Challenging the IT University Education and Innovations in Bulgaria:

Introducing Management Aspects of Software for IT Graduates

ECSS 2011, 7-9 November, Milan

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ESI European Software Institute Eastern Europe

Faculty of Mathematics and Informatics

SEMP: SOFTWARE ENGINEERING MANAGEMENT PROGRAM

USAID FROM THE AMERICAN PEOPLE

ESI European Software Institute Eastern Europe

AMERICA FOR BULGARIA FOUNDATION Фондация Америка за България

In partnership with Software Engineering Institute | Carnegie Mellon

Sofia University "St. Kliment Ohridski"

- 25K Students
- 2,5K staff
- 15 faculties, departments

The Faculty of Mathematics and Informatics (FMI)

inheritor of the former Physics-Mathematical Department founded in 1889.

1904 the Department was renamed to Physics-Mathematical Faculty

1963 it was separated as an independent faculty at the Sofia University

1986 it exists as a Faculty of Mathematics and Informatics

FMI Sofia University

FMI is responsible for teaching and research in the fields of **Informatics, Computer Science**, **Information Technologies**, **Software Engineering, Mathematics, Applied and Industrial Mathematics,**

- 2500+ students and postgraduates, 63 PhD students (2011)
- full-time lecturers incl. 70 professors and associate professors and 80+ assistant professors
- Research and Development Labs

Faculty of Mathematics and Informatics

- 15 departments
  - Computer science departments – 4
    - Computing Systems (Computer Science)
    - Information Systems
    - Software Engineering
    - Computer Informatics
  - Classical mathematics departments - 7
  - Mathematics and applications - 4

Education and Research

Bachelor programs – 8 (> 2K students)

- Informatics, Computer Science, Information Systems, Software Engineering
- Mathematics, statistics, applied mathematics

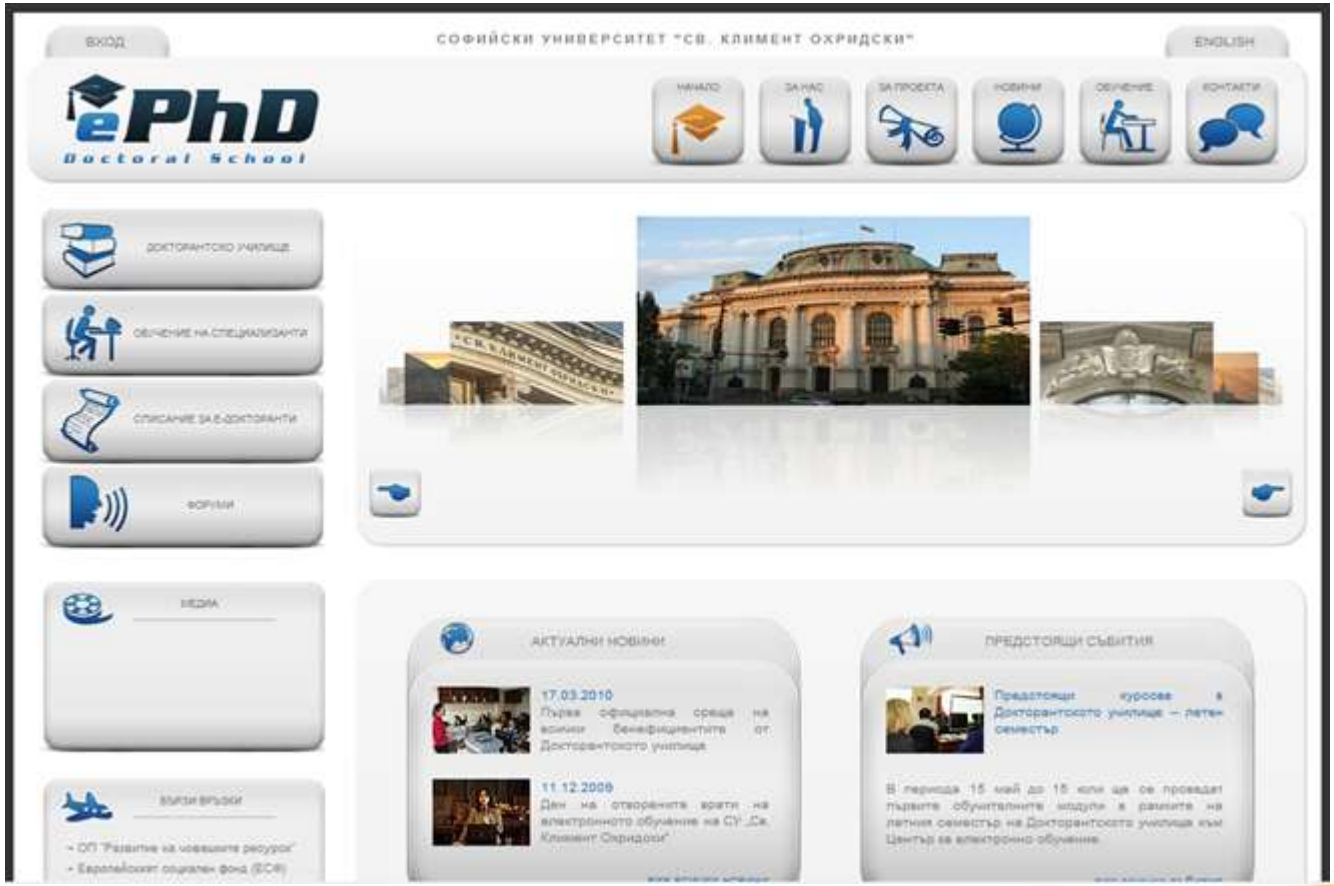
Master Programs – 26 (> 500 students)

- Computer Science - 15
- Mathematics and Informatics – 2 (school teachers)
- Pure Mathematics - 4
- Applied Mathematics – 5

PhD School – 63 PhD Students (2010 – 11)

PHD School

http://e-PhD.uni-sofia.bg



Educational And Research Centers and Labs

- Center of Technologies of Information Society
- 3D Simulation and Business Processes Competence Center
  - KIT University of Karlsruhe
  - BlueGene Supercomputer
- Bulgaria Korean IT Cooperation Center
  - E-government, semantic web, historical heritage
- University eLearning center for research and education in eLearning, distance learning, longlife learning

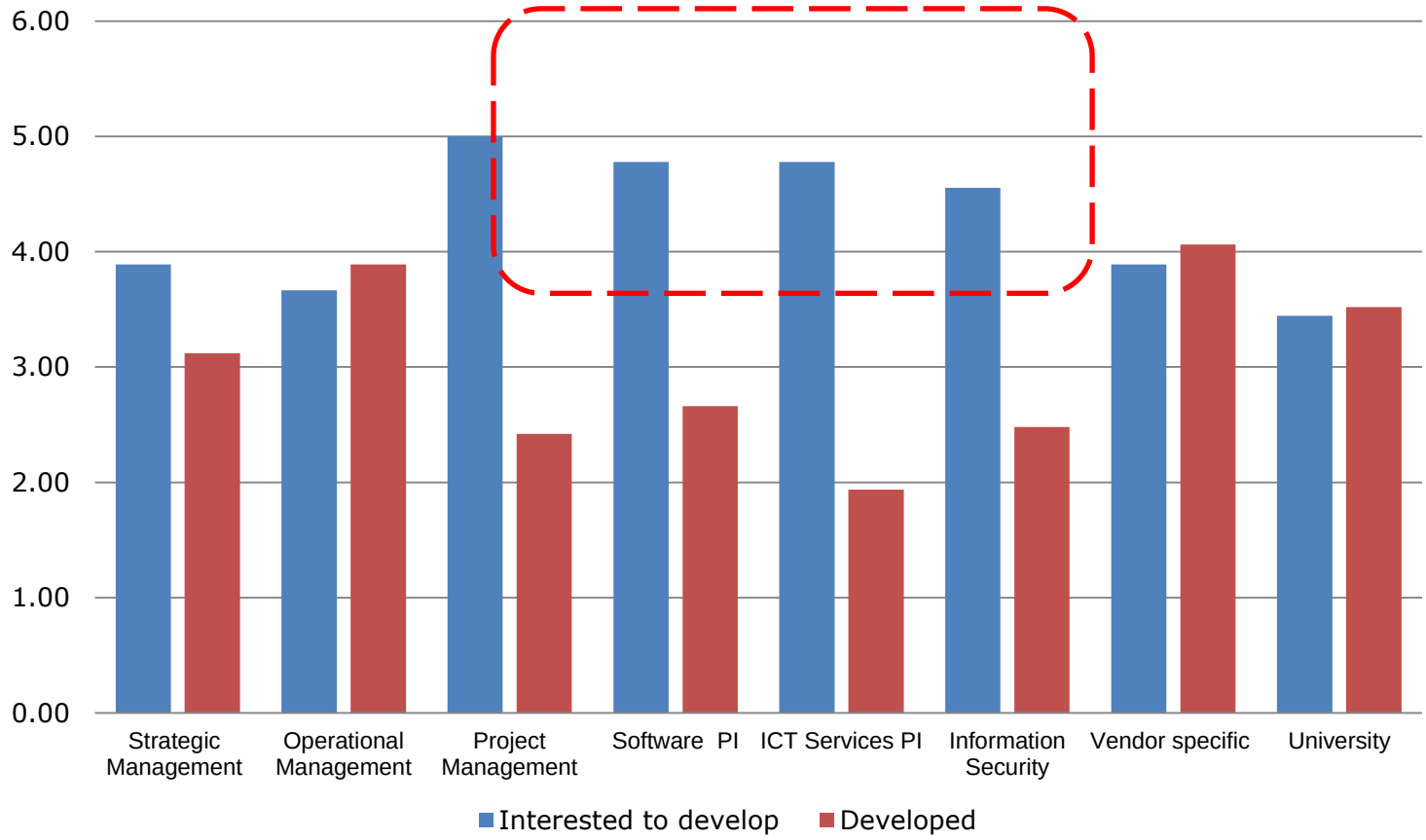
Partnership Agreements and Collaboration

Needs to be Addressed

- Lack of systematic content and practice in lecturing "management" subjects for graduate high education courses (bachelors and masters)
- Bridging "research" to "industry"
- Need for internationally recognized and contemporary qualification position (master degree) in ICT engineering and management
- Innovations management deficit – demand for and readiness to absorb effective stimulation environment and research schools in challenging areas of ICT

Major Competence Gaps

Survey for South-Eastern Europe
(8 countries, RCI/USAID)



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ТУ - СОФИЯ

American University in Bulgaria

With the support of:

BASSCOM

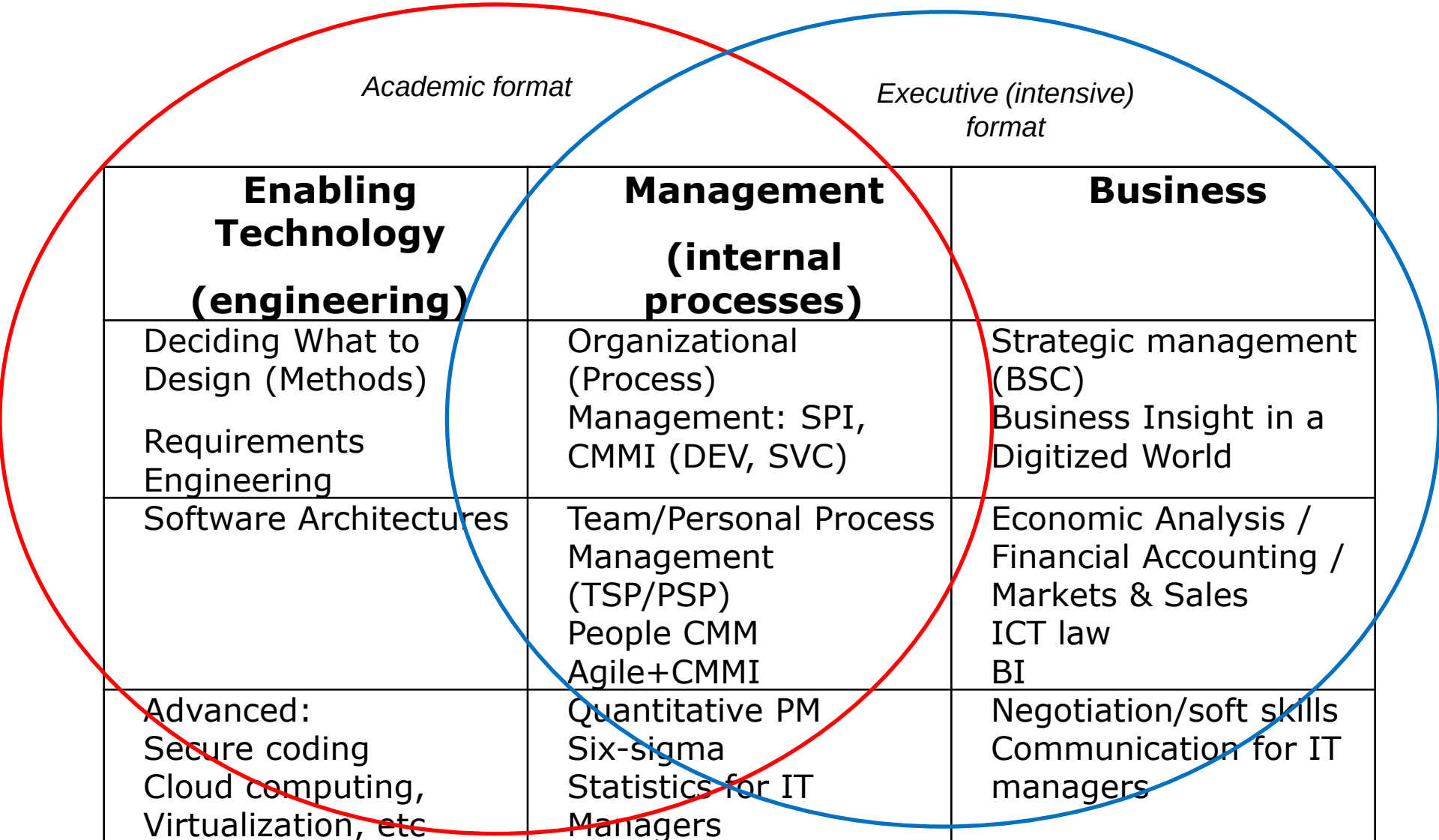
ICT Cluster BULGARIA

РЕПУБЛИКА БЪЛГАРИЯ
Министерство на образованието, младежта и науката

SEMP Objectives

- Increase IT industry competitiveness
- Modernize IT education through specialized IT management components in 3 areas:
  - Engineering/Technology
  - Processes & Organization Management
  - Business
- Validated by industry profiles
  (e.g. team/project/product managers for CMMI ML2 organizations)
- Change style of teaching in BG, adopt the "student centric approach"

SEMP Core Areas



Enabling Technology (engineering)	Management (internal processes)	Business
Deciding What to Design (Methods) Requirements Engineering	Organizational (Process) Management: SPI, CMMI (DEV, SVC)	Strategic management (BSC) Business Insight in a Digitized World
Software Architectures	Team/Personal Process Management (TSP/PSP) People CMM Agile+CMMI	Economic Analysis / Financial Accounting / Markets & Sales ICT law BI
Advanced: Secure coding Cloud computing, Virtualization, etc	Quantitative PM Six-sigma Statistics for IT Managers	Negotiation/soft skills Communication for IT managers

Are we aligned with the modern trends?

Prof. Mehdi Jazayeri (University of Lugano) – ECSS 2011 Workshop

T-t-T & Qualification Paths

- Academic courses transfers (CMU, ISR): 4-6 (2 completed, in pilot phase)

- Professional courses (CMU, SEI) – transfer + academic adaptation: 8 (5 completed, piloting)

- Augmented/improved or developed local courses: 6-8 (piloting, "mentored" by ESI, SEI, CMU)

<u>Methodology:</u>

- Student centric approach
- Sync content, terminology (world standard), cross-links
- Practical/project work: innovations and entrepreneurship (real industry project, aka start-up)

Implementation Approach

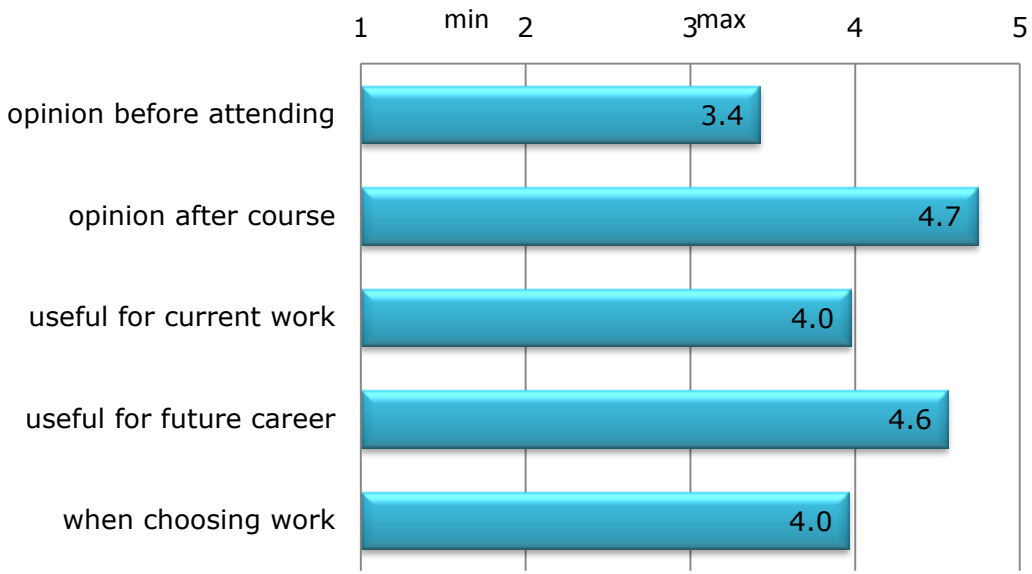
- **Courses/profiles/programs**
  - regular students + "academic" courses
  - executive/intensive courses (or mix)
- **Incremental development**
  - Early pilot courses
  - Needs assessment & content refinement (curriculum first draft)
  - Enhanced Existing Master Programs (validated profiles, >4-6 SEMP courses)
  - SEMP master profile (inter-university)
- **Project-based study**
  - 2/3 integrated content (academic + professional, 3 focus areas)
  - 1/3 practical project ("start-up" spirit, Learn by doing + mentorship)
- **Monitor Quality & Continuous Improvement**

(incl. professors and students exchange, PhD, R&D) – SEI/ISR, CMU + EU partners

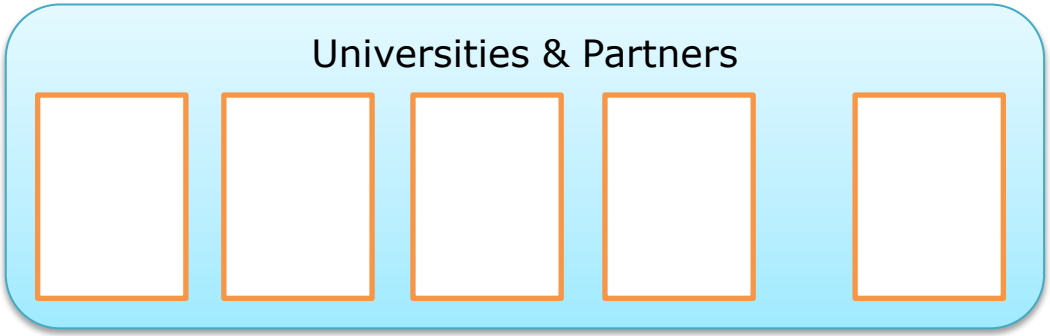
Pilot Courses Feedback

Student opinion

(> 300 students, 3 pilot courses)



Institutionalize T-t-T



SEMP: Training and Qualification Center

Program content and curriculum development	Train-the-Trainer (professors qualification)	Students advanced training

academic	Business/executive profile	Common: processes, student-centric methodology, pedagogy	Individual qualification & accreditation paths	Qualification/accreditation maintenance	Professional courses (advanced training)	Practical course (aka "studio course") and Internship program

Compliances (1):e-CF, EQF, ECVET…

European e-Competence Framework

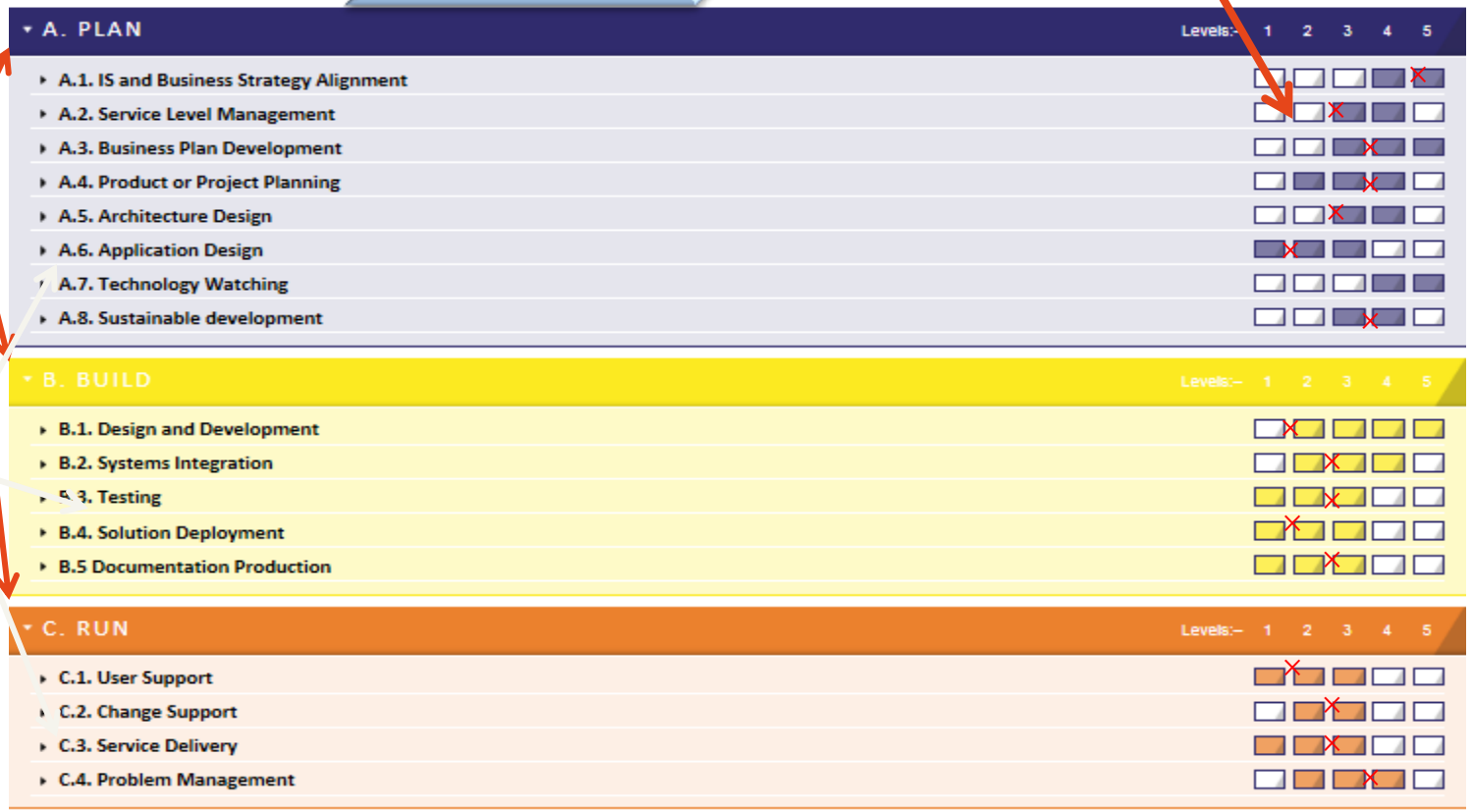
ENABLE

PLAN BUILD RUN

MANAGE

Dimension 3
e-Competence proficiency levels
e-1 to e-5, related to EQF levels 3-8

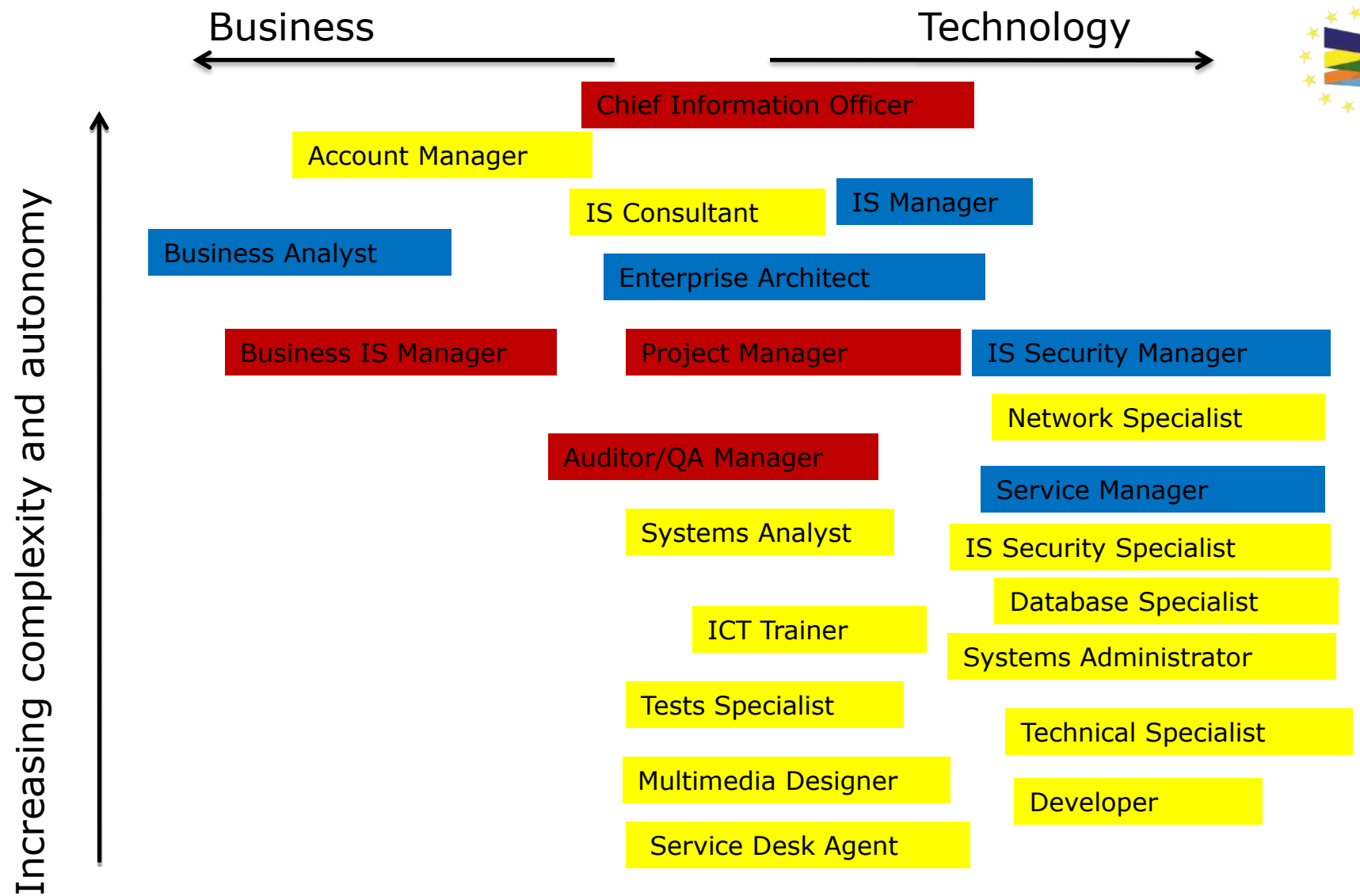
Dimension 2
36 Competences



http://profilingtool.ecompetences.eu/

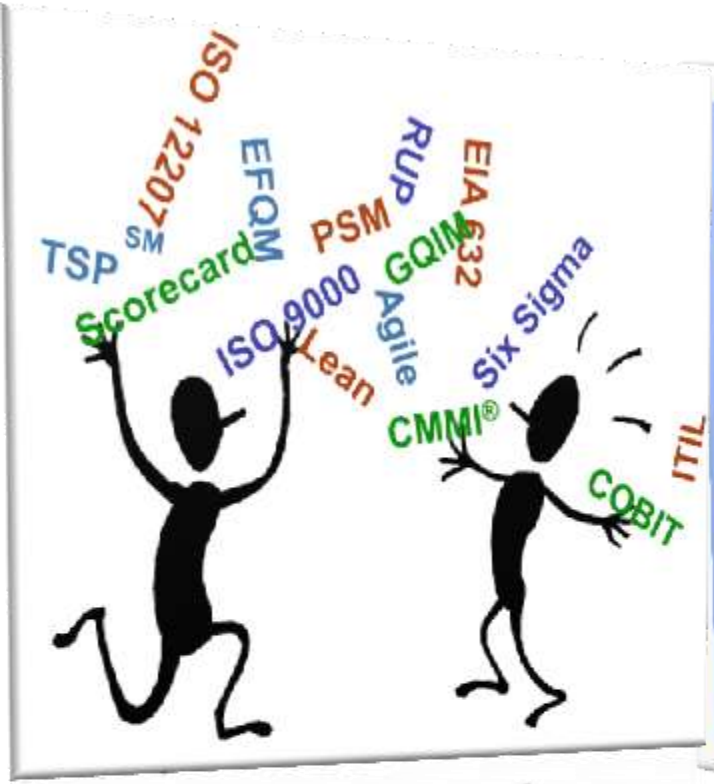
Compliances (2): European ICT profiles

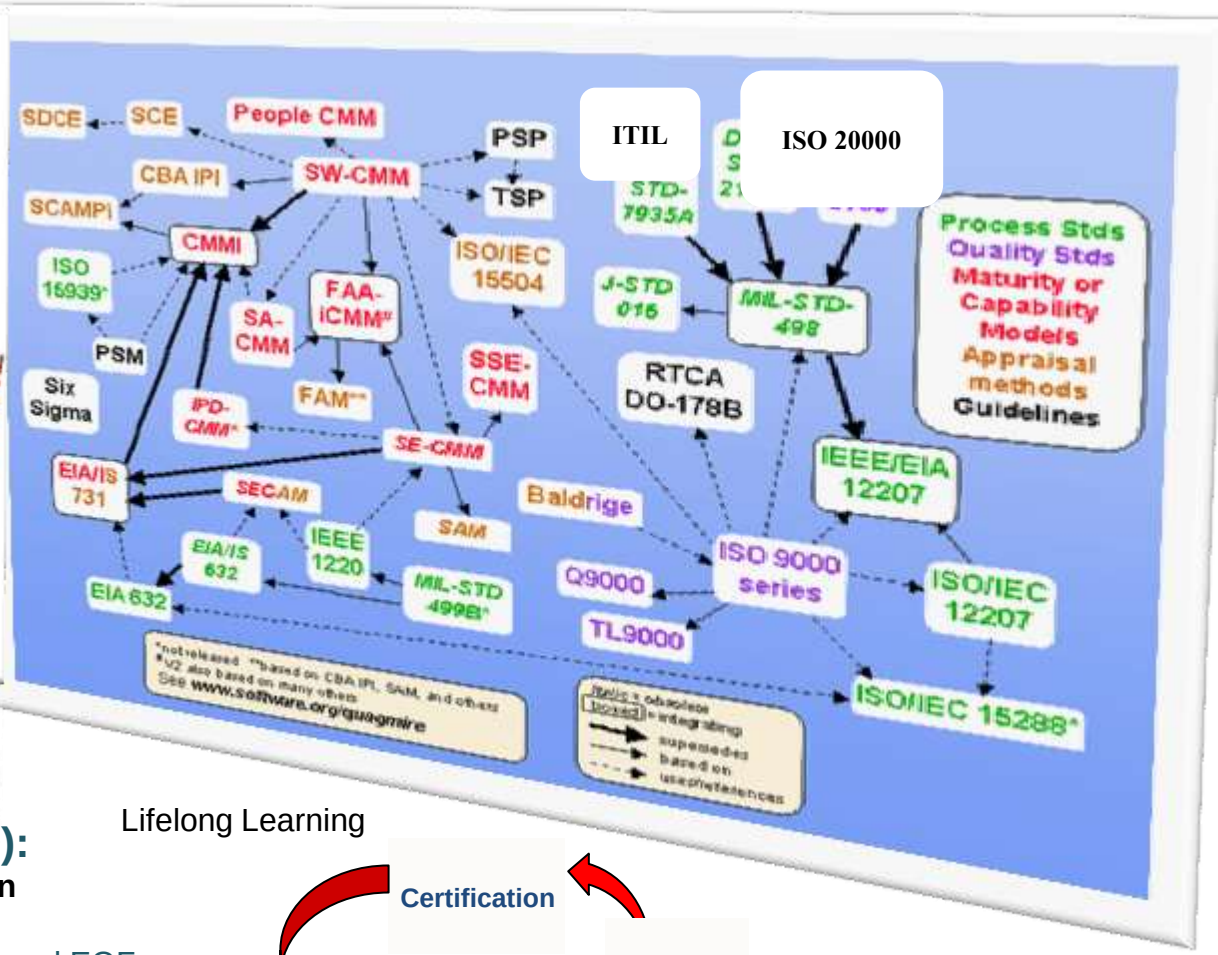
["Towards European e-Job Profiles (2010-2012)", based on the e-CF www.ecompetences.eu]



Compliances (3):

Personal competences versus organizational models: the parallel jungle?





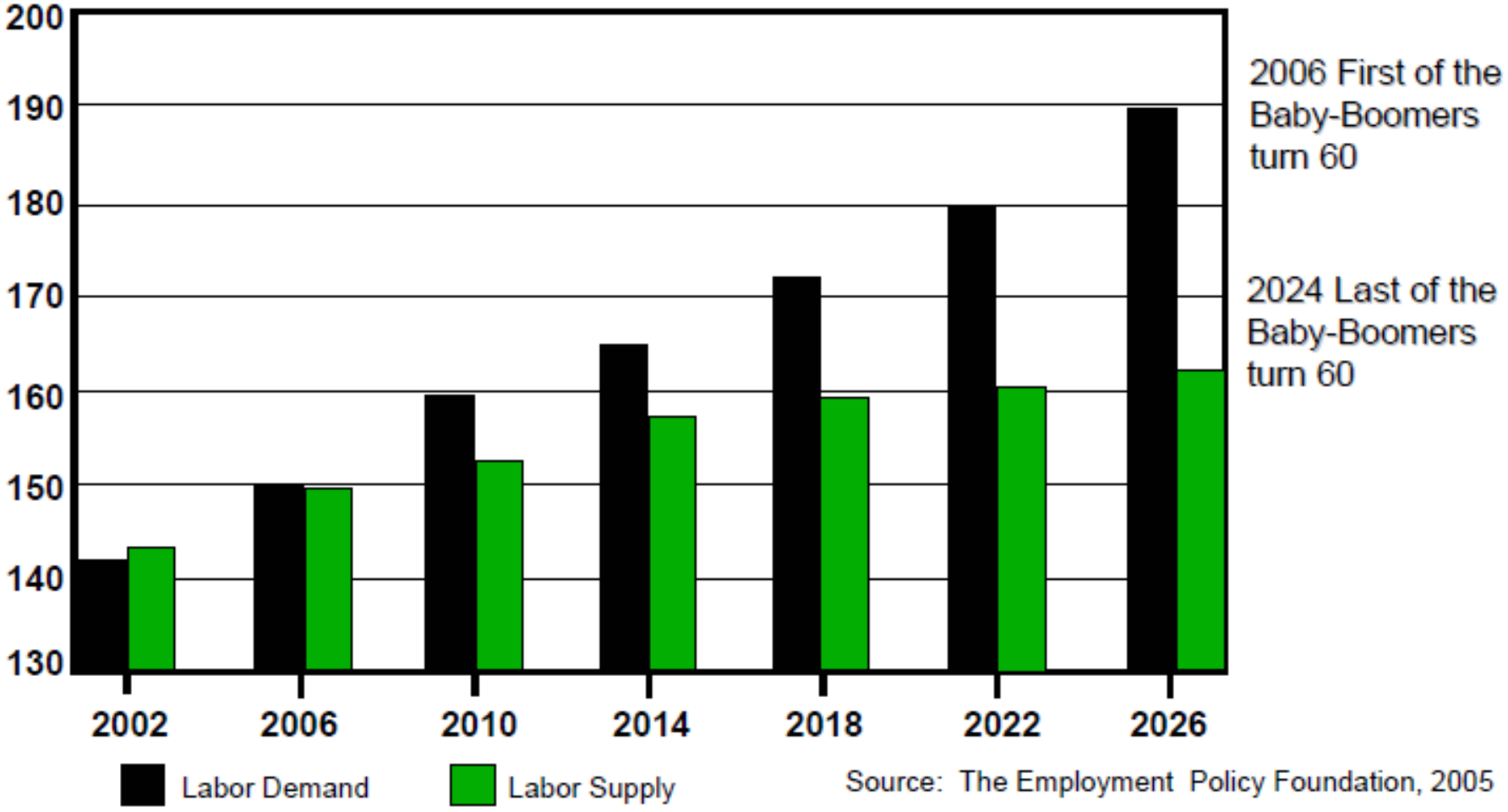
ICT Certification in Action (CEN):

Towards a **Convergence and Harmonization**

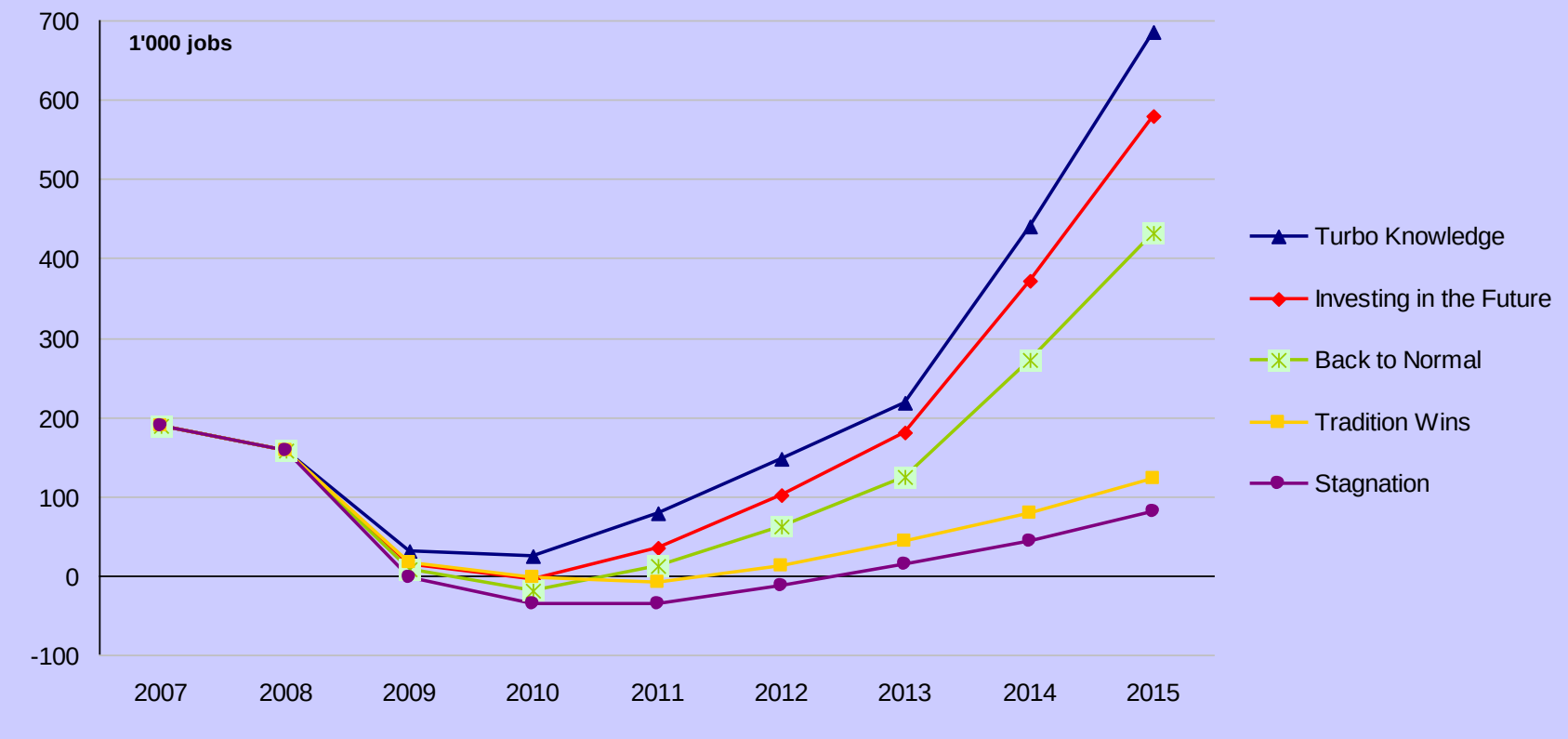
- maps of ICT certifications stakeholders
- positioning e-certifications with e-CF (v2) and EQF,
- bridging certifications with education

www.ict-certification-in-europe.eu

Meeting the labor demand



IT is the job market to be in now- right?



Foresight study anticipates that the EU labour market may face an excess demand of 384,000 ICT practitioners by 2015

http://www.eskills-monitor.eu/documents/Meskills%20Scenario%20and%20Foresight%20report_final.pdf

Other compliances…

Thank you!

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