# Θέματα Τεχνολογικά Υποστηριζόμενης Κατάρτισης με στόχο την Ανάπτυξη Επαγγελματικών Ικανοτήτων

**Δημήτριος Γ Σάμψων**
**Senior Member IEEE**

*Τμήμα Ψηφιακών Συστημάτων, Πανεπιστήμιο Πειραιώς*
*Ινστιτούτο Τεχνολογιών Πληροφορικής και Επικοινωνιών, Εθνικό Κέντρο Έρευνας και Τεχνολογικής Ανάπτυξης (ΕΚΕΤΑ)*

# Speaker Introduction (1/2)

- Professor, Dept of Digital Systems, **University of Piraeus**, Greece (2002-today)
- Adjunct Professor, Faculty of Science and Technology, **Athabasca University**, Canada
- Adjunct Professor, International Multidisciplinary PhD Studies in Educational Technology & Learning Environments (IMPDET-LE) Doctoral Programme of the **University of Eastern Finland**
- Research Fellow, Information Technologies Institute, **Center for Research and Technology Hellas**, Greece (1999-today)
- Founder and Director of **Advanced Learning Technologies and Services for Education and Learning** (ASK) , Greece (1999-today)
- Past-Chair, **IEEE Computer Scociety Technical Committee Learning Technology** (2007-2011)
- More than **280 scientific publications** in book chapters, journals and conference proceedings, with at least **1.280 known citations** (with **h-index 20**) and **7 Best Paper Awards** in International Conferences
- Participation in **64 R&D projects** with total external funding **14+M€** (1995-today)

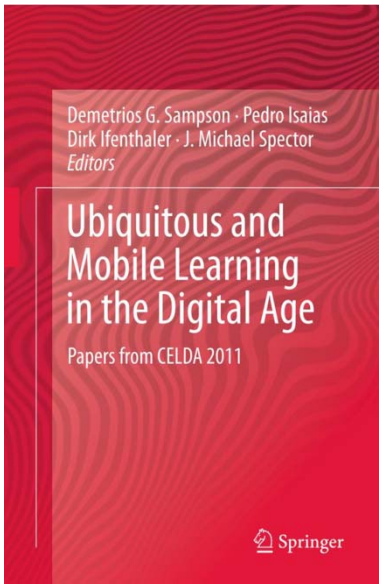
# Speaker Introduction (2/2)

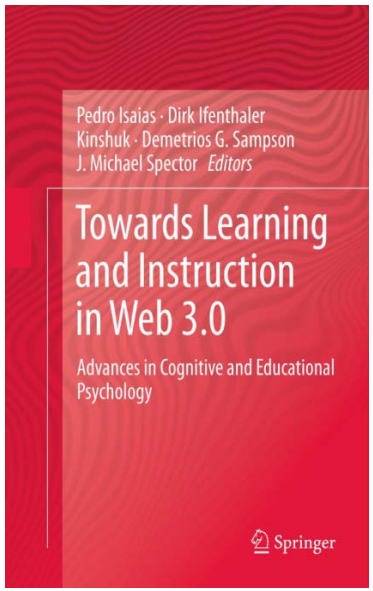
- Co-Editor-in-Chief, **Educational Technology & Society Journal (since 2000)**
- Steering Committee, **IEEE Transactions on Learning Technologies**
- Advisory Board of the **Journal of King Saud University** - Computer and Information Sciences
- Member **Editorial Board** in **18** Academic Journals
- Guest Editor **20 Special Issues** in 12 different journals
- Guest Editor **5 Books** published by Springer
- General Co-Chair and/or Program Co-Chair
  - ✓ **IEEE International Conference *on Advanced Learning Technologies (Global)* -** ICALT 2013, 2012, 2011, 2010, 2009, 2007, 2006, 2005
  - ✓ **IEEE International Conference *on Wireless, Mobile and Ubiquitous (Asia)* -** WMUTE 2012, 2010, 2008, 2006
  - ✓ **IEEE International Conference on *Technology for Education (India)* -** TE2012, TE2011
  - ✓ **IADIS International Conference *Cognition and Exploratory Learning in Digital Age (Europe)* -** CELDA 2012, 2011, 2010, 2009, 2008, 2007, 2006, 2005

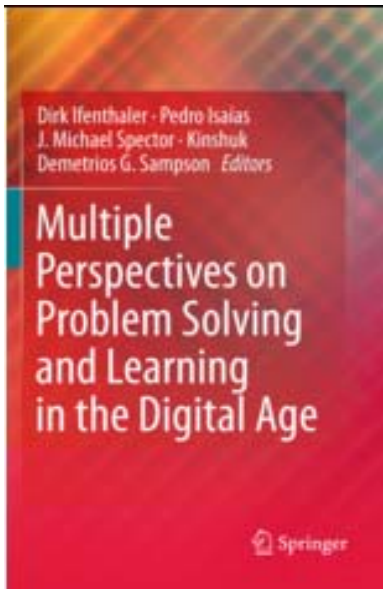
# Research Areas

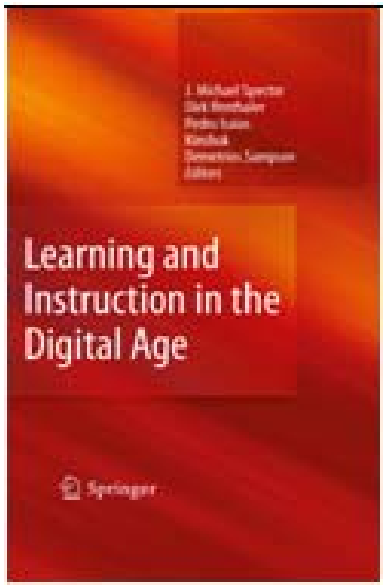
- Cloud Computing for Open Educational Resources and Practices
- Context-Aware Adaptive and Personalized Mobile Learning
- Web 2.0 and Social Computing for Learning
- Learning and Knowledge Analytics
- Digital Game and Intelligent Toy Enhanced Learning
- 3D Virtual Worlds in Real Education
- Learning Technologies for People with Disabilities

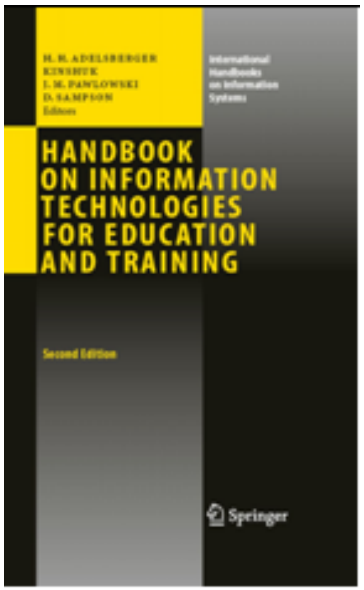
# Recent Books in TeL



# Dept Digital Systems @ Univ Piraeus, Greece

- **The University of Piraeus** is one of the oldest State (Business) Universities in Greece (since 1938). It presently operates with **nine** academic departments, specializing in Digital Systems, Economics, Business Administration, International Studies and related areas.
- The **Department of Digital Systems** offers a four-year Undergraduate Programme (240 ECTSs) in "***Digital Systems***" (800 undergraduate students), two Postgraduate Programmes (90 ECTSs) in "***Technology Education and Digital Systems***" (areas of studies: e-Learning, Network-Oriented Systems, Digital Communications and Networks) and in "***Techno-economic Management and Digital Systems Security***" (areas of studies: Techno-economic Management of Digital Systems, Digital Systems Security) (200 postgraduate students), and Ph.D. studies (40 PhD students).

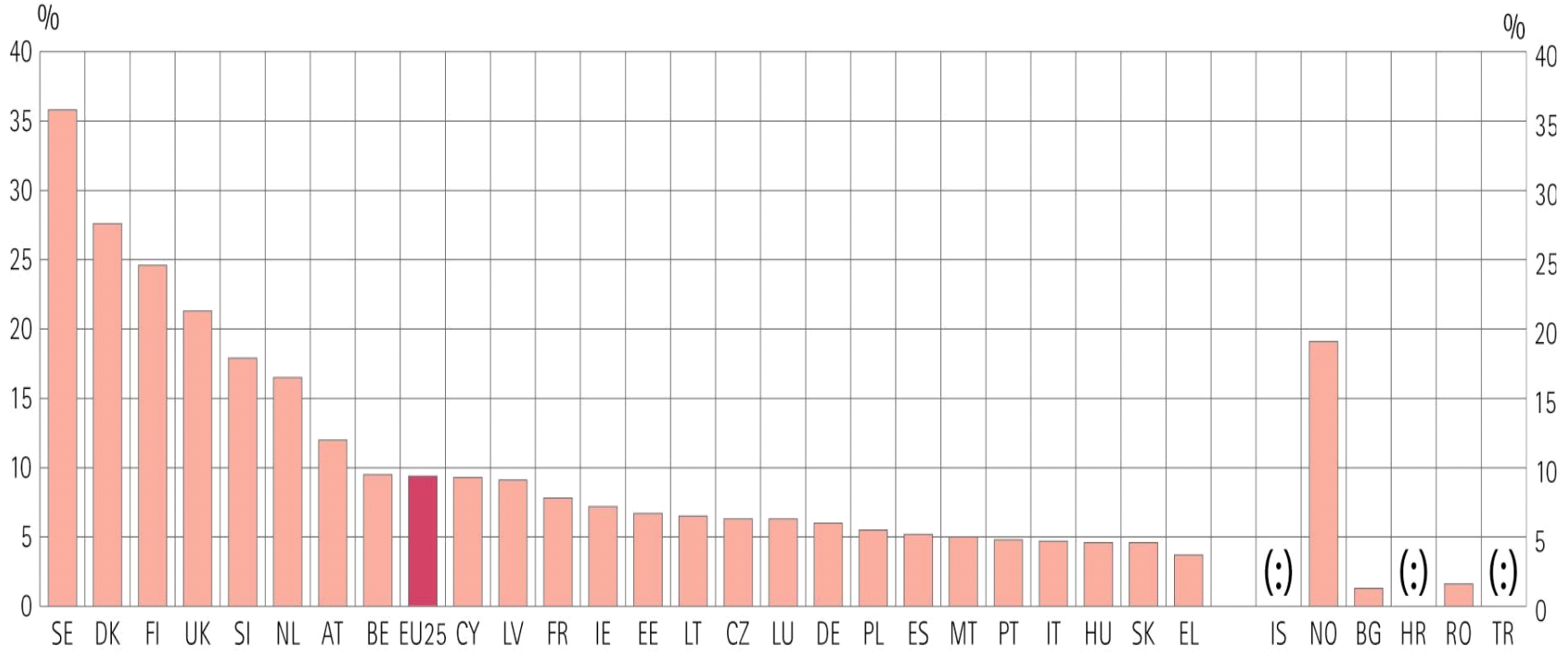
# Δια Βίου Μάθηση:

## Η Εκπαιδευτική Πρόκληση της **Κοινωνίας και της Οικονομίας της Γνώσης**

- ***Κοινωνία της Γνώσης***: η καθημερινή ζωή εξαρτάται σημαντικά από την γρήγορη, ασφαλή και αποτελεσματική επεξεργασία πλήθους πληροφοριών και γνώσεων
- ***Οικονομία της Γνώσης***: η επιχειρηματικότητα και η εργασία επηρεάζεται σημαντικά από την δημιουργία, την εφαρμογή και την διαχείριση νέας γνώσης
- Η ανάγκη διαρκούς ανάπτυξης νέων **ικανοτήτων (competencies)** και αποτελεσματικής διαχείρισής τους (ατομικά και συλλογικά) απαιτεί πρόσβαση σε «**Δια Βίου Μάθηση**»

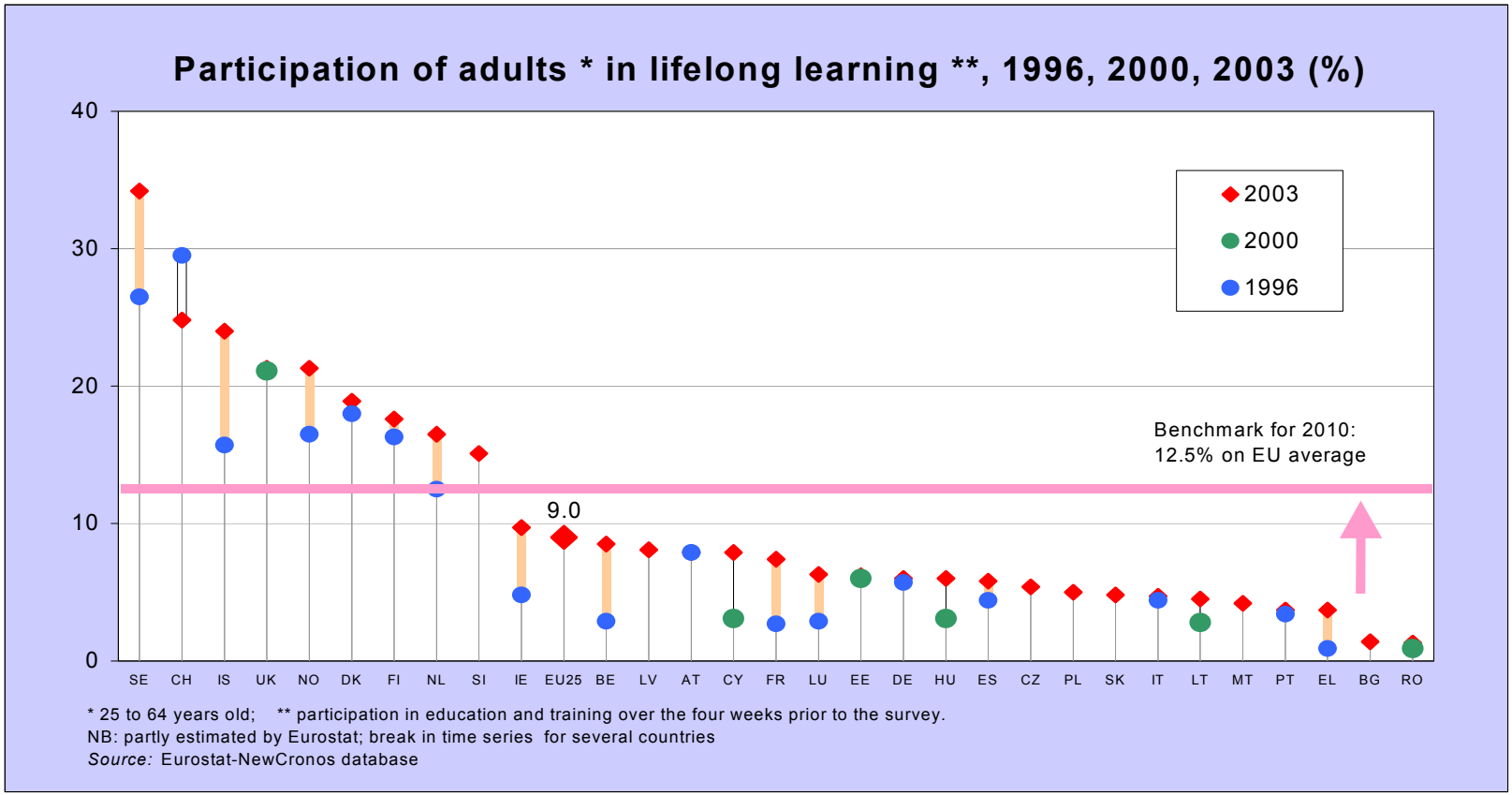
# Πρόσβαση Ευρωπαίων Πολιτών στη Δια Βίου Μάθηση

**Ποσοστό Πληθυσμού Ηλικίας 25-64 που συμμετέχουν σε προγράμματα εκπαίδευσης και κατάρτισης (2004)**




E&T 2010 progress report 2004, DG EAC

# … still a long way to go …



**Συνεπώς**:

ενώ η «δια βίου μάθηση» αποτελεί την βασική εκπαιδευτική πρόκληση για την Κοινωνία της Γνώσης του 21ου Αιώνα,

τα ποσοστά πρόσβασης σε «συστήματα» Δια Βίου Μάθησης παραμένουν ιδιαίτερα χαμηλά

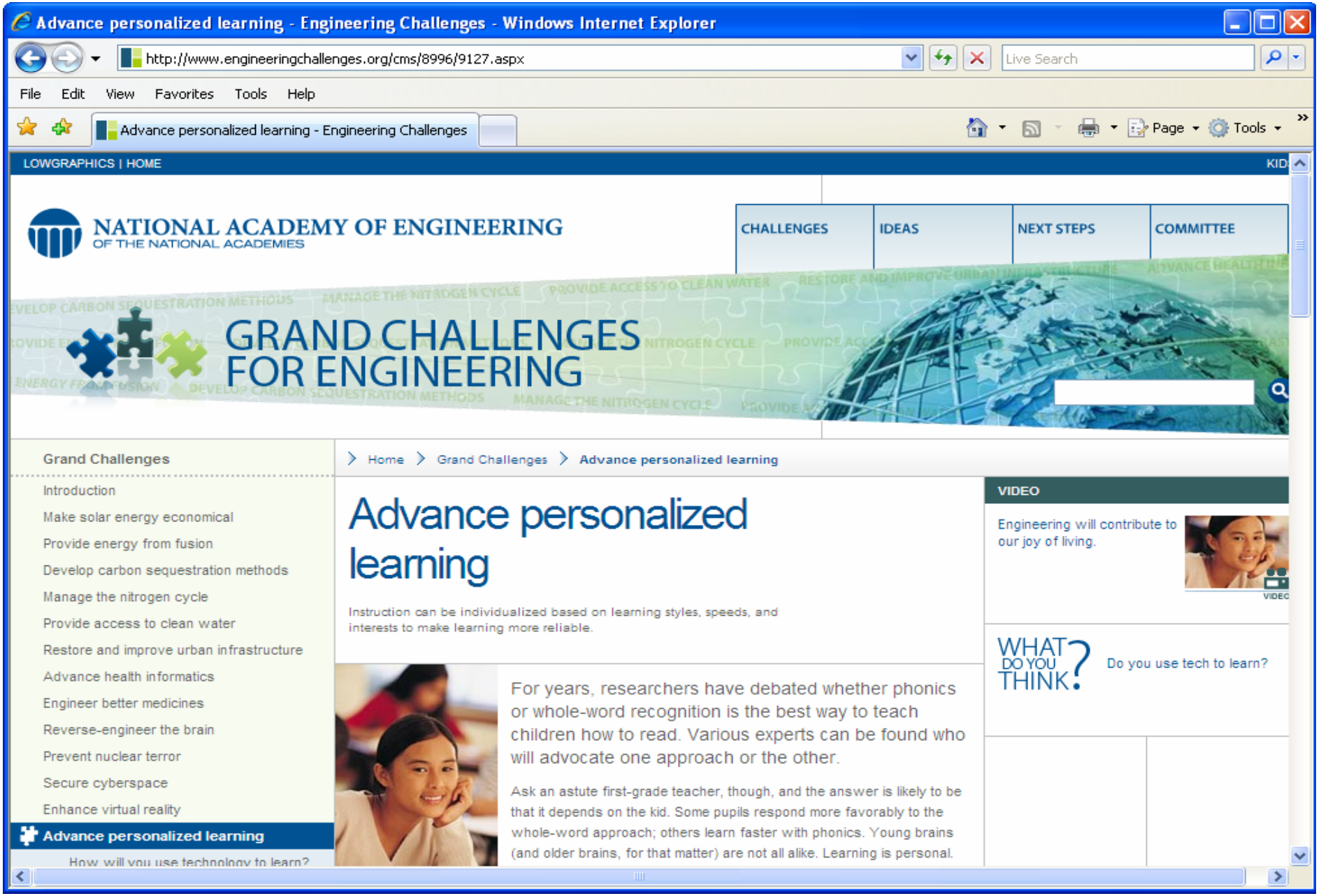
# *γιατί ?*

Τα **παραδοσιακά** Εκπαιδευτικά Ιδρύματα **επιμένουν** να «διδάσκουν» **ΟΛΟΥΣ** με:

Με την **ΙΔΙΑ** ύλη, την **ΙΔΙΑ** μέθοδο, τα **ΙΔΙΑ** μέσα, στις **ΙΔΙΕΣ** αίθουσες, με τον **ΙΔΙΟ** δάσκαλο, τις **ΙΔΙΕΣ** ώρες, με τον **ΙΔΙΟ** ρυθμό

# Πόσο ελκυστικό και χρήσιμο είναι αυτό το μοντέλο εκπαίδευσης και κατάρτισης στην «Δια Βίου Μάθηση» ?

Η Ακαδημία Μηχανικών των ΗΠΑ (**National Academy of Engineering, USA)** αναγνώρισε πρόσφατα την **Τεχνολογικά-υποστηριζόμενη Εξατομικευμένη Μάθηση** (**Technology-enhanced Personalised Learning**) ως μια από τις **14** σημαντικότερες τεχνολογικές προκλήσεις του 21ου Αιώνα (**Grand Challenges for Engineering for the 21st Century**)




http://www.engineeringchallenges.org/cms/8996/9127.aspx

Αντίστοιχα, η **Τεχνολογικά-υποστηριζόμενη Εξατομικευμένη Μάθηση** αναγνωρίζεται ως η μεγαλύτερη **εκπαιδευτική πρόκληση** από τα περισσότερα Υπουργεία Παιδείας και Διαβίου Μάθησης στην Ευρώπη και τον Κόσμο.

UK DfES (2006), *2020 Vision. Report of the Teaching and Learning in 2020 Review Group*, ISBN: 978-1-84478-862
UKDfES (2004), Personalised Learning, www.standards.dfes.gov.uk
Australian Flexible Learning Framework

Σήμερα, η **Τεχνολογικά-υποστηριζόμενη Εξατομικευμένη Μάθηση** αναδεικνύεται ως η απαραίτητη **Εκπαιδευτική και Τεχνολογική Καινοτομία** προκειμένου τα Εκπαιδευτικά Συστήματα να προετοιμάζουν κατάλληλα και αποτελεσματικά την Γενιά του Παγκόσμιου Ιστού, του Διαδικτύου και των Ψηφιακών Μέσων ώστε να μπορούν να αντιμετωπίσουν τις προκλήσεις της Κοινωνίας της Γνώσης στον 21ο Αιώνα.

... Αξιοποιώντας τα **ταλέντα**, τη **δημιουργικότητα** και τις **ιδιαίτερες ικανότητες και ανάγκες** του κάθε μαθητή, του κάθε φοιτητή, του κάθε δια βίου μαθητευόμενου ...

αντί να τα ισοπεδώνουν στο «μέσο» όρο

Το 2008 ο οργανισμός ISO ενέκρινε το πρώτο διεθνές πρότυπο Εκπαιδευτικής Τεχνολογίας (***ISO** IEC JTC1/SC36* 24751-1:2008. *"**Individualized Adaptability and Accessibility in e-Learning, Education and Training**"*).

Εκεί ορίζεται ως ως «Αναπηρία» (**Disability**) κάθε εμπόδιο που αντιμετωπίζει ο δια βίου μαθητευόμενος όταν οι εκπαιδευτικές εμπειρίες που του παρέχονται δεν ανταποκρίνονται στις ανάγκες και στις απαιτήσεις του !!!

# Defining Disability

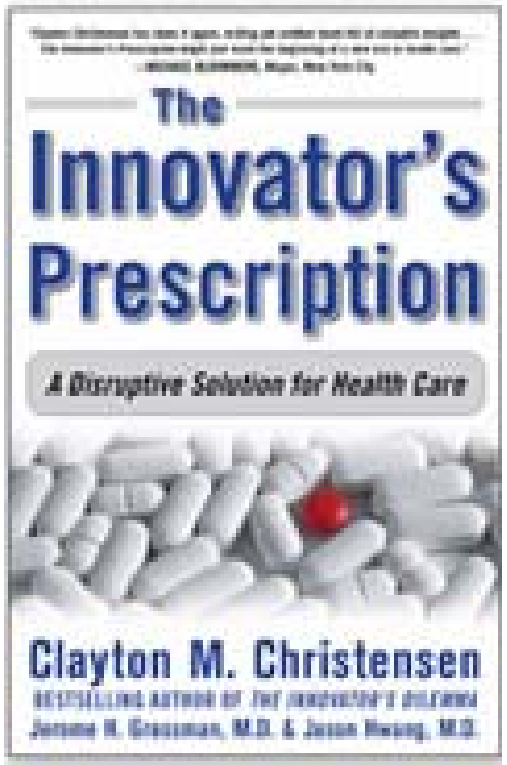
"Learners experience a **disability** when there is a **mismatch** between the learner's **needs** (or preferences) and the education or learning **experience delivered**"

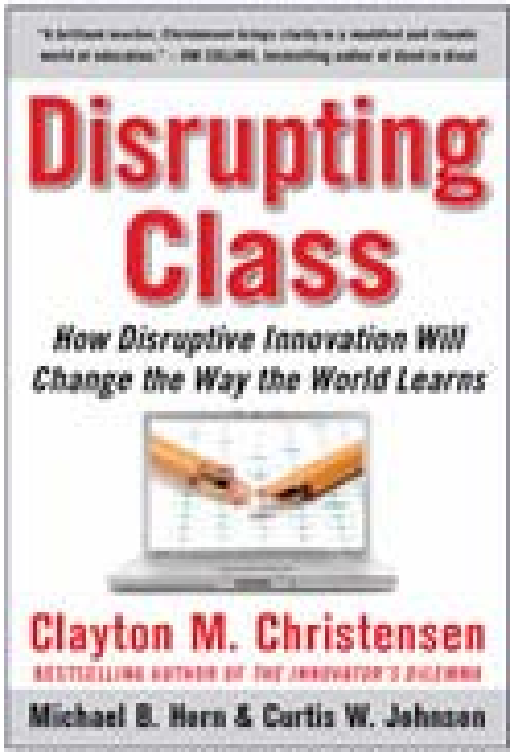
"*ISO IEC JTC1/SC36* 24751-1:2008. *"Individualized Adaptability and Accessibility in e-Learning, Education and Training." Available online at:*
http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=41521

# Για ποιό λόγο ?

## τα παραδοσιακά μοντέλα εκπαίδευσης και κατάρτισης δυσκολεύονται να ανταποκριθούν στις απαιτήσεις της Κοινωνίας της Γνώσης του 21ου Αιώνα ?

Θα μπορούσε η Θεωρία της ***Disruptive Innovation*** (Clayton M Christensen, Harvard Business Professor ) να χρησιμοποιηθεί ως εργαλείο για να καταλάβουμε και να μελετήσουμε την βελτίωση των Εκπαιδευτικών Ιδρυμάτων ?



Η Θεωρία της **Disruptive Innovation** επιχειρεί να εξηγήσει:

- Γιατί οι οργανισμοί δυσκολεύονται να ενσωματώσουν συγκεκριμένες καινοτομίες
- Πως οι οργανισμοί μπορούν να επιτύχουν στην υιοθέτηση καινοτομιών

- Σύμφωνα με την **Disruptive Innovation Theory** υπάρχουν δύο (2) είδη καινοτομίας:
  - **Sustainable** Innovation: επιτυγχάνεται από καλώς εδραιωμένους market leaders προσφέροντας νέα και βελτιωμένα προϊόντα και υπηρεσίες με στόχο την σταδιακή βελτίωση της απόδοσης. Συνήθως δε, φτάνουν σε ένα σημείο όπου ο ρυθμός της βελτίωσης είναι τέτοιος που δεν μπορεί να απορροφηθεί – χρησιμοποιηθεί από τον ενδιαφερόμενο – χρήστη.
  - **Disruptive** Innovation: αναπτύσσεται και υιοθετείται από νέους οργανισμούς με προϊόντα και υπηρεσίες που δεν είναι αρχικά τόσο ώριμα ή «καλά» όσο αυτά των market leaders, αλλά που καθιστούν τις υπηρεσίες προσιτές (με την ευρύτερη έννοια: οικονομικά, κοινωνικά, χρηστικά) σε αυτούς που ουσιαστικά δεν τις χρησιμοποιούσαν ή δεν τις αξιοποιούν (the “non-consumers”).

- Εφαρμόζοντας την DIT στην Εκπαίδευση και Κατάρτιση:
  - Εξατομικευμένες Μαθησιακές Εμπειρίες (Student-centered Learning Experiences) μπορούν να αναπτυχθούν **εκτός** των τοιχών των παραδοσιακών εκπαιδευτικών μοντέλων (the "competing against non-consumption" principle)
  - Οδηγώντας σταδιακά σε μια ανατρεπτική μετάβαση (*disruptive transition)* από την μονολιθική δασκολοκεντρική τάξη και διδασκαλία ίδια για όλους (size-fits-to-all) στην **τεχνολογικά-υποστηριζόμενη μαθητοκεντρική και εξατομικευμένη μάθηση** εντός, αλλά κυρίως εκτός των παραδοσιακών εκπαιδευτικών μοντέλων.

# Η πρόταση μας:

# Technology-supported Open Access to Context-Aware Competence-based Lifelong Learning

**D. G. Sampson** and P. Zervas, "Context-Aware Adaptive and Personalized Mobile Learning Systems", in Demetrios G. Sampson, Dirk Ifenthaler, Pedro Isaias, and Michael J. Spector, (Eds.), *Ubiquitous and Mobile Informal and Formal Learning in Digital Age*, Springer, **January 2013**

P. Zervas, **D. G. Sampson**, S. Gomez and R. Fabregat, "Tools for Context-Aware Mobile Educational Content Adaptation", in Demetrios G. Sampson, Dirk Ifenthaler, Pedro Isaias, and Michael J. Spector, (Eds.), *Ubiquitous and Mobile Informal and Formal Learning in Digital Age*, Springer, **January 2013**

**D. G. Sampson** and P. Zervas, "A Hierarchical Framework for Open Access to Education and Learning", *International Journal of Web Based Communities, **February 2013***

**D. G. Sampson**, P. Zervas and G. Chloros, "Supporting the Process of Developing and Managing LOM Application Profiles: The ASK-LOM-AP Tool", *IEEE Transactions on Learning Technologies* (TLT), (ISSN 1939-1382), vol. 5(3), IEEE Computer Society, **September 2012**

P. Zervas, S. Gomez, R. Fabregat and **D. G. Sampson**, "Tools for Context-Aware Learning Design and Mobile Delivery", in Proc. of the *11th IEEE International Conference on Advanced Learning Technologies* (ICALT 2011), Athens, Georgia, USA, 6-8, **July 2011**

**D. G. Sampson**, P. Zervas and A. Kalamatianos, "ASK-LOST 2.0: A Web-based Tool for Social Tagging Digital Educational Resources in Learning Environments", in B. White, I. King, and P. Tsang, (Eds.), *Social Media Tools and Platforms in Learning Environments: Present and Future*, chapter 23, pp 387-398, Springer, **2011**

**D. G. Sampson**, "Competence-related Metadata for Educational Resources that Support Lifelong Competence Development Programmes", Educational Technology & Society, 12 (4), 149-159, **October 2009**

**D. G. Sampson** and D. Fytros, "Competence Models in Technology-enhanced Competence-based Learning", in H.H. Adelsberger, Kinshuk, J.M. Pawlowski and D. Sampson (Eds.), *International Handbook on Information Technologies for Education and Training*, 2nd Edition, Springer, Chapter 9, pp. 157-176, **June 2008**

**D. G. Sampson**, P. Karampiperis and D. Fytros, "Developing a Common Metadata Model for Competencies Description", *Interactive Learning Environment*, Special Issue on *Learning Networks for Lifelong Competence Development*, (ISSN 1049-4820), vol. 15(2), pp. 137-150, Routledge , **August 2007**

P. Zervas and **D. G. Sampson**, "The TenC Competence Observatory: An Enabling Technology for Common Description of Competences", in Proc. of the *7th IEEE International Conference on Advanced Learning Technologies* (ICALT 2007), ISBN: 9780769529165, pp. 765-769, Niigata, Japan, IEEE Computer Society, **July 2007**

# Competence-based Lifelong Learning

- Knowledge-based Society anticipates new models for learning:
  - No longer tied to school and/or university context
  - More integrated into work and other life activities contexts
  - Combining formal and informal learning to the level of seemingless integration
- Competence-based approaches
  - are becoming more popular both in the field of formal or non-formal education and training
  - appear to offer the opportunity to develop e-training programs that bare the potential to meet lifelong learning expectations

# Competence Definition (1/2)

- The concept of ***competence*** can bridge the world of education, training, knowledge management, human resource management & informal learning
- However*, many definitions exist* which turns out to be a huge problem for system development
  - ***Competence***: Effective performance in a domain at different levels of proficiency
  - ***Competency***: Undefined (we prefer to avoid the term and use more specific terms when needed, eg, a skill)

# Competence Definition (2/2)

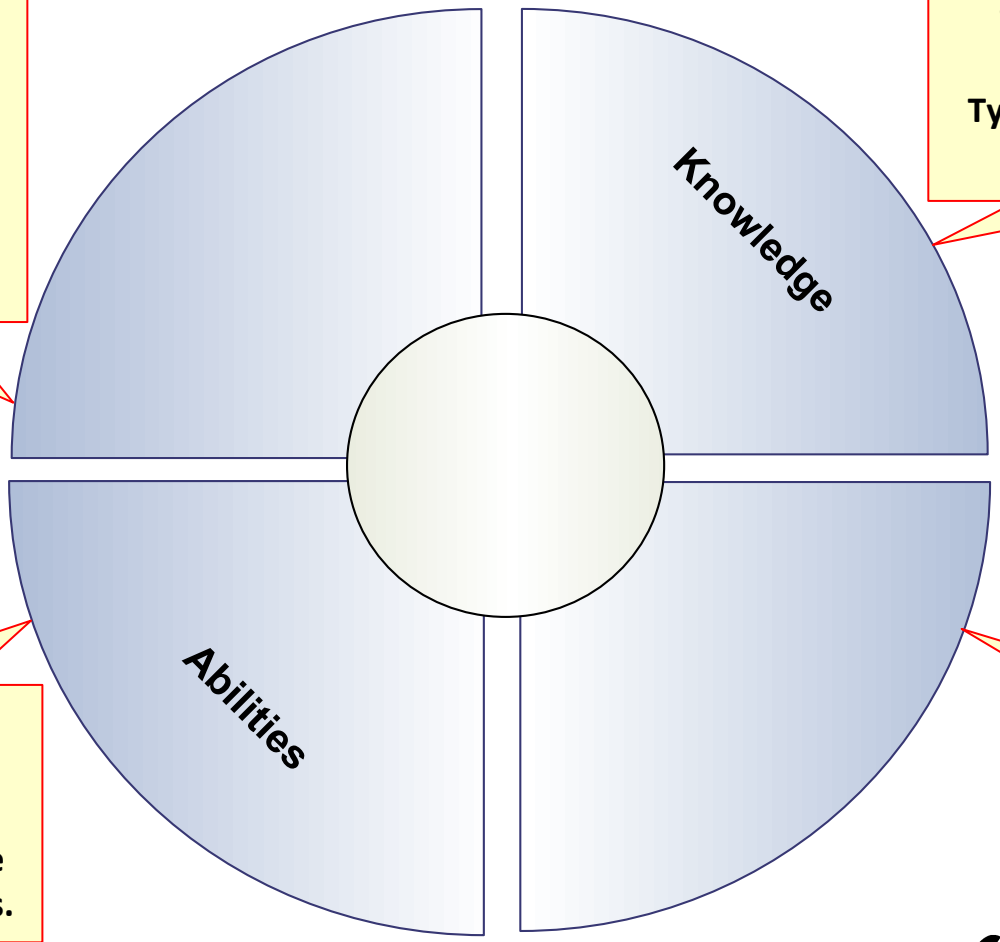
***Competence*** is defined as the integrated application of knowledge, skills, values, experience, contacts, external knowledge resources and tools to solve a problem, to perform an activity to handle a situation.

*Friensen, N. and Anderson, T. (2004) 'Interaction for lifelong learning', British Journal of Educational Technology, Vol. 35, No. 6, pp.679-687.*

# Competence Dimensions

•Self-concepts: attitudes, values, self-control.
•Traits: a general disposition to behave in certain ways.
•Motives: recurrent thoughts driving behaviours.

Tacit knowledge - Explicit knowledge
Typically on a subject domain

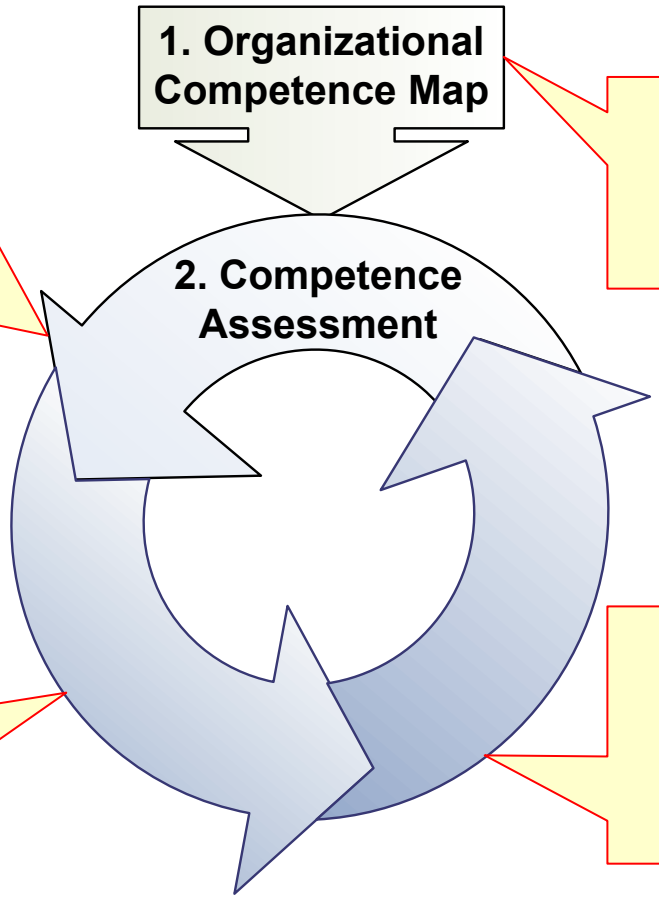



Ability is a demonstrated cognitive or physical capability to successfully perform a task with a wide range of possible outcomes.

A skill is a capacity to perform physical or mental tasks with a specified outcome.

# Competence Development Lifecycle

1. Assess individual's competences.
2. Gap Analysis between existing competences and the required competences for a specific job role.




Identification of Job Roles and relevant competences

Design Competence Development Programmes to minimize the identified gaps

Continuous Performance Monitoring and Assessment to confirm improvement.

# The need for common description of competences

- Key component in Competence Development Lifecycle is ***Competences Description***
- However, different organizations typically define the same competences with different ways (for example due to different organizational processes, different internal taxonomies, etc)
- Enabling technologies and infrastructures for facilitating the creation and maintainance of *commonly identifiable competence descriptions* are essential.

# The ASK4Competences Observatory

- We claim that the technology of *web-based observatories* could be used to facilitate the development and maintainance of ***commonly identifiable competence descriptions***
- To this end, we developed the ***ASK4Competences Observatory***, as the technical means to achieve that

# The ASK4Competence Observatory

## Main Objectives

- The *ASK4Competences Observatory* is a web-based environment aiming :
  - To store and monitor *competences* and their corresponding *levels* that need be acquired in different professional and academic fields to perform certain tasks
  - To define and maintain *job descriptions and functions* occuring in different professional fields
  - To provide mechanisms for *assigning competences to different jobs/functions* and for *mapping different competence descriptions to each other.*

# The ASK4Competence Observatory

## User Groups

- ***Enterprises or Organizations,*** who are interested in defining the desired competences for their employees' job roles
- ***Individuals***, who are qualified to practice a specific profession and they want to compare their own competences
  - with reference ones (defined by an organization or enterprise) related to this profession as well as
  - with the corresponding level which they anticipate to serve in the profession.

# The ASK4Competence Observatory

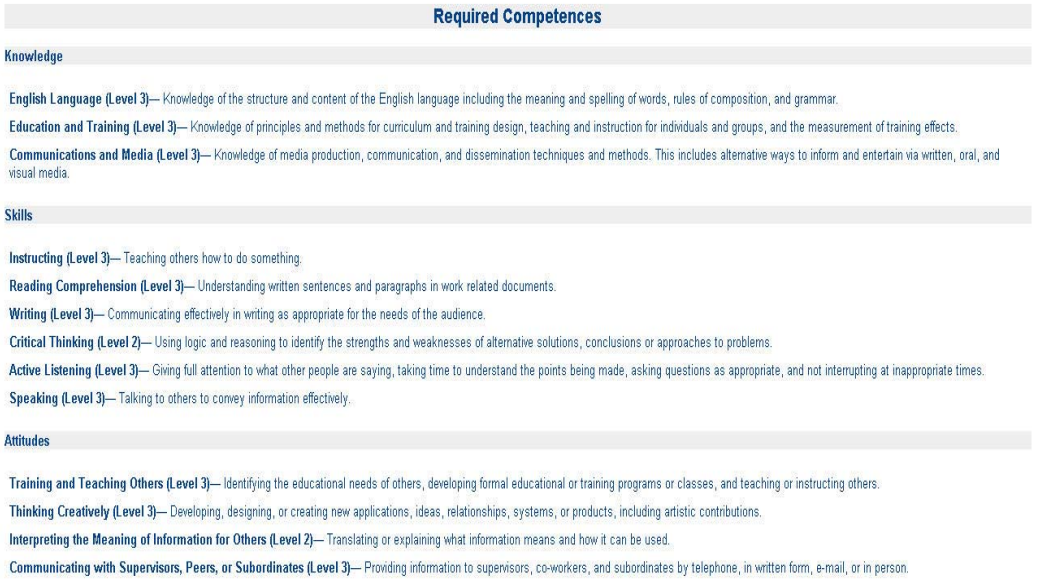
## Main Functionalities (1/4)

- ***Create Jobs/Functions*:** the user can define different Job/Functions and the appropriate levels that these job/functions are expected to be performed at
- ***Search Jobs/Functions:*** the user can search for Jobs - Functions already defined by other users

# The ASK4Competence Observatory

## Main Functionalities (2/4)

- ***Create Competences:*** the user can create competence descriptions and store them
- ***Search for the Competences of a specific job/function*:** the user can search for the Competences that need to be acquired, in order to become or considered ascompetent for a specific Job/Function (as defined by a specific organisation)



**Required Competences**

**Knowledge**

**English Language (Level 3)**— Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar.

**Education and Training (Level 3)**— Knowledge of principles and methods for curriculum and training design, teaching and instruction for individuals and groups, and the measurement of training effects.

**Communications and Media (Level 3)**— Knowledge of media production, communication, and dissemination techniques and methods. This includes alternative ways to inform and entertain via written, oral, and visual media.

**Skills**

**Instructing (Level 3)**— Teaching others how to do something.

**Reading Comprehension (Level 3)**— Understanding written sentences and paragraphs in work related documents.

**Writing (Level 3)**— Communicating effectively in writing as appropriate for the needs of the audience.

**Critical Thinking (Level 2)**— Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.

**Active Listening (Level 3)**— Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.

**Speaking (Level 3)**— Talking to others to convey information effectively.

**Attitudes**

**Training and Teaching Others (Level 3)**— Identifying the educational needs of others, developing formal educational or training programs or classes, and teaching or instructing others.

**Thinking Creatively (Level 3)**— Developing, designing, or creating new applications, ideas, relationships, systems, or products, including artistic contributions.

**Interpreting the Meaning of Information for Others (Level 2)**— Translating or explaining what information means and how it can be used.

**Communicating with Supervisors, Peers, or Subordinates (Level 3)**— Providing information to supervisors, co-workers, and subordinates by telephone, in written form, e-mail, or in person.

# The ASK4Competence Observatory

## Main Functionalities (3/4)

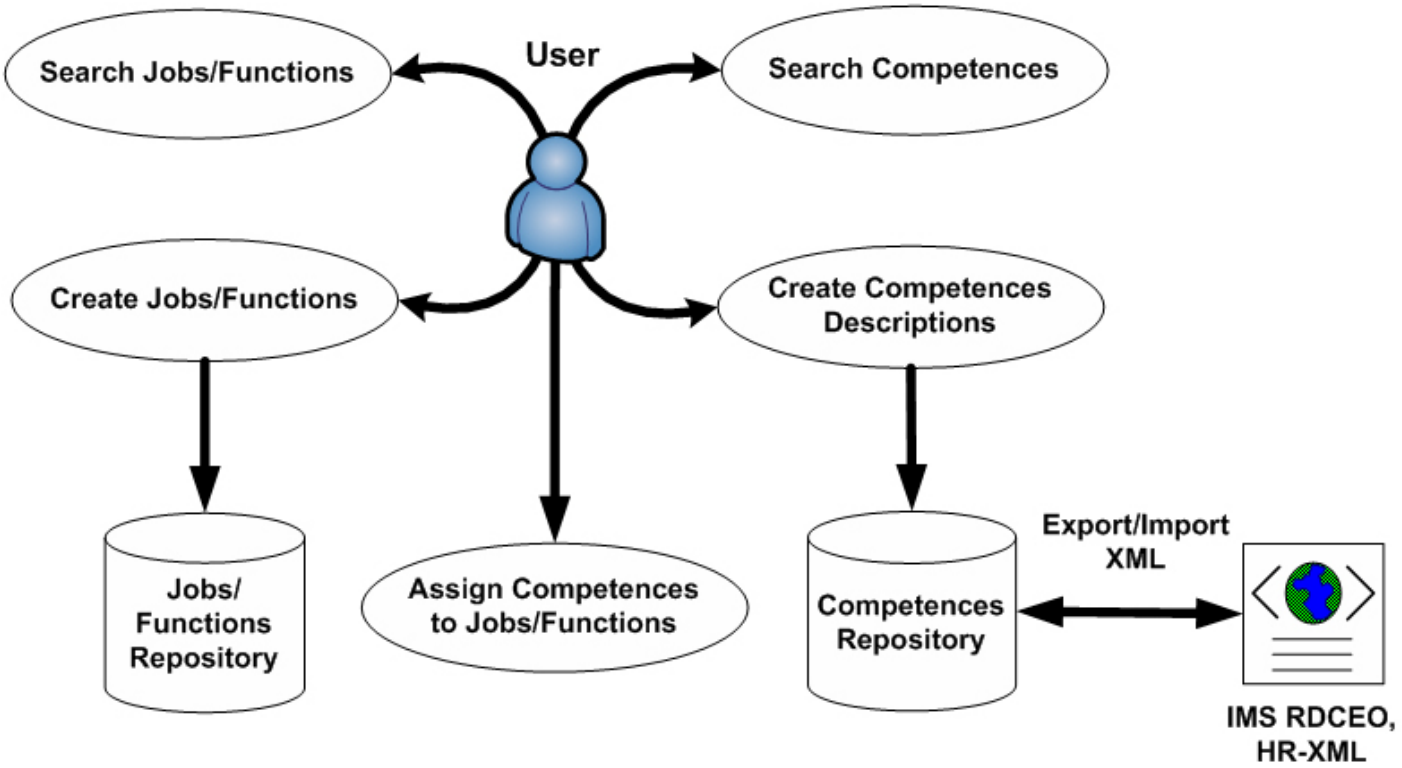
- ***Assign Competences to Jobs/Functions***: the user can define the set of competences and their corresponding levels that determines the minimum requirements for a specific Job/Function.
- ***Import and export competences based on IMS RDCEO and HR-XML format***: the user can import/export competences to/from Competence Observatoriew to/from other systems that follows the IMS RDCEO and /or HR-XML standard.


IMS RDCEO XML Representation


HR-XML Representation

# The ASK4Competence Observatory

## Main Functionalities (4/4)



# The ASK4Competence Observatory

## Joint Model for Describing Competences (1/2)

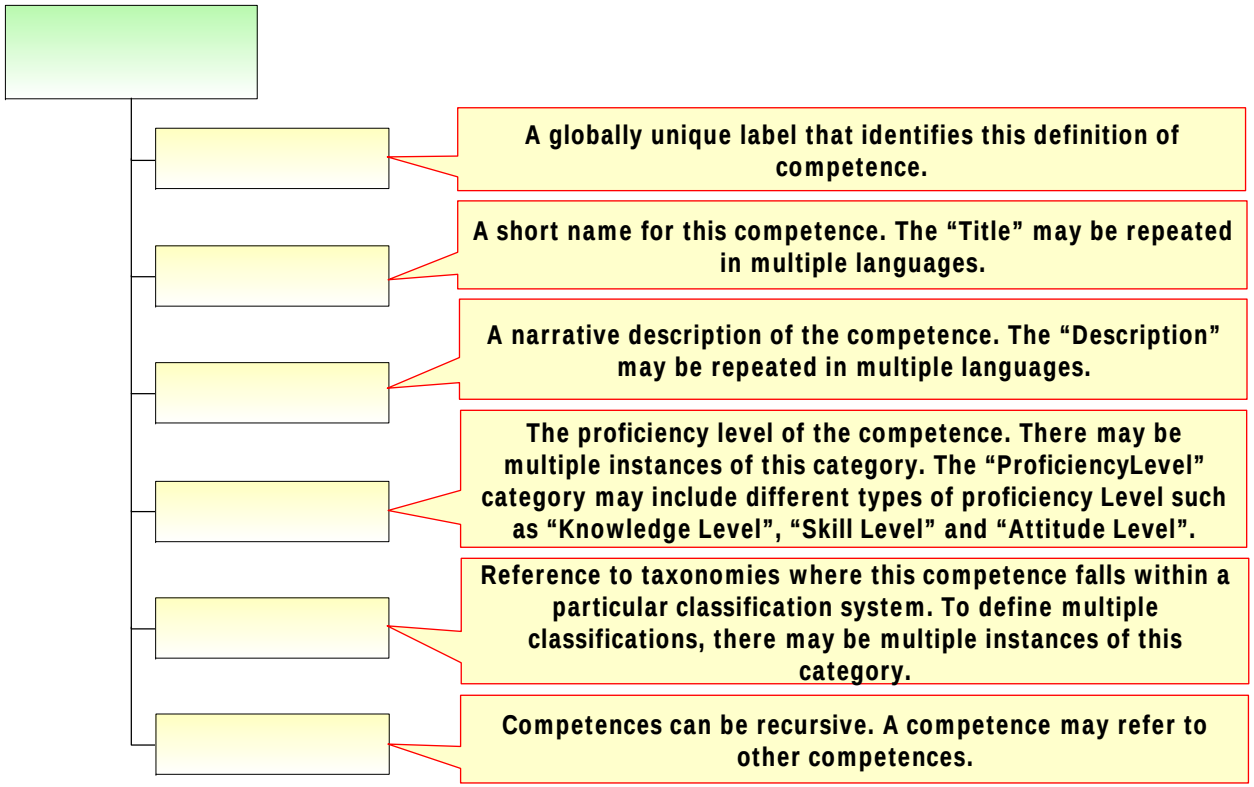
- A critical aspect for importing and exporting competences based on IMS RDCEO and HR-XML format to/from Competence Observatories is the internal representation of the competencies descriptions.

- For this purpose we have proposed and used a ***joint competence description model*** that builds upon the mapping of the current state of the art specifications namely, IMS RDCEO and HR-XML.

- See D. Sampson, P. Karampiperis and D. Fytros, "*Developing a Common Metadata Model for Competencies Description*", *Interactive Learning Environment*, vol. 15(2), August 2007

# The ASK4Competence Observatory

## Joint Model for Describing Competences (2/2)



# Issues for further Research

Dynamic competence description - how do we capture and model changes as we go ?

How this can be related to Tagging People in their Professional Capacities ?

Tagging of Educational Resources with regard to Competencies depends on WHO is tagging (for example Academia or Industry) – this can be an issue to consider on Tagging Authorship and Credibility

How can we built Job and/or Task Context-Aware Competencies Descriptions?

Can we create Competence Maps to support Competence-based Curricula (as we use Topic Maps for supporting Domain Knowledge Curiccula) ?

# Πρόγραμμα Μεταπτυχιακών Σπουδών

«Ψηφιακά Συστήματα και Υπηρεσίες»

Κατεύθυνση **Ηλεκτρονική Μάθηση**

## Τμήμα Ψηφιακών Συστημάτων

## Πανεπιστήμιο Πειραιώς

ΠΑΝΕΠΙΣΤΗΜΙΟ ΠΕΙΡΑΙΩΣ
ΤΜΗΜΑ ΨΗΦΙΑΚΩΝ ΣΥΣΤΗΜΑΤΩΝ

# ΣΠΟΥΔΕΣ ΣΤΑ ΨΗΦΙΑΚΑ ΣΥΣΤΗΜΑΤΑ

# ΕΠΕΝΔΥΣΗ ΣΤΗΝ ΨΗΦΙΑΚΗ ΓΝΩΣΗ

# Stay in contact …

**e-mail** me: sampson@iti.gr
**skype** me: dem-sampson
**google** us @: www.ask4research.info
**Linkedin** with me

or come and visit us:
Department of Digital Systems,
University of Piraeus, Greece