

University 4.4 – A Development Strategy for Education and Research Centers

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Due to increased demand for qualified human resources, for 'new & rare skills', for software solutions, reliable products and services in the field of applied informatics, there are large available financial funds that can be accessed by Informatics and Cybernetics schools. Educational and research departments must capitalize funds provided by the European/international institutions and private companies, by supporting the creation of spin-off entities that will conduct technology transfer projects. These funds must be used to increase the quality of teaching and to improve research results by assuring the financial needs and technical resources of teachers (project based payments), students (scholarships projects) and the community (public available projects). The presented strategy, University 4.4 describes four development directions for a four years period. It has been developed by Catalin Boja, Razvan Bologa, Marius Popa and Cristian Toma and since November 2011 it represents the assumed development strategy of The Department of Economic Informatics and Cybernetics (DICE) from The Bucharest University of Economic Studies.

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1 Introduction

The objective of the proposed strategy is to describe development directions that will permit to an educational and research center (ERC) or department, *The Department of Economic Informatics and Cybernetics (DICE)*, [1] to operate competitively and globally on four areas of the economic informatics and cybernetics field:

- on the Educational track by defining, supporting and implementing bachelor and master programs with an English curricula. This will promote visibility and accessibility to a wider group of international candidates. Another direction of the educational track is to define a self sustainable pool of available human resource by defining programs aiming to identify above average graduates to be engaged in educational or research processes;
- on the Research, innovation and technology transfer track by starting interdisciplinary research projects and by using research results to create spin-off entities that implement technology transfer

from university to industry;

- on the Social involvement in community activities track by creating and implementing social programs that will promote the educational and research field in undergraduate and secondary education. Also, an active presence and involvement in virtual and real social networks promotes the department image and objectives.
- on the public image and trust, capacity to raise funds, attract investments and sponsorships from private sector track by implementing lobby, public relations (PR) and media mechanisms and techniques to raise funds necessary to carry out in a dynamic and viable way all four development directions.

In order to achieve objectives of the proposed directions, the ERC team must act as a single unit but also through individual initiatives and through collaboration. It must aim for a Nash equilibrium, in which "each one is making the best decision that he or she can, taking into account the decisions of the others" [2].

In this strategy, the Technology Transfer (TT) concept [3] is used to describe an active process by which technology is transmitted between two or more entities, in order that scientific and technological developments are accessible to a broader scope of users, to be marketed as new products and / or services. The Spin-Off concept describes an entity formed by the detachment from a larger one, such as a new company formed from a university research group or a business incubator. The Spin-Off project is based on the findings of the research group members and its objective is generating commercial revenues from research results. Successful spin-off projects that have analyzed are The Massachusetts Institute of Technology – Lincon Laboratory entities [4], the CASED spin-off of the Darmstadt and Fraunhofer University consortium [5] and Bremen University technologic park [6].

In order to have a clear and valid context, the strategy is defined based on well defined premises that describe the limits and the validity of any future action:

- Administrative processes and decision-making must take place within DICE in a fair and transparent way. DICE members involvement in the administrative and decision process is based on clearly defined responsibilities, thus increasing the levels of transparency.
- The Department must seize the favorable mechanisms that are created and provided by the globalized knowledge-based society. This is done by assuming a pragmatic and entrepreneurial approach in conducting its academic functions that will enable to capitalize its knowledge. This leads to recognition of its scientific papers, publications and international conferences and to an added value / wealth for its members and the community in which it operates.
- No interpretation of the technology transfer, spin-off entity or university entrepreneurship concepts can be used against the idea that university is an "*Alma Mater - Nourishing mother*" - for its students and teachers. Members of the academic

community, students, professors and researcher conduct their activities on the principle of absolute freedom in terms of academic knowledge exploitation, access to ideas and knowledge transfer between all involved parties and the general public.

- The last 20 years evolution of humanity toward a global knowledge based society requires a reorganize of academic processes so that they operate in accordance with the new socio-economic rules. In the Romanian context, the article 121 of the 2011 Education Law permits and promotes rethinking of academic processes.

The presented strategy, *University 4.4* describes four development directions for a four years period. It has been developed by Catalin Boja, Razvan Bologa, Marius Popa and Cristian Toma and since November 2011 it represents the assumed development strategy of The Department of Economic Informatics and Cybernetics (DICE) from The Bucharest University of Economic Studies.

2 The Educational track

To ensure the foundation of the four directions shown in this strategic vision, the department must develop and ARACIS accredit, by 2012, a new licensing program and, eventually, new competitive and attractive master programs in English. This is a requirement for international visibility and for accessing worldwide pools of undergraduate and graduate candidates. Educational programs, both in English and the Romanian language, must have a pronounced applied informatics orientation in the *computer science - software, firmware, hardware and cybernetics and economics / business* fields, so to achieve regional and international recognition in a short period.

The purpose of these English language programs of study is to ensure retention of the Romanian students and to attract foreign students from abroad in a productive and competitive knowledge-based ecosystem that underpins the research, innovation and technology transfer track.

A percentage of 20-30% of students enrolled

in the department educational programs must receive educational motivating scholarships. Scholarships are provided largely by attracting funds from the private sector by implementing the fourth direction of this vision/strategy and through spin-off entities. Since scholarships are largely covered by the private sector, the latter may express, in terms of a legal contract or a Memorandum of Understanding (MoU) with the university, conditions regarding sponsorships and investments and also conditions for internships, professional assessment tests.

A percentage of 10-15% of the best students, who are in contractual relationship with the university and are students of English educational programs, must be involved in research projects that deliver ICT solutions in the applied computer science field. All these solutions are preferably developed as open-source systems by spin-off entities which are coordinated by internationally recognized "mentors". The project coordinators are department researchers or are proposed by international consortia that can include representatives from Apache Foundation, Google, Yahoo, IBM, Intel, Microsoft, Oracle or other private companies.

For educational programs, the DICE internal rules of operations must define clear procedures used to promote courses and professors. DICE will encourage young researchers to collaborate with parties from the ICT industry to ensure a real and beneficial bidirectional flow between academic and industry.

3 The Research, Innovation and Technology Transfer track

The Department of Economic Informatics and Cybernetics, through its research centers and spin-off entities, and thus through the private sector, must target scientific results recognized by the world leading scientific indexing services, like ISI Web of Science. Also it must manage its own financial budget, within the boundaries of existing laws.

The Area of Knowledge and Professional Activity (AKPA) represents a human innovation domain that has social relevance and has reached a level of maturity that may be sub-

ject to scientific research or profit-oriented business. Some examples of relevant areas of knowledge are: a programming language, software platform, a class of algorithms, an interdisciplinary sub-field (mathematics, software, hardware & firmware) - biometrics, security, banking, text-to-speech implementation (TTS) and Speech Recognition, VoIP and video conferencing solutions, IP TV, IP Radio, bio-informatics, project management methods, routing algorithms.

The AKPA areas in the Economic Informatics and Cybernetics (EIC) field are divided into two categories:

- Fundamental - are those AKPAs in which knowledge does not change radically during a normal working life (40 years) and are necessary for all EIC professionals. Some examples are mathematics, fundamental algorithms, computer systems, databases, computer science fundamentals.
- Professional - are those AKPAs in which knowledge has a shorter life and therefore requires a constant and continuous process of learning, development and re-learning. Examples of such AKPAs are programming languages and development environments, software packages, mobile platforms, embedded systems, cloud computing.

The department must assume an active economic player role by establishing spin-off entities in the economic informatics and cybernetics field, focusing on, without copying, the model of top American and European universities. Through spin-off entities, DICE will capitalize results of academic research and teaching processes in the interests of the institution and its members.

Based on current Romanian regulation and laws, a university spin-off is an entity/organization that *transforms technological inventions developed from university research that are likely to remain unexploited otherwise* [7] and is part of one of the following categories:

- is established by University, possibly in partnership, in accordance with article 121, paragraph 1, of the Education Law;
- is founded by DICE members, possibly

in partnership, and it is registered by an active member which is in the department from more than five years;

- is a company that has a written partnership with DICE and whose employees are, in proportion of minimum 20%, teachers or graduates of the department educational programs.

The activities of a DICE spin-off program can be:

- projects for scientific research and development of human resources;
- professional training;
- consulting, technical and economic feasibility studies, technical expertise;
- all activities related to human resources in the informatics and cybernetics field;
- capitalization of products/services, deliverables and other innovative the informatics and cybernetics results by transforming technologies developed in university or in partnerships with other universities.

Between the department and the spin-off there is a bi-directional relation. A spin-off will get the right to influence the AKPA curricula within the limits imposed by legal regulations. DICE will contribute to spin-offs only with human resources. Any financial or in-kind contributions are not accepted even if they are permitted by existing regulations.

Spin-off entities are evaluated periodically and must:

- contribute to the department's budget;
- provide employment opportunities for active DICE member or graduates;
- Provide DICE with free access to documentation, software, equipment and other necessary teaching and research resources;
- to finance/co-financed research projects or other methods for obtaining and publication research results, on behalf of DICE.

For fundamental ACAP's, educational processes will take place based on the principle of continuity and fairness. Teaching standards are established in a transparent way, based on principles that will be agreed at DICE level.

4 The Community Involvement track

The Department must involve in community activities on two levels:

- at education level to improve the community eco-system. Examples of involvement at this level are:
 - *Uni-Kinder* - inviting children from kindergartens, secondary and special schools to participate at presentation sessions at which they can see, by simple and meaningful examples, the impact and the importance of IT and cybernetics technologies in society.
 - *e-School* - establishing partnerships with the best schools and high-schools in the country, so some of the best DICE students to be involved in computer science education activities. It also aims to promote on social media networks and distribution channels, video educational content created by students. Another aspect is the implementation of a monitoring system for alumni.
- at voluntary activities level - involving with existing student and other NGOs organizations in activities like:
 - a World Blood Donor Day, on 14th June.
 - a National Cleaning Day, on 24th September, to collect garbage wastes from parks and streets.
 - a tutoring campaign in which DICE students teach secondary school children basis DICE disciplines mathematics, economics, computer science and even physics.

These types of projects have great impact in the community and provide a healthy and valuable social capital at national and international level. It is also an important factor in the Image, Fundraising, Investment and Private Sector Sponsorship track.

5 The Image, Fundraising, Investment and Private Sector Sponsorship track

The Department should have a direct and strong relationship with the Romanian and abroad media, relation that should be managed by communication and PR professional.

Based on these links, DICE will promote own interests in media and over the Internet. Also, DICE must be present at major ICT and technology events in the EU and in the world, like the CeBIT event in Germany. DICE must have people dedicated to attract sponsorship, investment and funding, particularly through senior members. DICE should continue to promote special relations with the embassies of different countries to ensure the involvement of worldwide universities in joint academic projects

6 Conclusions

Since November 2011, this vision is the four years development strategy of The Department of Economic Informatics and Cybernetics (DICE) from The Bucharest University of Economic Studies. The success of the assumed strategy requires the common effort of all department members. The strategy will lay the foundation for a continuous evolution path that will continue beyond the initial four years.

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