

Persyaratan Kurikulum Baru Bagi Skills dan Jobs Masa Depan (Studi Kasus Uni Eropa)

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E-Skills Report 2014

e-SKILLS: THE INTERNATIONAL DIMENSION AND THE IMPACT OF GLOBALISATION

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Background

- Newly emerging ICT trends have always created new skill requirements and jobs on the one hand, but on the other hand, through efficiency gains and restructuring have also contributed to the vanishing of old jobs no longer meeting the requirements of industry and the markets.
- *“Technology impacts the types of occupations in demand, as well as their skills content. Demand for new types of skills comes with new waves of technologies. The new wave of ICT currently arriving is creating new skills demands (such as for big data analytics and its virtualization, e-leadership and dual thinkers on the business and technical side, and including for Chief Information/Technology Officers – CIOs and CTOs)” (European Commission, 2013g).*
- A recent study for the European Commission revealed that the main training/education barriers to the impact of newly emerging ICT trends (e.g. cloud computing, social media technologies, big data, internet of things) that – in particular in combination – drive economic transformation and growth include the lack of training/education in skills or the wrong skills and outdated education systems and educators (European Commission, 2013g).

Emerging skills requirements and job descriptions of professionals resulting from different mega-trends in the IT industry, termed as 3rd platform skills and jobs

- The results from this intensive stakeholder dialogue with demand side representatives from industry and supply side experts from academia have been incorporated and first conclusions are drawn.
- **The 3rd platform is IDC's term** for the convergence of disruptive mega-trends in the IT industry which is built on
 - **mobile devices and apps (mobility & consumerization)**
 - **cloud services (cloud computing)**
 - **big data analytics (Big Data)**
 - **social technologies (Social Media Technologies)**
 - **IT Security**
 - **Internet of things and**
 - **Microelectronics and Parallel Systems**

Trend: Mobility and consumerization

Mobility

- From the point of view of both 3rd party service providers and end-user IT departments there will be stronger demand for:
 - Mobile applications development skills, including customization to companies' processes
- User industries will be particularly interested in e-leadership skills to:
 - Integrate mobile solutions into companies' existing processes and workflows
 - Design new services/ products based on mobility
 - Leverage mobility as a new channel to reach customers (particularly in the sectors telecom/media, finance, government and healthcare).
- IT industry actors will increase demand for the following skills (as well as those indicated above):
 - Ability to integrate mobile applications with traditional ones
 - Enhanced security skills.

Trend: Mobility and consumerization

Consumerization

- Consumerization is the blurring of boundaries between business and personal time, driven by employees bringing personal devices into the work environment.
- Operationally, consumerization introduces a range of skill and management issues.
- The increasing variety of different hardware, OS and configurations requires both strong skills to apply **new approaches to enterprise architecture** as well as the skills to organize the effective integration of user devices. *Source: IDC 2013: Guide Synthesis Report. Annex ICT Technology Trends. Not yet published.*

e-skills tasks, relevant competence requirements and associated professional profiles

IT Industry / Vendors		
e-Skills domain / tasks	Relevant e-competences (e-CF) and other / additional skills	Roles involved as per the existing ICT Professional Profiles built on the e-CF:
Mobile Apps development skills incl. customization to companies' processes	A.4. Product or Project Planning A.6. Application Design B.1. Design and Development B.2. Systems Integration B.3. Testing B.4. Solution Deployment B.5. Documentation Production C.4. Problem Management	- Developer - Systems analyst - Project manager - Digital media specialist
Integration of mobile Applications with traditional ones	A.5. Architecture Design B.2. Systems Integration B.3. Testing E.7. Business Change Management	- Systems architect - Systems analyst - Developer
Enhanced Security skills	D.1. Information Security strategy Development D.3. Education and Training Provision D.9. Personnel Development E.8. Information Security Management	- ICT Security Manager - ICT Operations Manager - ICT security specialist

Mobility & Consumerization

Other industries / demand side		
e-Skills domain / tasks	Relevant e-competences (e-CF) and other / additional skills	Roles involved as per the existing ICT Professional Profiles built on the e-CF:
Mobility & Consumerization	<p>Mobile Apps development skills incl. customization to companies' processes</p> <p>A.4. Product or Project Planning A.6. Application Design B.1. Design and Development B.2. Systems Integration B.3. Testing B.4. Solution Deployment B.5. Documentation Production C.4. Problem Management</p>	<ul style="list-style-type: none"> - Developer - Systems analyst - Project manager - Digital media specialist - ICT security manager
	<p>Redesign of business and marketing strategies</p> <p>A.1. IS and Business Strategy Alignment A.3 Business Plan Development A.7. Technology Watching E.1. Forecast Development E.5. Process Improvement E.7. Business Change Management</p>	<ul style="list-style-type: none"> - Business analyst - Business information manager - Enterprise architect - ICT consultant - CIO

<p>Design of new products and services based on mobility</p>	<p>A.4. Product or Project Planning A.5. Architecture Design A.6. Application Design B.1. Design and Development</p>	<ul style="list-style-type: none"> - Project manager - Developer - Systems analyst - Systems architect - Project manager - Digital media specialist - ICT security manager
<p>Complexity of internal IT support, broader technical skill set required (Management of BYOD environments)</p>	<p>C.1. User Support C.2. Change Support C.3. Service Delivery C.4. Problem Management D.3. Education and Training Provision</p>	<ul style="list-style-type: none"> - Systems administrator - ICT security specialist - Service Manager - Service Desk Agent
<p>Asset Management challenge + Governance issues</p>	<p>E.9. IT Governance E.3. Risk Management E.8. Information and Security Management</p>	<ul style="list-style-type: none"> - Systems administrator - ICT security manager - CIO
<p>Security between corporate and consumer environments</p>	<p>D.1. Information Security Strategy Development D.9. Personnel Development E.3. Risk Management E.8. Information and Security Management</p>	<ul style="list-style-type: none"> - ICT Security Manager - ICT Security Specialist - ICT Operations Manager - Service Manager
<p>Security between corporate environment and staff devices / training of staff and awareness raising for security issues</p>	<p>D.1. Information Security Strategy Development D.3. Education and Training Provision E.3. Risk Management C.1. User Support C.2. Change Support C.3. Service Delivery</p>	<ul style="list-style-type: none"> - ICT Security Manager - ICT Security Specialist - Service Desk Agent

- **Scope of Tasks**

- The dialogue with stakeholders elicited the topic as being prominent on the agenda of CIOs and security officers. There is a strong need for mobile device management and acceptable use policies as security issues are eminent, and there is a serious threat of security breaches in mobile devices brought in by staff or enterprise data made available to private devices. Training and raising awareness among staff have been reported a key issue and hence been included as a task here.

Trend: Cloud Computing

- **Demand from ICT vendors:**
 - Increased demand for skills to design, build, optimize, and manage their clouds and all the users of these clouds (even though maintenance skills are less required because of clouds automation levels)
 - High demand for IT security skills, a very complex task in public clouds
- In the case of IT users, there is quite a difference in skills demand, depending on the type of cloud adopted.
- **Demand from IT users of public clouds:**
 - Reduction of demand for the technical skills and resources to build and maintain companies' infrastructures and applications
 - Demand for new skills of managing external cloud services, defining strategies, managing security and SLA requirements, and supporting cloud users

Trend: Cloud Computing

- **Demand from IT users of private clouds:**
 - High-level complex IT skills (usually bought externally) to design clouds
 - Skills for managing and maintaining private clouds (easier than traditional IT)
 - Skills for customization of private clouds services
- The demand for specialized resources tends to move from the IT users to the IT vendors. Generally, the profiles required by IT users in this field become more business and project-oriented. E-leadership skills in user organisations must keep pace with this change.

e-skills tasks, relevant competence requirements and associated professional profiles

IT Industry / Vendors		
e-Skills domain / tasks	Relevant e-competences (e-CF) and other / additional skills	Roles involved as per the existing ICT Professional Profiles built on the e-CF:
Cloud Design	A.4. Product or Project Planning A.5. Architecture Design A.6. Application Design B.1. Design and Development E.3. Risk Management E.6. ICT Quality Management E.8. Information and Security Management E.9. IT Governance	- Enterprise Architect - Systems Architect - Developer - Network Specialist - ICT Security Manager - Quality Assurance Manager - Test Specialist - Database Administrator - Systems Analyst
Cloud Building	B.2. Systems Integration B.3. Testing B.4. Solution Deployment	- Systems Architect - Developer - Test Specialist
Cloud Optimization	B.3. Testing B.4. Solution Deployment C.2. Change Support E.5. Process Improvement	- Business Analyst - Developer - Test Specialist
Cloud Management	A.2. Service Level Management C.4. Problem Management D.2. ICT Quality Strategy Development E.6. ICT Quality Management E.9. IT Governance	- Service Manager - ICT Operations Manager - Quality Assurance Manager - Database Administrator
Aligning the Cloud with national law / IT Governance?		

Cloud Computing	Other industries / demand side		
	e-Skills domain / tasks	Relevant e-competences (e-CF) and other / additional skills	Roles involved as per the existing ICT Professional Profiles built on the e-CF:
	Public Clouds		
	Manage external Cloud services	D.4. Purchasing D.8. Contract Management E.3. Risk Management E.6. ICT Quality Management E.8. Information and Security Management E.9. IT Governance	- CIO - ICT Security Manager - Service Manager
	Define Strategies	A.1. IS and Business Strategy Alignment D.2. ICT Quality Strategy Development E.3. Risk Management E.7. Business Change Management	- CIO - ICT Security Manager - Business analyst - Business Information Manager - Enterprise Architect

Security Management	D.1. Information Security Strategy Development D.3. Education and Training Provision D.9. Personnel Development E.3. Risk Management E.8. Information and Security Management	- ICT Security Manager - Quality Assurance Manager - ICT Operations Manager
Manage Service Level Agreement requirements	A.2. Service Level Management D.7. Sales Management	- Service Manager
Private Clouds-		
Cloud Design (high level skills)	A.4. Product or Project Planning A.5. Architecture Design A.6. Application Design B.1. Design and Development B.3. Testing E.7. Business Change Management	- Enterprise Architect - Systems Architect - ICT Security Manager - Developer - Business Information Manager
Cloud Management	E.3. Risk Management E.6. ICT Quality Management E.8. Information and Security Management E.9. IT Governance	- Project Manager - Quality Assurance Manager - Systems Administrator - Database Administrator
Cloud Maintenance	C.1. User Support C.2. Change Support C.3. Service Delivery C.4. Problem Management	- Technical Specialist - Service Manager - ICT Security Specialist - Service Desk Agent - Systems Administrator - Database Administrator
Cloud Customization	B.2. Systems Integration	- Systems Architect - Systems Administrator - Database Administrator

- **Scope of tasks**

- The challenge in cloud computing today is not so much technical, as the technology has begun to mature and stable solutions exist. Rather, the main challenge is of a legal nature – in an international sense. Due to the very nature of cloud computing, many different judicial systems can apply to both user and provider industries. A CIO or other type of professional charged with responsibility in this area in an organisation has to cope with different laws of the countries involved, including at least the home country of the organisation, the country of the supplier organisation and those countries where data might be stored. This includes, but is not limited to, the very diverse regulations concerning data protection.
- Knowing that security breaches would jeopardise the entire business model, cloud providers usually work to very high security standards, but at the same time they are also the target of professional hackers who try to steal their data. Risk strategies thus need to be made.
- On the demand side, Quality Assurance as well as security management roles are reported essential since there is strong need to be confident in the level of protection offered by a cloud provider. Other experts stress the importance of the ‘organisational perspective’, arguing that one should not lose sight of processes, rules and service management (including contract management) as key issues to be considered within cloud computing.

Trend: Big Data

- The role of the statistician has been reborn with the rise of Big Data, combining analytical and statistical skills with some level of business understanding to create the "data scientist".
 - More specifically, IDC foresees increasing demand for business analytics and particularly **Hadoop related skills**, not only by IT companies but also by end-user companies. (*Hadoop = Apache™ Hadoop® is an open source software framework that enables the distributed processing of large data sets across clusters of commodity servers*)
 - **Demand for ICT-based business analytics** is expected to grow most strongly in finance, large retail companies and telecom providers, and the leaders initiating innovation must have the skills to guide holders of these new qualifications.

e-skills tasks, relevant competence requirements and associated professional profiles

- The e-skills tasks, relevant competence requirements and associated professional profiles for 'Big Data' as specified in expert consultations are depicted in the following overview. It includes a special section on 'data scientists' mainly demanding non-ICT specific skills and competences.

Both ICT industry / vendors and user industries		
e-Skills domain / tasks	Relevant e-competences (e-CF) and other / additional skills	Roles involved as per the existing ICT Professional Profiles built on the e-CF:
Business analytic skills (specific to vertical sectors)	<i>Not just ICT specific</i> A.1. IS and Business Strategy Alignment A.3. Business Plan Development A.7. Technology Watching E.1 Forecast development E.5. Process Improvement	- CIO - Business Information Manager - Business Analyst - Account Manager
Building sw/hw environments for Big Data (e.g. Hadoop or MapReduce)	A.4. Product or Project Planning A.6. Application Design B.1. Design and Development	- ICT Operations Manager - Business Analyst - Project Manager - Database administrator - Developer - ICT Consultant
SW/HW implementation (e.g. Hadoop or MapReduce)	B.2. Systems Integration B.3. Testing E.7. Business Change Management	- Project Manager - Systems Architect - Database Administrator - Developer
Environment management (e.g. Hadoop or MapReduce)	C.1. User Support C.3. Service Management C.4. Problem Management E.6. ICT Quality Management E.9. IT Governance	- Database administrator - Systems Administrator
Demand for 'Data Scientists' (DS):		
DS: Statistical & Analytical skills	<i>Mainly non- ICT specific</i>	

Big Data

	<p>DS: E-business skills to assess the meaning of data (specific to vertical sectors)</p>	<p><i>Mainly non- ICT specific</i></p>	
<p><u>Note:</u> sensor data and stream data handling are to be seen as an integral part of the above domains / tasks</p>			

Scope of tasks

- Big data builds on at least three pillars:
 - the business or vertical knowledge
 - the analytical methods and
 - the IS enabling the analysis
- These skills need to be brought together, to some degree in persons understanding all three, and to some degree in interdisciplinary teams.
- **Recruitment of data scientists** has been reported to happen especially among **mathematicians and people with strong mathematical skills, such as natural scientists and engineers.** The ICT skills needed relate to understanding the IS requirements, as well as being able to **code algorithms in programming languages such as Python.**

- Experts believe that the ‘big data’ challenge makes it clear that education still happens too much in “silos”. It resembles the situation of software engineering 30 years ago, when good software engineers came from Mathematics/sciences, technical and engineering fields, as well as economics.
- One of the experts expressed the opinion that the Hadoop Map/Reduce engine is **dying** (expecting YARN and HDFS as successors to remain).
 - Therefore, he proposes that the skill set to be taught should be more generic (scalable data analytics), as opposed to specifically map/reduce.
 - He quotes Mike Olson, CSO of CCloudera, the major Hadoop vendor: ***"What the Hadoop ecosystem needs is a successor system that is more powerful, more flexible and more real-time than MapReduce. While not every current (or maybe even future) application will abandon the MapReduce framework of today, new applications could use such a general-purpose engine to be faster and to do more than is possible with MapReduce"***.

Academic / educational programmes

- Topics like ‘Big data’ but also other new topics like ‘cloud computing’ are currently taught at higher education institutions in Europe and the USA where there are different ways of teaching and learning. ‘Big data’ for instance is either taught as



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The End