Bridging the Gap:
A New Business-MIS Degree
in Hungarian HE

A On demand for EU workforce with ICT-intelligence

B The Hungarian Bachelor/Masters HE programmes on ICT professions

C Towards the new Masters Programme on Business Information Systems

IT STAR

UNIVERSITAS QUINQUEECCLESIENSIS 13 67

Competitiveness, strategy, education

A

B

C

- „Innovation starts with people and this is why e-skills are important. They are not just pure technical skills: successful innovation in ICT requires also cross-disciplinary, cognitive and problem-solving skills as well as an understanding of the fundamentals of business. …
  …A highly skilled and adaptable workforce will be the foundation for Europe's competitiveness and prosperity in the 21st century."

  G. Verheugen, VP of the EC: „E-skills for the 21st century"; Brussels, 7th June 2007

- „37% of European citizens have no computer skills whatsoever, while only 22% seem to be acquainted with a wide range of computer activities. A lack of basic e-skills will prevent these people from participating fully in the 21st knowledge-based economy and society."

  EUROSTAT Report, 2007

- „….the social and economic costs due to the lack of proper IT skills (called the *cost of IT ignorance*) was evaluated in Italy around 19 billion Euro per year."

  A Bocconi University (Italy) project, 2007

The background: urgent demand

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The EITO Report 2007* declared:

- new development is needed for the demand of new software and IT services,
- new start-ups and mergers and acquisitions are needed to enhance the ICT business line
- innovation is needed in broadband communication services, especially mobile networks,
- strengthening of research co-operation is needed between industry and universities

Digital Society? Digital Economy? „Digital Sharing Economy?"

B. Lamborghini, 2nd IT STAR Workshop, Genzano di Roma, 26 May 2007

The background, what could make all this work in the EU to be competitive:

- new ICT human capital – graduates with proper knowledge, skills, professional experiences, and motivation towards new applications.
- hands-on training to all age groups at appropriate levels of ICT intelligence
- easy access to IT and digital communication services
- standardisation and uniform requirements towards ICT professionals all over in EU – guidelines to public & higher education

* EITO: The European Information Technology Observatory, 1992

Efforts towards standardisation

- The **eCompetence Framework** (eCF*) document and other efforts declare: qualifications on this new field have to be unified all over the EU labor market - based on opinions from the academia, from other stakeholders like politicians, HR experts, industries, the public sector and social partners.

- The eCF dimensions:
  - Five „competence areas":

    PLAN – BUILD – RUN – ENABLE – MANAGE
  - A set of reference e-Competences for each area (32)
  - Proficiency levels of each e-Competence (e-1 to e-5, EQF: 3 to 8)
  - Knowledge and skills are indicated as an optional framework for inspiration

- National standardisation efforts in Hungary:
  - ECDL competence level national framework, with external assessment
  - ICT competency guidelines for public education
  - National Qualification System of Vocational Competencies (OKJ List), with a broad multi-party agreement of stakeholders – program & syllabi framework for all adult education /further education institutes
  - HE Accreditation Board, with a Committee on ICT Proficiencies:
    - guidelines („Common Competencies in the Curriculum", KKK)
    - preliminary evaluation of a planned program
    - site visits on 3-8 years; a right to assess at any time, on site.

* Presented at the European e-Skills Conference, 9-10 October 2008, Thessaloniki

A

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B/ Hungarian BSc/MSc programmes on ICT

- **Traditionally HE degree programmes have aimed two professions:**
  - „Hard-professional": Computer Engineering (technical knowledge, design & maintenance skills, managing services, etc.)
  - „Soft-professional": Software Engineering (algorithms, mathematical background, programming languages, op. systems, etc.)
- **An explicit need has been emerging in the '90-s:**
  - Large multinationals need high-level „application oriented" ICT staff
  - SMEs need a one-person decision maker on ICT
  - BOTH declare:
    „Company level ICT is NOT for pure-ICT professionals only – a new profession should be '***business-driven***', with business knowledge and skills"
- From 2000 on, universities, chambers, businesses, ICT vendors and J. v. Neumann Soc. jointly have initiated to establish a new Bologna-BSc degree programme:

  BSc in Business Informatics: „bridging the gap" in the field where ICT applications are mostly used.

A

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Relevance of the eCF recommendations to a curriculum:
BSc in Business Informatics   vs.   eCF Level 4. - 5.

A **B** **C**	**Year 1:** **Core Knowledge**	Mathematics, Computing Theory, Operation Research, Computer Architectures I, Programming I. Micro- & Macroeconomics, ICT in Business Processes, Accounting, Business Law	**PLAN:** A.1. IS and Business Strategy Alignment A.2. Service Level Management A.3. Business Plan Development A.4. Specification Creation A.5. Systems Architecture A.7. Technology Watching

	Year 2:
	
	+ Basic Skills
		Computer Architectures II.,
		Networked Computing,
		Software Systems,
		Programming Methodologies
		Programming Technologies
		Database Theories,
		Database Modeling for Business,
		Business Info. Systems I.
			BUILD: B.1. Design & Development
			B.2. System Integration
			RUN: C.4. Problem Management
			ENABLE:
			   D.1. Information Security Strategy Development
			   D.2. ICT Quality Strategy Development
			   D.4.–D.8.:
			       Purchasing- Sales - Channel & Contract Mgmt

	Year 3: **+ICT work compe-tences**	Database Modeling Programming Languages I.-II. Intelligent Systems, Privacy & Security in IT Business Info. Systems II. eBusiness Solutions, Information & Knowledge Mgmt Integrated Business Systems	**MANAGE:** E.1. Forecast Development E.2. Project and Portfolio Management E.3. Risk Management E.4. Relationship Management E.5. Process Improvement E.6. ICT Quality Management E.7. Business Change Management E.8. Information Security Management

Problems of the new BSc in Hungary

A

B

C

- Professional accrediting bodies and interviewed stakeholders have packed the curriculum with overwhelming quantity of **ICT+business** knowledge, required skills and competencies
- Disciplines (courses) have lost their credit value, as a consequence: students have to work more for the same grading (i.e. a BSc level diploma)
- „Business" and „IT/Math" oriented faculty are of two, different cultures, even in education (in used terminology, in teaching style and in assessment methods, etc.)
- Future employers are not safe on competence levels and knowledge content of the 3-years BSc graduates
- Annual graduation: appr. 2,000 Computing Engineers, 1,000+ Programming Engineer and only 3-400 in Business Informatics
- Annual enrollment: Business Informatics ~300 in 2007, ~550 in 2008 (applied 1700); ~720 in 2009 (applied 2,700!)

C/ Planned role of a Business Informatics Masters Programme

A

B

C

- Declared labor market need in Hungary (by chambers, ICT-oriented and general businesses, public sector, etc.) is appr. 10,000 ICT-related new professionals annually. Colleges & universities can produce less, than 2-3,000.
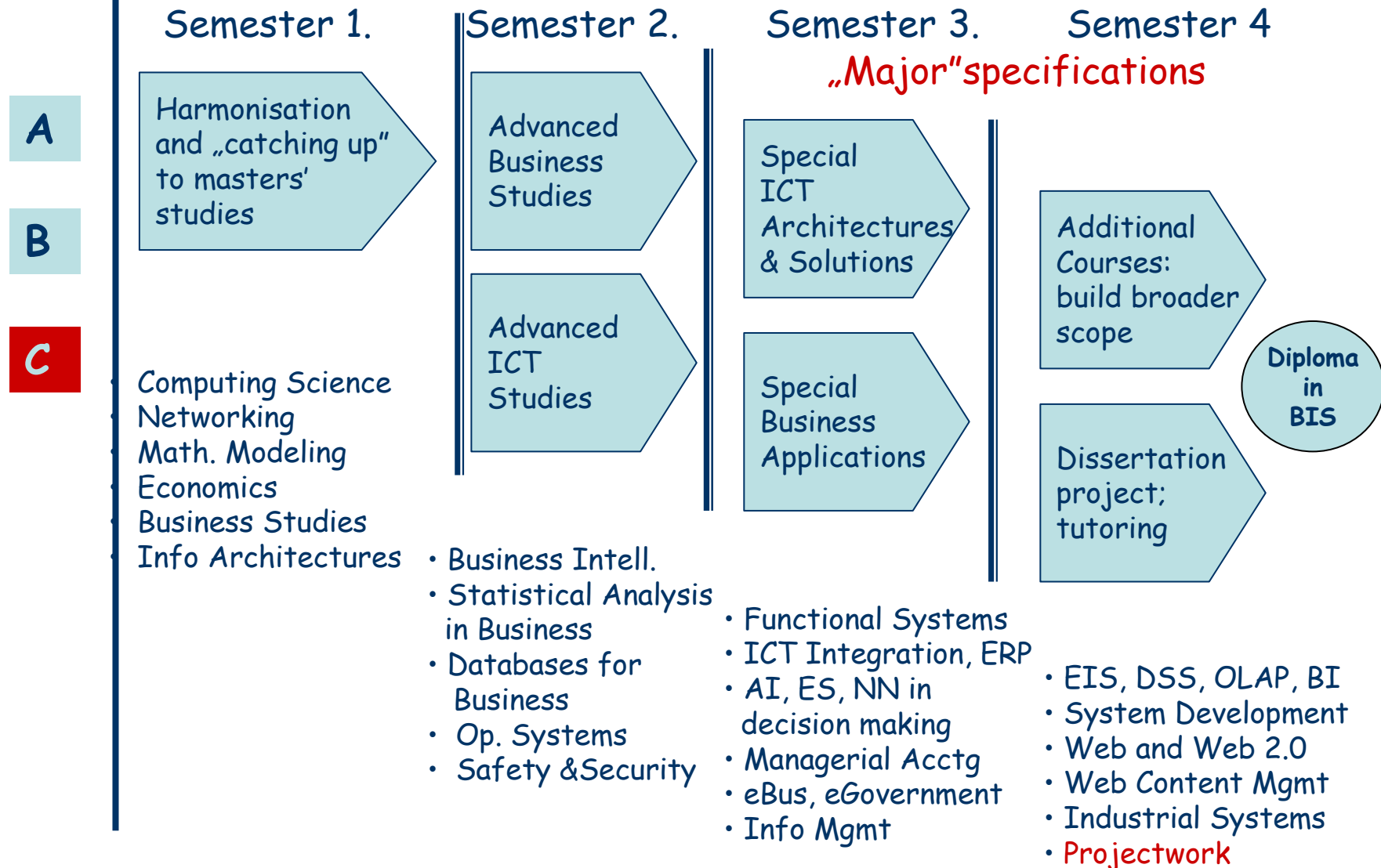
- Excellent students graduating in Business IS should have a strict way to continue their studies to higher (and even to the PhD) level

- Those graduating in different Business, Engineering, or even more extreme BA/BSc programmes, should have a smooth way to have masters studies towards ICT applications: this is a „Bridging the Gap" challenge!

- Those who have graduated years before and work in decision oriented positions, related to ICT applications, should have fresh knowledge on this field (continuing adult education)

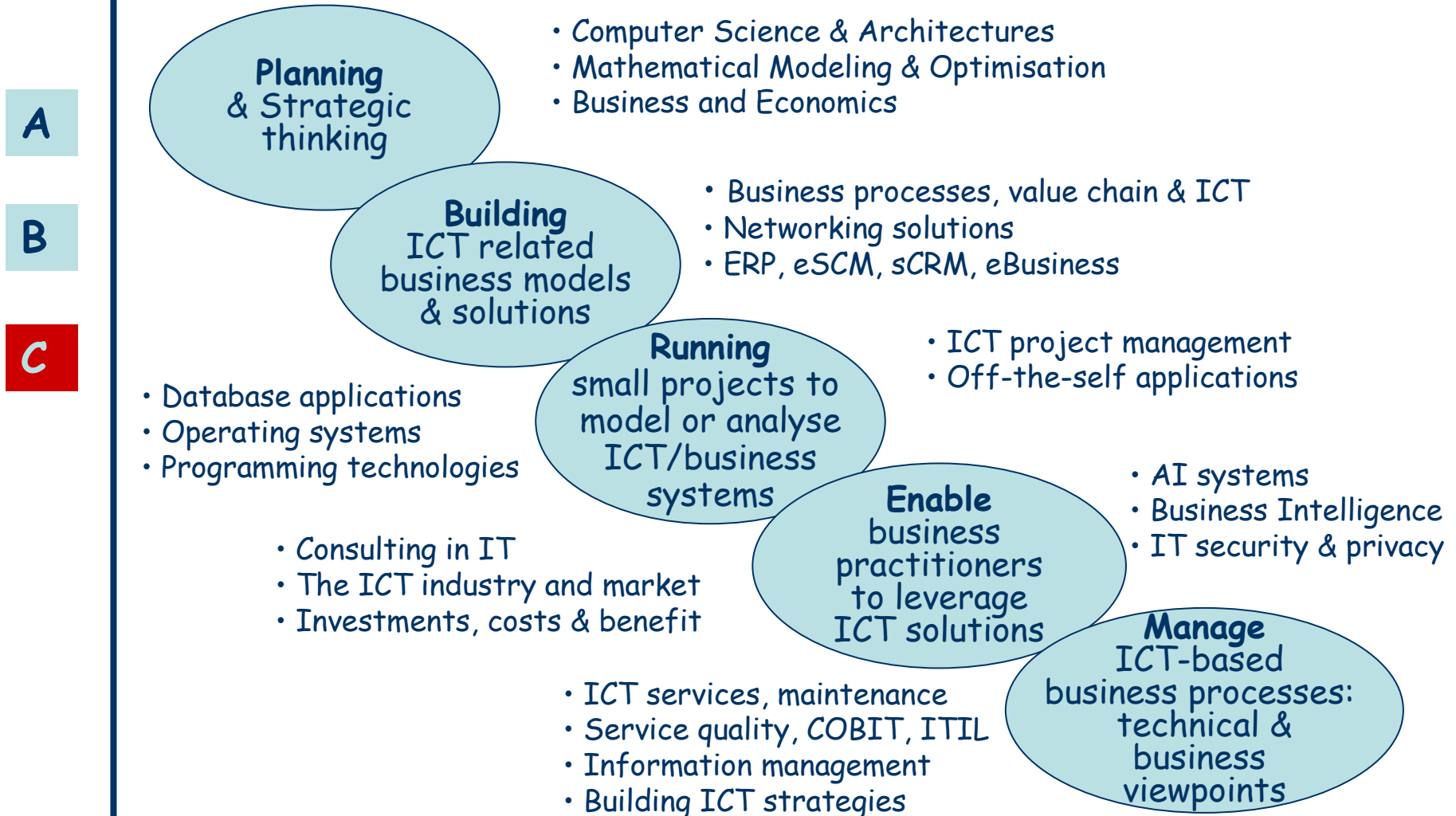- Research and PhD level programmes need talented knowledge workers in ICT + business oriented level

The MSc structure accepted

Semester 1. **Semester 2.** **Semester 3.** **Semester 4**

"Major"specifications

A

Harmonisation and „catching up" to masters' studies

Advanced Business Studies

Special ICT Architectures & Solutions

Additional Courses: build broader scope

B

C

Advanced ICT Studies

Special Business Applications

Dissertation project; tutoring

Diploma in BIS

Computing Science
Networking
Math. Modeling
Economics
Business Studies
Info Architectures

- Business Intell.
- Statistical Analysis in Business
- Databases for Business
- Op. Systems
- Safety &Security

- Functional Systems
- ICT Integration, ERP
- AI, ES, NN in decision making
- Managerial Acctg
- eBus, eGovernment
- Info Mgmt

- EIS, DSS, OLAP, BI
- System Development
- Web and Web 2.0
- Web Content Mgmt
- Industrial Systems
- Projectwork

eCF Frame versus Declared Curricula

A

B

C

Planning & Strategic thinking

- Computer Science & Architectures
- Mathematical Modeling & Optimisation
- Business and Economics

Building ICT related business models & solutions

- Business processes, value chain & ICT
- Networking solutions
- ERP, eSCM, sCRM, eBusiness

- Database applications
- Operating systems
- Programming technologies

Running small projects to model or analyse ICT/business systems

- ICT project management
- Off-the-self applications

- Consulting in IT
- The ICT industry and market
- Investments, costs & benefit

Enable business practitioners to leverage ICT solutions

- AI systems
- Business Intelligence
- IT security & privacy

Manage ICT-based business processes: technical & business viewpoints

- ICT services, maintenance
- Service quality, COBIT, ITIL
- Information management
- Building ICT strategies

(Basic competences) – **Special competences** – Key (work-) competences

Question 1: Who are invited?

A

B

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Basic competences are required to enter (50%):

- a BA/BSc diploma (180 credits) in Computing or in Business
- or: minimum 40 credits from listed IT & Business courses
- language proficiency (accredited exam)

Investigation at the **entrance examination** (50%):

Former business studies & competencies

Former business work experience

Former ICT studies & competencies

Former ICT related work experience

Other: verbal presentation, motivation, etc.
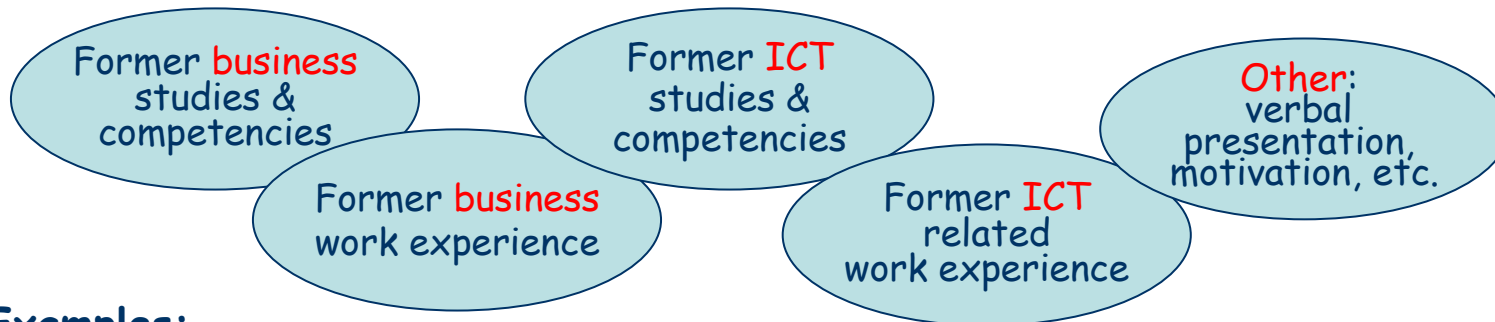
Examples:
1/ BSc in Business IS – no additional credits are required
2/ BA in Business (like Mgmt, Mktg): - additional ICT credits are needed
3/ BSc in ICT (like Engineering, Programming): addidional Business credits to gain
4/ BA/BSc in other fields: 40 more credits to gain before entering the Programme

„Additional" credits are offered to students in their 1st & 2nd semester.

Question 2: Who needs a Master level?

- 1995-2001: 11,000 new jobs around the ICT sector
- 2009: „The North-East region needs 2,000 new ICT professionals in 2 years, but BSc graduates rather leave to good jobs instead attending to a Master programme"

  Dean of Faculty of Informatics, Debrecen University

- **Large companies**: They need high level professionals for service and maintenance, and also for localization, for development
- **SMEs**: They have neither a CIO, nor an IT department – they just need an „overall" expert, working alone, with „business" communication skills
- **IT Services** companies, support/call centers: focused knowledge & skills towards one platform, system, or service + active foreign language and communication skills
- **Public sector**: They need ICT managers to train endusers, to decide in tenders, to use ASP and other solutions
- **ICT solution-providers** need qualified „bi-lingual" experts for sales and for implementations, installations; but mainly re-training graduates towards their own, special systems

A

B

C

Question 3: **Competences to learn - from whom?**

A

- Knowledge needed:
Relevant books, journals, funding to travel (teaching abroad, conferences, ICT communities, etc.), software / hardware, and also indoor ICT research by the home faculty
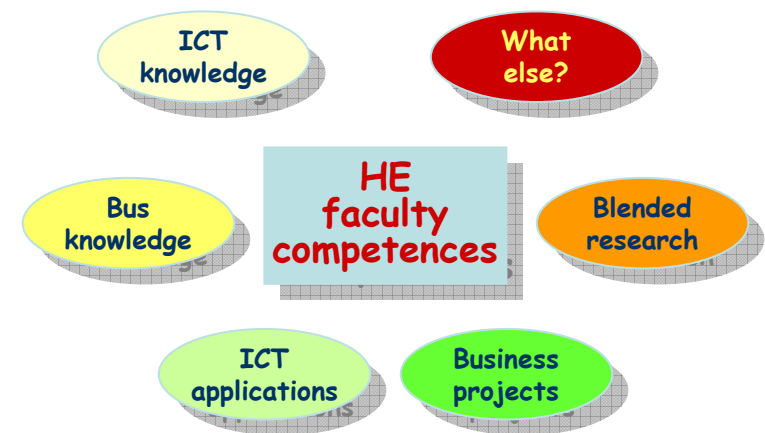
B

- ICT skills needed:
HE faculty with up-to-date ICT applications skills, business software practicing, manuals, and project-experiences

C

- ICT competences:
Ability to design, to build and use different ICT systems

- Role of vendors: fresh knowledge, real cases and carreer info should come from ICT vendors – important to have special trainings, practical placement offers, visiting lecturers, business cases, etc. – avoiding the „syren calls…"

ICT knowledge

What else?

Bus knowledge

HE faculty competences

Blended research

ICT applications

Business projects

A short summary of challenges

- „ICT literacy" , i.e. basic ICT competences have to be built at public education level

- According to changes in the economy: business drivers force to create new ICT professions, also in higher level

- eCompetences: Who needs what at this level?

- A HE response could be:
„Information Management via Applications" –
a competence-based master programme
to „bridge the gap" between ICT professionalism and the main application fields, like business

- Conflicts to „traditional" degree programmes:
much larger horizon and rapidly
changing content
have to be covered in
the Masters programme

Thanks for your kind attention.

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APPENDIX I.

University Degree
MA / MSc
ISCED 6.

College Degree
BA / BSc
ISCED 5.

Post-Secondary
Education (FSZ)
ISCED 4.

Job market

Secondary
Education 45%
ISCED 3-4

Professional
Secondary ed. 45%
ISCED 3-4

Vocational
Training Courses
(Modular NVQ;
1- 4 semesters)

Compulsory Elementary/Primary Education
~ 900,000 students enrolled annually   ISCED 1-2
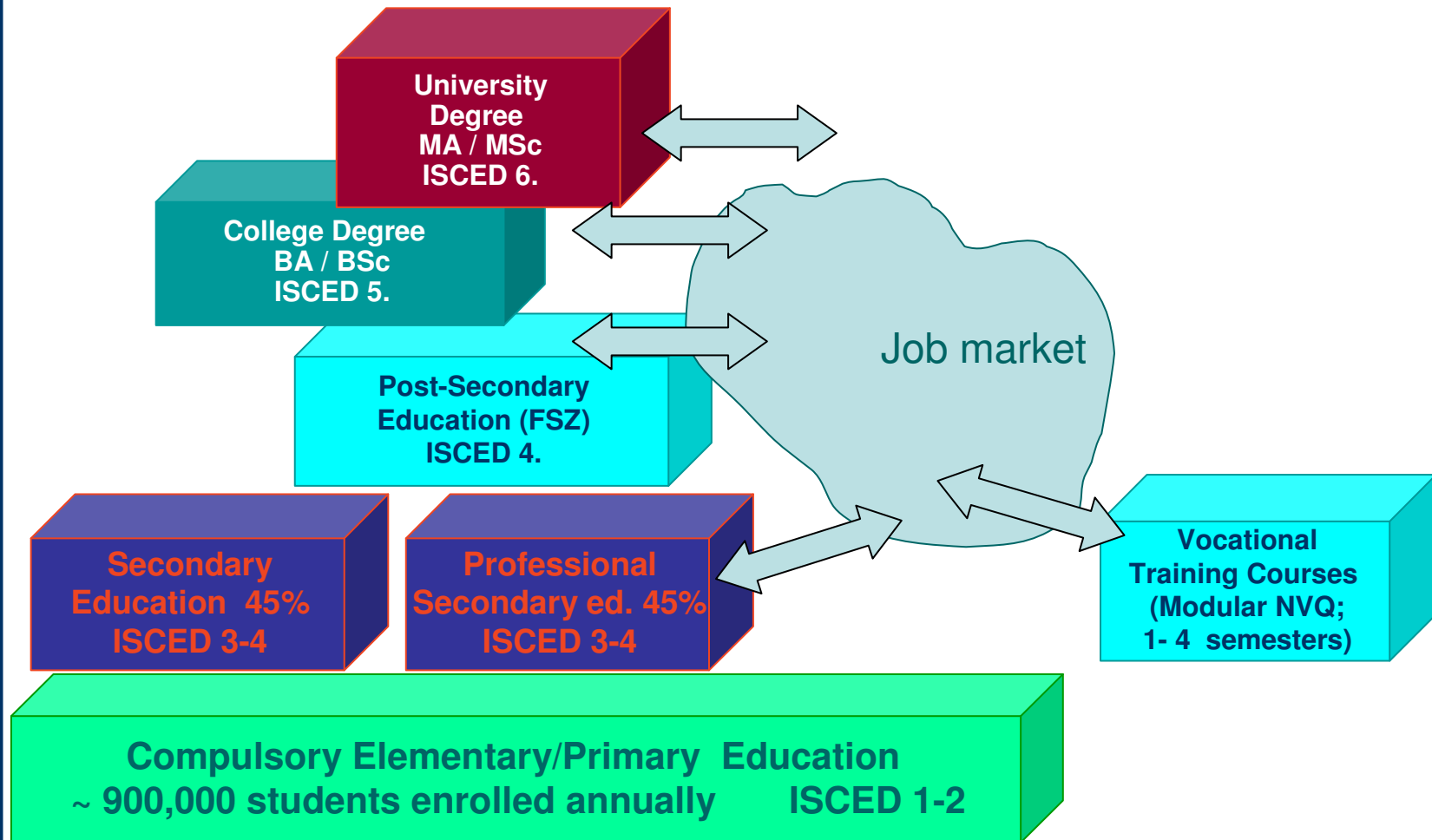
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II.

Enrollment in secondary level vocational schools, 2007 Hungary

HR controlling

Others

Banking assistant

Logistics

Business informatics

Sportmanager

Legal assistant

Customs assistant

Business assistant

Finance assistant

Mktg assistant

Acctg assistant
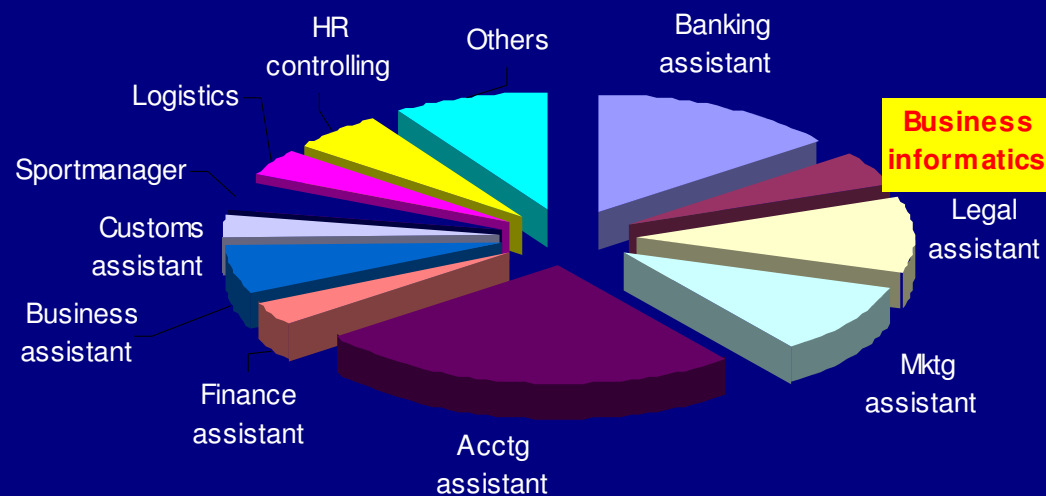
Bridging The Gap: New Business-MIS Degrees In Hungarian HE

Dr. Peter Dobay

Head of Dept. Business Informatics
University of Pécs, Faculty of Business, HUNGARY

General shift from „ICT literacy" towards „Information Management via Applications" should foster emergence of new professions. SMEs and non-profit organizations normally have neither large, sophisticated IT/MIS departments, nor dedicated, CIO-like leaders. Millions of these business-oriented organizations would need in-between knowledge, skills and practice when employing one and only one specialist for their (existing and/or planned) information systems. Understanding this need of the labor market, Hungarian HE introduced a non-engineering, non-programming, but rather business application-oriented Masters programme in institutes offering Business and ICT degree programs parallel.
This contribution describes drivers of this educational development, problems of building a nationwide, uniform curriculum and the possible role of this new profession in a modern, networked economy.

On demand for EU workforce with ICT-intelligence

No doubt: Europe is moving towards a rather knowledge-based, information –intensive economic paradigm, instead investing into raw-material-based, traditional mass production industries. This positive shift is burdened with the prompt global financial and economical crisis, but mega-trends prove that direction remains the same. Let it be either the green energy, or environmental or health-care problems on the carpet, the background is always one or a mixture of the followings: innovation, knowledge management, creativity - and massive use of Information/Communication Technologies.

All researchers, practitioners and academics within the ICT sector valued as a real success when the European Commission launched the **eEurope initiative** („Growth and Employment Strategy") in 2000 with the aim of accelerating Europe's transition towards a „knowledge based economy" and to realize - besides the potential benefits of higher growth and more jobs - a better access for all citizens to the new services of the Information Age.

Emphasis at the first phase of this eEurope Initiative has been on exploiting the advantages offered by the Internet, on increasing general „connectivity of people and businesses".[1] A total of 64 targets were declared to be achieved by the end of 2002. As the majority of those were successfully completed (e.g. the EU went forward with extended Internet connectivity, member states could adopt legal frameworks for communicaton and e-business, etc.), in June 2002 the European Council launched a second phase, the **eEurope 2005 Action Plan (named "An Information Society for All")**, which focused on exploiting broadband technologies to deliver online services in both the public and private sector. The idea was that that broadband-level communication stimulates the use of the Internet by making it possible to use more developed applications and services[2] - that is, a move towards more organizational and human change, rather then only technological development.

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[1] See the eEurope 2002 Action Plan at e.g.
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:52002DC0263:EN:NOT
[2] See e.g. at http://ec.europa.eu/information_society/eeurope/2005/index_en.htm

For us, Hungarians, it was important that in a Warsaw (Poland) conference in May, 2000, Central and Eastern European "candidate" countries agreed to launch an "eEurope-like Action Plan" (eEurope+), which workings has then been followed by numerous "progress" and "benchmarking" type Reports, joined to Member States' similar programs.

We all are being aware of the fact: ICT use is not a technology itself, this is rather an "architecture", with a vision on role of information and knowledge, with strategy mapping and action planning around this, with people working directly for it, with a proper organizational background and leadership being responsible fro effectivity and efficiency, and, last, but not least of course, with an aligned ICT infrastructure, the hardware, software and networking tools. This highly complexed system has always key figures: **professionals** of this new technology, of this new working style, of this new way of thinking on business and other activities.

Even the eEurope 2005 Action Plan had some comments on education, schools, professions, like "…Most schools are now connected … and provide convenient access to the Internet …by the end of 2003 we can reach a ratio of 15 pupils per online computer in the EU.." etc. The Council also requested to "…develop **digital literacy** through the generalization of the Internet, and computer users' certificates for secondary school pupils…" etc. More data can be found maybe in the fresh ***Europe's Digital Competitiveness Report***[3] – but, in my opinion, here the technology-based indicators are overwhelming (like access to broadband, Internet usage statistics, the ICT sector in the GDP, etc.). These are very important data, of course, as widespreading „popularism" of use of ICT is the real base for all development: mass public and professional demand generate more production, high level innovation, with decreasing prices and increasing performance.

ICT professions then and now

If we agree ICT systems form a complex architecture with human asset as a key factor, let us turn now towards the problem of ICT professionals.

G. Verheugen, VP of the EC declared in 2007[4]:

> „*Innovation starts with people and this is why e-skills are important. They are not just pure technical skills: successful innovation in ICT requires also cross-disciplinary, cognitive and problem-solving skills as well as an understanding of the fundamentals of business. …*
> *…A highly skilled and adaptable workforce will be the foundation for Europe's competitiveness and prosperity in the 21st century."*

An EUROSTAT Report declared in 2007:

> „*37% of European citizens have no computer skills whatsoever, while only 22% seem to be acquainted with a wide range of computer activities. A lack of basic e-skills will prevent these people from participating fully in the 21st knowledge-based economy and society."*

And a voice from a business aspect[5]:

> „*…the social and economic costs due to the lack of proper IT skills (called the cost of IT ignorance) was evaluated in Italy around 19 billion Euro per year."*

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[3] http://ec.europa.eu/information_society/eeurope/i2010/docs/annual_report/2009/sec_2009_1060_vol_2.pdf
 Brussels, 04.08.2009 Commission Staff Working Document
[4] G. Verheugen, VP of the EC: „E-skills for the 21st century"; Brussels, 7th June 2007
[5] A Bocconi University (Italy) project, 2007, an IT Star document

The EITO Report 2007[6] declared:
- new development is needed for the demand of new software and IT services,
- new start-ups and mergers and acquisitions are needed to enhance the ICT business line
- innovation is needed in broadband communication services, especially in mobile networks,
- strengthening of research co-operation is needed between industry and universities.

Is it a vision of a Digital Society? A Digital Economy? Or, a „Digital Sharing Economy?", where all have easy access to information resources - but *how they can use and utilize these,* depends of their former education, ICT skills gained, continuous trainings they should have on their workplaces, that is, a new style of *information literacy.*

The world economy is in rapid change today: business behavior is influenced by the general crisis, more global activities emerge, new national economies knock on the door (the BRIC countries…), environmental issues penetrate to all business decisions – professions have to change as well. Martin Falk says[7] "…between 1993 and 1995, the majority of German firms in services introduced new organizational practices (OC), in particular total quality management systems, certified ISO 9000, lean administration, flatter hierarchies, delegation of authority and ICT-enabled organizational changes." Where can a firm attract new style of labor for these types of challenges?

Is there a shortage of "ICT professionals" as such, or, as usual, shortages reflect to a diverse portfolio of professionals? As an example, an Australian report states[8]: "…our universities are 'pumping out' graduate programmers and we are having real problems finding work for them all. An Australian Computer Society (ACS) survey released in May highlighted that in 2004, 22.2 percent of programmers were unemployed - far above the national average. ..but demand for programmers and software developers in categories including .NET, Lotus Notes, SAP, Peoplesoft, Siebel, and Linux ..is high.."

What can we learn from these comments? Probably we have to understand: IT is much more being viewed now as a utility in businesses. The ICT community has to wake up to the needs of the business, to business strategies and business activities, to align their ICT offers to the business objectives. CEOs would like to have good business analysts, they need smart project managers, instead narrow-minded, "eggheaded" programmers.

Is this a lesson for us? A lesson for whom? For strategy builders of conservative higher education sytems, or for more flexible continuing education training institutes, maybe for the narrow-interest trainings of the ICT company "academies"?

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[6] commented by B. Lamborghini, 2nd IT STAR Workshop, Genzano di Roma, 26 May 2007
EITO stands for The European Information Technology Observatory, founded in 1992
[7] Martin Falk: Endogenous organizational change and the expected demand for different skill groups, Centre for European Economic Research, L7, 1, D-68161 Mannheim.20 July 2001
[8] Mark Wheeler: The ICT labour market: Where agendas collide; Technology & Business Magazine 18 October 2005; see at http://www.zdnet.com.au/insight/business/soa/The-ICT-labour-market-Where-agendas-collide/0,139023749,139217595,00.htm

Anyone can list „traditional" ICT professions like[9]:

- *a system analyst & designer,* the fastest growing (and most wanted) profession, having capabilities to overview a large, complex business information system, creating upper level models for decision makers (nearly 25% of all ICT jobs are called like that)[10]; a specific experience with business processes, a particular industry is essential;
- *a system programmer,* a learned mathematician, creative in algorithms and testing, close to the processor and assembler coding;
- *a system designer,* a builder of a complex software package, with practice in different platforms and development environments;
- *a coding programmer,* with skills in 1-2 high level languages and platforms, development tools, testing and debugging.

Probably you agree, we have numerous new "positions", however not all being covered with specific diplomas or other certificates:

- *a database manager,* to build data models, communicating with stakeholders of business processes and databases;
- *a deployment expert,* representing a well-sold complex business software package, with adapting competencies, user-level communication skills;
- *a knowledge engineer/manager,* applying "soft methodologies" in interviewing managers and leaders about their knowledge asset, creating knowledge maps and treasuries, wiki-s and other services;
- *an information manager,* being responsible for alignment of ICT systems to real business needs, building the "Information Factory", a complex utility for information transfer, with auditing and controlling tasks;
- *a system manager,* manipulating servers, network management, safety, authentication systems, mail services, ICT architecture management, etc.
- *a Web-designer,* with special skills to create online services, Web and Web 2 business solutions, nowadays responsible for a corporate Web-portal;
- *a Web content manager,* with media- and communication competencies, using smart tools to manage multimedia content of a professional portal/website;
- *and all "solution provider" ICT consultants…*sometimes used as a salesman only.

As a summary, I guess we are entitled to say, traditional diploma programs offered by higher education can not fulfill these new labor market requirements. Think on an HR manager facing the problem: an EU-wide job opening for dozens of new ICT positions and candidates arrive from 10 different countries…[11]
The background, what could make all this work in the EU to be competitive:
- new generation of ICT human capital: graduates with proper knowledge, skills, professional experiences, and motivation towards new applications;
- hands-on training to all age groups at appropriate levels of ICT intelligence;
- easy access to IT and digital communication services;
- standardization and uniform requirements towards ICT professionals
all over in the EU – clear guidelines to public & higher education to follow.

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[9] An ancient article on this problem is Dobay, P.: Who Are These ICT People? I–II. in *Munkaügyi Szemle*, XLII. 4 - 5. 1998 (*Labor Market Review*, in Hungarian)
[10] In Canada alone about 150,000 „system analysts" was employed in 2008
[11] My last experience from a Hungarian job portal: „Job is offered for an ICT Compliance Officer"

The Hungarian Bachelor HE programs on ICT professions

Looking for desired "new ICT professions", higher education systems face the challenge to serve labor market needs from the level of "a must" elementary ICT skills through reliable mid-professionals to high level ICT managers and CIO to train – a hard job to prepare for!

The EU – among others - declares free move of labor: skilled wokrforce can „tramp around" jobs anywhere in Europe. We experience numerous efforts towards standardization of skills, certificates, diplomas, even in ICT field, as employers should be safe about the knowledge and competence level of these labor sources. The *eCompetence Framework* (eCF) document[12] and other efforts declare: qualifications on this new field have to be unified all over the EU labor market - based on opinions from the academia, from other stakeholders like politicians, HR experts, industries, the public sector and social partners.

The eCF dimensions:
- Five „competence areas":
            PLAN – BUILD – RUN – ENABLE – MANAGE
- A set of reference e-Competences for each area (32)
- Proficiency levels of each e-Competence (e-1 to e-5, EQF levels: 3 to 8)
- Knowledge and skills are indicated as an optional framework for inspiration

The eCF and the European Qualifications Framework efforts have been adapted by the Hungarian higher education, by the Committee for Program Accreditation. Thus all new program definitions and curricula is taken under investigation, and documents should prove competence levels, which graduates have to achieve and to present, in details.

These national level standardisation efforts have led to some results in Hungary:

- An ECDL competence level national framework has been established, with thousands (mainly young ones) running successfully the external assessment;
- There exists an "ICT Competency Guidelines" complex documentation addressed for public education;
- The National Qualification System of Vocational Competencies (OKJ List) has been restructured to modern labor market needs, with less specified vocational professions, and also with a broad multi-party agreement of stakeholders – program & syllabi framework for all adult education /further education institutes is compulsory to keep;
- The Hungarian HE Accreditation Board, with a Committee on ICT Proficiencies presented and documented a series of initiatives like

    - Guidelines for Creating New Diploma Programmes in ICT Field
      („Common Competencies in the Curriculum", KKK, for
        ICT Engineering, Programming and Business Information Systems)
    - "Guidelines for Preliminary Evaluation" of a proposed diploma program
    - and the Board – involving field experts – organizes site visits on 3-8 years;
      they have a right to assess an institute and/or a specific training programme
      at any time, on site.

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[12] Presented at the European e-Skills Conference, 9-10 October 2008, Thessaloniki; www.ecompetences.eu

Traditionally HE degree programmes have aimed two professions in Hungary:

- A „Hard-professional": Computer Engineering (mainly technical knowledge, system programming, design & maintenance skills, managing services, etc.)
- A „Soft-professional": Software Engineering (algorithms, mathematical background, programming languages, op. systems, application systems design and development, etc.)

As mass applications are invading the market today, with much more higher ratio of "adaptive deployment", even installing a simple ERP system in weeks, an explicit complex of labor need has been emerging in the '90-s:

- Large multinationals need more high-level „application oriented" ICT staff, being able to communicate to business professionals on a daily base;

- SMEs need a one-person decision maker on ICT, as more funding is available for building ICT-related business systems (remember the EU initiatives: e.g. building eBusiness solutions is highly supported everywhere);

- BOTH declare:
  „Company level ICT is NOT for pure-ICT professionals only – a new profession should be 'business-driven', with appropriate and up-to-date business knowledge and skills".

Reflecting to these arguments, from year 2000 on, universities, chambers, businesses, ICT vendors and the John von Neumann Computer Society jointly have initiated to establish a new Bologna-BSc degree programme: *__BSc in Business Informatics"__.* The aim was clear: using the change processes with the EU-wide Bologna process, we should "mix" a new diploma program, serving a joint need, somehow *__„bridging the gap"__* between „hard-ICT professionals" and „acting business managers". First some more ideas have emerged like „a need for ICT in Public Services", or „ICT in Industry" or even „ICT in Healthcare" but later it was crystallized, we need mainly these new professionals in the field where ICT applications are mostly used – and this is „business", in general.

Learning objectives were clear according to ICT and business trends:

- Companies today have to adapt much faster, and adaptation needs flexible and relevant information management.
- ICT tasks have been deployed and managed for a long time by "ICT engineers", installing hardware systems and "Computer Programmers" have been creating new software insourced or as a service. But today installations of well-proved complex packages do not need more coding, not to speak about highly reliable hardware constructions of today. Today ICT managers should have a new, strategic thinking on business, they have to experts in understanding business processes, budgeting and controlling problems, etc.
- Modern ERP systems support high level managerial decisions, negligating some "assistant" positions with functional services, with visualizations, easy database access, reporting and business intelligence facilities. Candidates should know how to build and use these systems.

- Businesses are much more global, thus communication and collaboration systems, flattened structures, higher responsibility in lone work, telework and other systems have to be managed by new ICT professionals. eSCM and eCRM systems with various eBusiness solutions is a must to handle.
- Managers understand information as a business asset. Where to get it, for how much, to whom to serve it, how to use it efficiently, generally: competence on how to work with the "Information Factory" of the firm needs general business, budgeting, managing and controlling knowledge and skills from the ICT professional.

The curriculum content is seen below, compared to the criteria above and to the eCF competence priorities (Table 1.).

Problems are trivia. How can a simple BSc programme involve and integrate all of this: content, skills and behavior? We decided in 2000-2002 talks to focus on a ***business information systems culture,*** suggesting that this new professions is not about "some more" ICT, "some basic Business Studies", but this is about a complex ***"bridging paradigm",*** which helps understand both demand and offers from both side of the table. Thus, two cultures, an engineering-mathematical way of thinking and a business-managerial attitude have to merge and work smoothly within this curriculum.

Finally the Accreditation Committee declared the necessary competence framework:
- be able to handle modern ICT systems
- be able to understand and to compose models in modern development environments
- be able to use business process modeling toolsets
- be able to understand joint interest between business and ICT systems
- know the modern application systems portfolio and best ICT practices
- be able to create simple models and way of running small ICT application projects
- be able to use professional terms of both cultures.

No doubt, planning committee has faced - and is facing - some problems with introducing this new curriculum:

- Professional accrediting bodies and interviewed stakeholders have packed the curriculum with overwhelming quantity of ***ICT+business*** knowledge, required skills and competencies
- As a consequence, disciplines (courses) have lost their credit value: students have to work more for the same grading (i.e. a BSc level diploma)
- „Business" and „IT/Math" oriented faculty are of two, different cultures, even in education (in used terminology, in teaching style and in assessment methods, etc.)
- Future employers are not safe on competence levels and knowledge content of the 3-years BSc graduates
- Annual graduation: appr. 2,00 Computing Engineers, 1,000+ Programming Engineer and only 3-400 in Business Informatics
- Annual enrollment: Business Informatics ~300 in 2007, ~550 in 2008 (applied 1700); ~720 in 2009 (applied 2,700!).

Table 1: The general structure of a BSc program in Business Information Systems

Year 1: Core Knowledge	Mathematics, Computing Theory, Operation Research, Computer Architectures I, Programming I. Micro- & Macroeconomics, ICT in Business Processes, Accounting, Business Law	**PLAN**: A.1. IS and Business Strategy Alignment A.2. Service Level Management A.3. Business Plan Development A.4. Specification Creation A.5. Systems Architecture A.7. Technology Watching

Year 2:
 	
+ Basic
Skills
	Computer Architectures II., Networked Computing, Software Systems, Programming Methodologies Programming Technologies Database Theories, Database Modeling for Business, Business Info. Systems I.	**BUILD**: B.1. Design & Development
		                   B.2. System Integration
		RUN: C.4. Problem Management
		ENABLE:
		   D.1. Info. Security Strategy Development
		   D.2. ICT Quality Strategy Development
		   D.4.–D.8.:
		   Purchasing- Sales - Channel & Contract Mgmt

Year 3:
 	
+ICT
work
compe-
tences
	Database Modeling
	Programming Languages I.-II.
	Intelligent Systems,
	Privacy & Security in IT
	Business Info. Systems II.
	eBusiness Solutions,
	Information & Knowledge Mgmt
	Integrated Business Systems
		MANAGE:
		   E.1. Forecast Development
		   E.2. Project and Portfolio Management
		   E.3. Risk Management
		   E.4. Relationship Management
		   E.5. Process Improvement
		   E.6. ICT Quality Management
		   E.7. Business Change Management
		   E.8. Information Security Management

Towards the new Masters Programme on Business Information Systems

What we have to recognize: families and secondary level students have a different "career portfolio" then compared to "labor market needs" portfolio. The most popular Hungarian BA/BSc level professions in the year 2009 were as it is shown in Table 2.

The planned role of the new Masters program was composed to respond to needs listed below:

- Declared labor market need in Hungary (by chambers, ICT-oriented and general businesses, public sector, etc.) is appr. 10,000 ICT-related new professionals annually. Colleges & universities can produce less, than 2-3,000.
- Excellent students graduating in Business IS should have a strict way to continue their studies to higher (and even to the PhD) level

Table 2. Most popular BA/BSc diplomas in application period Year 2009 in Hungary (Students can apply for more places to enter. Max. application point is 460.)

Rank	Profession	Applicants in the first place	Minimum entry points (from max. 460)
1.	Tourism & Catering	5,024	352 – 400
2.	Business & Management	4,010	400 – 450
3.	ICT Engineering	3,540	314 – 435 (!)
4.	Communications & Media Studies	3,007	400 – 451
5.	Finance & Accounting	2,978 (~50% increase)	396 – 452
6.	Legal Studies	2,630 (~30% increase)	337 – 426
7.	Mechanical Engineering	2,580	256 - 367
8.	Commerce, Trading & Marketing	2,350	317 – 452
9.	General Medical Studies	2,033	420- 437
10.	Psychology	1,760	354 – 453

- Those graduating in different Business, Engineering, or even in more extreme BA/BSc programmes, should have a smooth way to have masters studies towards ICT applications: this is a „***Bridging the Gap***" challenge!
- Those who have graduated years before and work in decision oriented positions, related to ICT applications, should have fresh knowledge on this field (continuing adult education)
- Research and PhD level programs need talented, high-level graduated knowledge workers in ICT + business fields.

Exhibits 1. shows the proposed 4-semester structure of a Masters Program. Students can select a "major specialization", focusing either to more programming, to more business decision support, or even to specialties like web-design and media-communication in business.

*Exhibit 1.: The 4-semester structure of the accepted Masters Program
        in Business Information Systems*
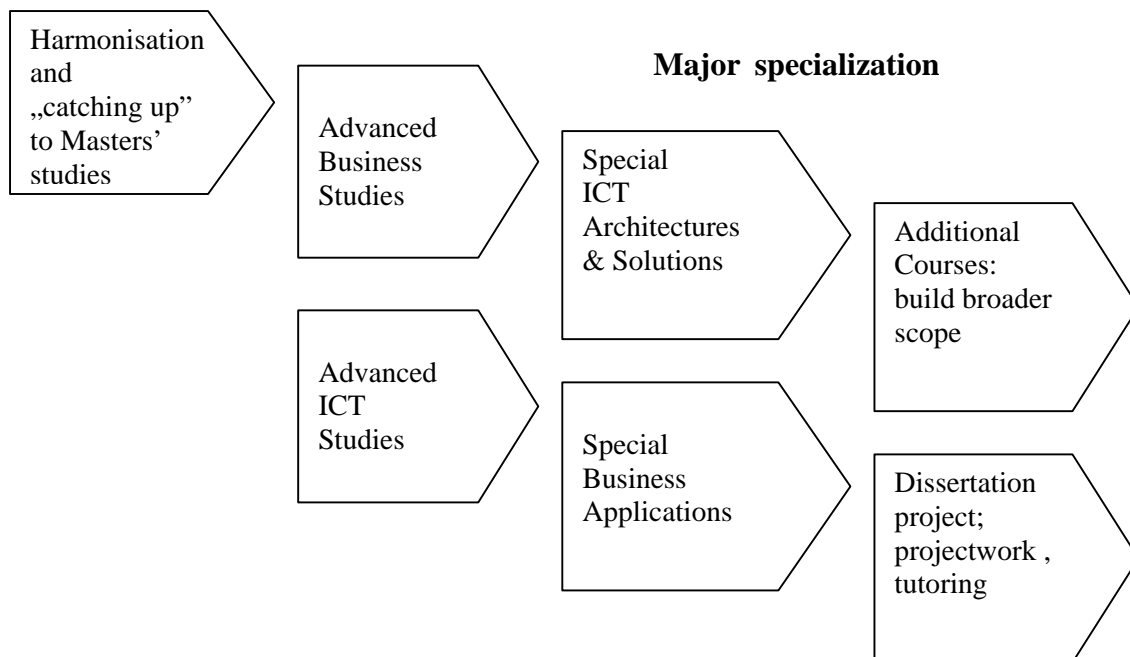
The next Exhibit 2. presents the alignment of the declared curriculum to the offered eCompetence Framework priorities.

Exhibit 2.: The Masters curriculum and the eCF priorities
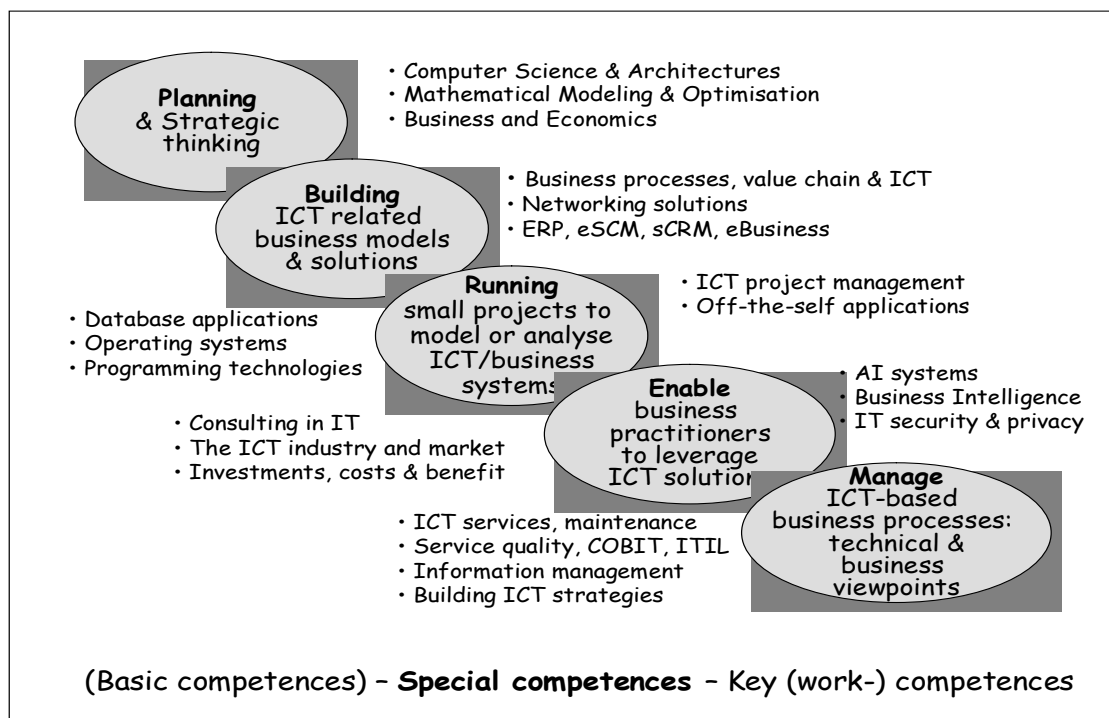
The team responsible for development of the program has been facing to numerous questions – let me introduce three here:

Question 1.: Who can be enrolled to this Master?

According to decisions, students can apply for the Program as follows:

Basic competences required (50%):
- a BA/BSc diploma (180 credits) in Computing or in Business
- or: a minimum of 40 former credits from listed IT & Business core courses
- language proficiency (accredited exam)

Investigation at the (oral) **entrance examination** (50%):
- former business studies & competences
- former business experience, if any
- former ICT studies & competences
- former ICT experience, if any
- motivation expressed in a presentation & interview environment.

Some examples of possible cases of candidates to enter with:

1/ BSc in Business Information Systems – no additional credits are required
2/ BA in Business (like Acctg, Mgmt, Mktg): additional ICT credits are needed
3/ BSc in ICT (like Engineering or Programming): additional Business credits to gain
4/ Any other BA/BSc degrees: 40 more credits to gain before entering the Program

"Additional credits" are offered through the 1st and the 2nd semester, on a personal basis.

Question 2: Who needs a Master level in ICT & Business?

Some answers found:

- around a million ICT oriented new jobs will emerge in the EU soon
- in Hungary 11,000 new jobs emerged around the ICT sector in years 1995-2001
- *Large companies:* They need high level professionals for development , for service and maintenance, and also for localization of software packages
- *SMEs:* They have neither a CIO, nor an IT department – they just need an „overall" expert, in „empowered" level, working alone, with „business" communication skills
- *IT Services companies, support/call centers:* focused knowledge & skills towards one platform, system, or service + active foreign language and communication skills
- *Public sector:* They need ICT managers to train endusers, to decide in tenders, to use ASP and other solutions, to use EU-based compatible systems
- *ICT solution-providers* need qualified „bi-lingual" experts for sales and for implementations, installations; but mainly they do massive re-training for graduates towards their own, special systems.

Question 3.: How can we base necessary competences of faculty?

A very hard problem, indeed. In lack of ICT professionals in industries and in public sector, a HE position is rarely competitive to young graduates. To have a good HE track needs years – a decade as a minimum – with less competitive compensation. Anyway, the Masters' level requirements seem to be clear for a faculty to enter a classroom:

- *Knowledge building:*
  Access to *r*elevant ICT books, journals, funding to travel (teaching abroad, conferences, ICT communities, etc.), use of modern software / hardware, and also doing indoor ICT-related research by the home faculty. A speciality: high „academic" rankings in Business IS is hard to define: more easy to have it in ICT engineering.
- *ICT skills needed:*
  HE faculty have to show up-to-date ICT applications skills, business software practicing, ICT project-experiences
- *ICT competences:*
  Ability to design, to build and use different ICT systems is a requirement
- *Role of vendors:* a special role of „solution providers" is to transfer fresh knowledge, real cases and career info to faculty – this is important to have access to special trainings, certificates, practical placement offers, to send visiting lecturers, show business cases, etc. – while this is a must to avoid the „syren calls" towards a „monopoly use" of any software or other solutions.

Summary: a lesson to learn

Business drivers force to create new ICT professions, mainly related to main application fields, like business areas. Creating a new Master needs sound demand from industry and public services, from employers and research institutes, and also enthusiasm from faculty involved. Basic ICT "literacy" has to be gained today on secondary level: what we work for is much more an ***"Information Management Literacy",*** understanding role of applications under a business vision and company strategy. A "blended Master" program, covering these two cultures, responding to problems from both sides could serve a bridge over a gap of understanding mainly in usual teamworks in projects.

Finally, some facts from a year 2006' analysis[13].
Matt Chapman writes: "The ICT sector is the fastest growing area of the European economy and will create 1.5 million new jobs over the next four years…Analyst firm IDC found that 60 per cent of the created jobs will be software-related and a third will use the Microsoft platform…". Don't forget: today the majority of small and medium-sized companies cannot do business without their PCs and internet connections. The IDC report added: "If ((…the 22 million EU-based…)) SMEs can be stimulated into adopting new technologies more rapidly, and creating innovative products more competitively, Europe's position as a leading player in the global economy can be assured."

This is our job. Not an easy one.

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[13] Matt Chapman: Europe to see 1.5m new ICT jobs by 2010, vnunet.com, 06 Jun 2006