society (NJSzT)

Iceland

Icelandic Society for Information Processing (ISIP)

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Malta

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Montenegro

Društvo Informatičara Crne Gore (DICG)

The Netherlands

Vereniging van Register Informatica (VRI) / Netherlands Genootschap voor Informatica (NGI)

Norway

Den Norske Dataforening (DND)

Poland

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Slovenia

Slovenian Society Informatika (SSI)

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