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MSIS 2006 IMPLEMENTATION REVIEW IN BULGARIA

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Abstract

MSIS 2006 is the last version of model curriculum and guidelines for graduate degree programs in information systems, that ACM, AIS, AITP and IFIP have proposed. At Faculty of Mathematics and Informatics of University of Sofia, the oldest Master degree program is in Information systems. Its curriculum has been developed following MSIS 2006 predecessor recommendations. In this paper, specifics in implementation of MSIS 2006 are discussed with focus on Service-Oriented Architecture as a backbone of the new recommendations.

Keywords: *MSIS 2006, Information Systems, Master Curriculum, Education, Service-Oriented Architecture.*

1 PRINCIPLES OF MSIS 2006

In the last 30 years many graduate degree programs in information systems have used the recommendations of ACM, AIS, AITP and IFIP, which last version of this model curriculum and guidelines is MSIS 2006 (Gorgone et al, 2006).

MSIS 2006, as its predecessors, has been developed mainly to meet the needs of North America societies in USA and Canada. This recommendation has been applied for development of graduate programs in information systems not only in North America, but the format and contents sometimes are so different that new names are announced like Business Informatics (Helfert & Duncan, 2007) and others (Calpinskas & Vasilecas, 2002). That is why there are different social needs that have to meet these programs.

How MSIS 2006 was developed? "A set of underlying principles and philosophy was used to guide the development. Essential career development skills including oral, written, and presentation skills; people and business skills; and ethics and professionalism are integrated throughout the curriculum and its individual courses." The main question here is "Are these principles and philosophy applicable in other countries?" We try to answer it in our case Faculty of Mathematics and Informatics (FMI) at University of Sofia, Bulgaria.

In MSIS 2006, it is supposed that the students have some prerequisite set of knowledge to participate efficiently in the program. This set of knowledge is defined by IS 2002: Model Curriculum and Guidelines for Undergraduate Degree Programs in Information Systems (Grogone et al., 2002). Most suitable for that are Bachelors in Information Systems, Bachelors in Informatics, Bachelors in Computer Science, and Bachelors in Software Engineering, who have been awarded at FMI, but there are other Bachelors from Business and Technical universities that participate in our program.

Several years ago Master program in Information systems was the largest program at FMI by the number of student enrolled in it 50 to 60 students. Today, this program is simply one of the largest programs – 40 students. The main reason for that is that it is not very specialized – with several carrier tracks. In the last several years, new Master programs emerged, some of which are specialized carrier tracks of Information systems curricula, like e-Business, e-Commerce and some others more specialized in software development. To change the situation we need more specialized IS curricula, but not one with many carrier tracks. The different carrier tracks are better to be established as different curricula how our experience shows.

2   SERVICE-ORIENTED ARCHITECURE

In MSIS 2006 specializations are defined through carrier tracks. The lack of specialization in MSIS 2006 is result of that the core of these recommendations is some kind of balance between technical and managerial courses. Organizations could use carrier tracks to do the needed specialization. In practice, this can be new Master programs to be created with clear specialization following different carrier tracks. This idea has been implemented and it is very successful - new students have enrolled these more specialized Master programs like Computer Graphics and IT Services. Master program in Computer has specialization on Geospatial information systems besides its main stream: computer graphics, CAD/CAM/CAE, Virtual Reality, computer games and so on.

Master program in IT Services is another case – its curriculum is mainly proposed by IBM for Service Science, Management, and Engineering (IBM, 2009) and some ideas and courses are taken from Information systems.

At FMI the level of teaching of Mathematics and Informatics is very good. That is why, we are specializing the recommendations to technologies. Business aspects of teaching are only partly supported by faculty members – mainly we use lecturers from other faculties or from the business.

In MSIS 2006 the focus is on integration. That is why we have developed the new Master program in IT Services – it is the main stream for innovation of Master program in Information Systems in accordance with MSIS 2006. IT Services curriculum is focused on Service-Oriented Architecture (SOA), that is the contemporary solution for software development and integration. SOA principles and practices could be used in most of the courses proposed by MSIS 2006 curriculum.

The reason for development of MSIS 2006 is "the need to strengthen the emphasis on the following important concepts (listed in alphabetic order):
- Business Processes
- Emerging Technologies
- Globalization
- Human-Computer Interactions
- Impacts of Digitization"

More or less all of these concepts are implanted from technological point of view in SOA. That is the reason to look at MSIS 2006 innovation as innovation with SOA.

3   IS AND BUSINESS FOUNDATIONS

MSIS 2006 recommends that students with knowledge in IS and Business foundations, how it is defined by IS 2002, to finish the courses in one year. The students that have no foundations knowledge have to be prepared in one preliminary year to join the core courses. The practice shows that this additional year is not enough to fill the gap between Bachelors in Informatics (broadly speaking) and non Informatics Bachelors. That is why we have developed a parallel version of the curriculum specialized for non Informatics Bachelors. It is light weighted with the main purpose to fill the gaps in the technology knowledge.

In the first year for non Informatics Bachelors we offer Fundamentals of IS (IS2002.1) and two parts of Programming, Data, File, and Object Structures (IS2002.5), which contents are the courses Data structures and Object-Oriented Programming with C++. The last two courses are just a same in the most Bachelors programs in Informatics. Our opinion is that the students in our faculty have to receive strong knowledge in programming, because this is our strong competitive advantage.

Fundamentals of IS (IS2002.1) is based on the (Laudon & Laudon, 2007)

Another two very important courses are on Database and on Networking. The Database course is based on Stanford University curricula (Garsia-Molina et al., 2009). Our opinion is that the knowledge on database systems is essential for Information system professional. No files and no main algorithms and data structures are as important as data base systems. The database centered development of Information systems is not simply an option. For example, UML in its earlier versions has used the use case model as central model, but UML 2.0 is using now the class model. It is motivated that software developed around data structures is more stable that driven by functional requirements. Sustainable part of the information system is the database that is represented as permanent data in the class model.

Information Systems Theory and Practice (IS 2002.3) is another obligatory course for the students. This course in our version is based on UML for design and development of information systems. Our opinion is that knowledge in UML and Rational Unified Process are obligatory for professionals in Information systems.

The other courses from the undergraduate degree program in Information systems are elective and students could chose them depending of their interests and preliminary knowledge from their Bachelors program. Bachelors from technical universities have to study more business and Bachelors from business universities – more technology.

Above mentioned obligatory courses are essential and unique foundations to core of our curriculum and that is why even if the students have participated in some like courses they have to enroll that ones. The requirements in these courses are highest in the country and many students have problems especially in the first semester. This creates many conflicts with their habits from the other universities.

In this first year, we offer to the students as elective some courses from the core that do not need of special prerequisites. Opinion for that is that in some Bachelors programs part of the topics from the first year have been studied and it is possible some students not to be enough loaded. They, in such a way have an option quickly to finish the program. In practice, most of the students overestimate their capabilities and knowledge and enroll many elective courses and result of that at the end of the first semester their results are not good, but in the second semester they do the opposite and are under loaded, but with good results at the end of the year.

4   CORE OF MSIS 2006

MSIS 2006 Level 2 core courses are divided into two main groups:
- IS Technology

  o   MSIS2006.1 – IT Infrastructure

  o   MSIS2006.2 – Analysis, Modeling and Design

  o   MSIS2006.3 – Enterprise Models

  o   MSIS2006.4 – Emerging Technologies and Issues

- IS Management

  o   MSIS2006.5 – Project and Change Management

  o   MSIS2006.6 – Strategy and Policy

  o   MSIS2006.7 – Integrated Capstone

  o   MSIS2006.8 – Implications of Digitization

  o   MSIS2006.9 – Human Computer Interaction

MSIS2006.1 – IT Infrastructure how is defined in the recommendations is very broad course including very many different topics in hardware, software, networking and so on. Such a course is not useful at all. The students will learn very many things that mean - nothing. I have found very many errors in the

books devoted for such overviews, even when these books have been written by worldwide known authors, and distributed all over the world. My opinion is that this course has to be divided in a series of courses for the different topics: one course on advanced networking (including Grid and Cloud computing), one course on advanced database systems (DBMS), one course on SOA (including Web Services, WS-* specifications – WS-BPEL, WSDL, WS-Human Tasks), one course on XML. My opinion is that the IT infrastructure is better to teach through SOA point of view to organize the chaotic technologies in some order. Some of these courses can be elective and other obligatory. For example, advanced database systems and advanced networking are obligatory ones in our program.

There is only one overview course that is IS 2002.1 – Fundamental of Information Systems. Only in this course full overview on all the aspects of information systems have to be done. With this course the students could understand the logic, the structure and the place of all the other courses in the curriculum.

MSIS2006.2 – Analysis, Modeling and Design is important course that in our implementation is based primary on RUP. The last one cover near all topics of software development and support, but some of them, like procurement, are not covered. One very important thing is that RUP is not only one version – there are versions for small companies, for large companies, for SOA, for ITIL and some others. The versions suitable for MSIS2006.2 – Analysis, Modeling and Design could be used to cover all its topics.

MSIS2006.3 – Enterprise Models we offer to the students as series of different courses on Customer Relationship Management (CRM), Enterprise Resource Planning (ERP), and Supply Chain Management (SCM) conducted from the companies developing and distributing such kind of software. These set of courses is varying during the years, because the market in Bulgaria is small one and there is no so big needs in so specialized professionals.

Such a specialized course like MSIS2006.4 – Emerging Technologies and Issues we do not offer. All its topics are addressed in the specialized technological courses.

MSIS2006.5 – Project and Change Management is now elective course in our program. Many of the topics mentioned in MSIS 2006 are covered somewhere else. The version of our course is more suitable for Software Engineering where is primary used. My opinion is that it is enough for the students to learn at least one project and change management process from A to Z to be good professionals. Many companies are declaring that they use such processes, but the reality is far different. My opinion is that such processes have to be used and strongly applied, but still the industry not only in Bulgaria is still not on that way.

Topics of the course MSIS2006.6 – Strategy and Policy are covered in the other courses and our opinion is that there is no need to dive in more details as separate course. There is a specialized course conducted by Moody International Bulgaria on Business Basics, which is based on Harvard Business School courses.

MSIS2006.7 – Integrated Capstone – knowledge on integration is very important part of core knowledge of the student. This topic is very complex and it is very difficult to teach the students on real examples. From technological point of view integration could be represented using Service-Oriented Integration (SOI), which is a natural application of Service-Oriented Architecture. For students with knowledge on SOA is easier to understand the integration through SOI. The other integration technologies are not so well integrated with the main streams of modern software development and have to be studied in more details to be understood.

Internship could help in integration if students participate in such a project, but to develop a laboratory for that purpose at FMI is no reasonable. Integration means that many different applications have to be integrated. This means installation of many different application servers to support their integration for teaching purposes. It is very huge investment and in Bulgaria demand for professionals on integration is not so big to do that.

In the course MSIS2006.8 – Implications of Digitization, there are two main topics Information systems ethics and Security. These main topics are addressed in different courses. A special attention is given to security; we offer two courses on that: an introductory and one basic course. Both courses are conducted by internationally certified professionals from the business.

MSIS2006.9 – Human Computer Interaction is not conducted separately. There is a course elective on that topic in the FMI, but we do not recommend it, because speaking about everything means speaking about nothing.

5   MASTER THESIS AND INTERNSHIPS

There is a practice one semester to be used for preparation of Master thesis. It is impossible this to be overloaded with the last semester when the students still enroll courses. The students could not enter in the problems of specific area and to do something valuable.

Internships and Master theses proposed by the Business is another risk. Internship, even in big international companies with traditions in that direction, very frequently degrades to remote supervision of the student. Master theses proposed by the Business to the students very simple and not real examples of their activities. Consultants from the Business are in most cases inadequate to help the students. To resolve the problem with the internship, we have developed rules. The group of students participating in internship program in every firm is controlled personally by a faculty member. The internship program of the firm has to be approved by the Master program. Internship program has to teach the students in something new from the practice. That is why we recommend the program to start with one month of introduction to the technologies and practices in the firm. It is a formal training and education. For students that have not succeeded in that month – the internship program is finished. Then in two months the students join teams in the firm and take participation in real projects. All the time the responsible faculty member controls the process. At the end of the program, usually, the firm offers permanent contract to the student. The firm pays to the students and to the responsible faculty member for the participation in the internship program.

Master theses proposed by the firms are strictly controlled too. Supervisor of a Master thesis could be only faculty member. The firm can offer a consultant for the proposed thesis. The thesis is approved by the department under which supervision is the Master program. In such a way, we eliminate the possibility the process to be compromised, which has happened in the past.

Internship creates good and stable connections with the business. Usually specific faculty members are assigned for connection with specific firms. The trust between the FMI and the Business is based on these binary connections between the faculty members and the people from the firms. Our experience shows that if some mediators have been used between the FMI and the Business like professional organization, then very soon the communications break down. Mediators are useful only for public relations purpose – one think is to declare that FMI works with several firms, another think is to declare that works with the whole industry. In reality the firms in one given industry are so different that to only with few of them is valuable to develop sustainable connections. Not every firm is interested in the new technologies and to hire the best students. Our interest is to offer the students attractive internship programs in attractive firms. The firms are interested to have as earlier access to the best student as possible to hire them. In practice we are open to work with all the firms, but we have established connections only with dozen ones.

6   CONCLUSION

Our curriculum on Information systems covers requirements of MSIS 2006. It is an implementation oriented for Bulgarian market and the needs of Bulgarian society. This program is more technology oriented. My experience shows that a professional to develop and support information systems, has to know very many details from the bottom to the up. The strong knowledge on technologies is essential

for all activities connected with information systems. If a business process is modeled without knowledge how it could be implemented, then this model is not useful even as reference.

A curriculum is to some extend stable in the time. At least in our university to change it or to change contents of some courses is a difficult and time consuming task. The world of Information systems is very dynamic – new technologies emerge every year and very soon the courses and the curriculum get obsolete. Some new technologies and business models are so simple that it is impossible to arrange full course. To resolve these problems we have organized regular seminar on database systems and knowledge base systems. At that seminar faculty members and representatives of the business represent some new developments. In such a way there is no need to organize separate courses. The side effect is that connections with the business get stronger. Firms like publicity in professional circles especially in young ones. This seminar is we adapted from Entrepreneurship curriculum of University of Berkley. Initially I tried to implement it as it was described – to invite some people from the business to talk students how they have organized their business and especially how they have started. It is clear that an economy is based on small and middle business and if we want to have stronger economy, we have to have many small start-up firms. Students are very suitable for such an initiative. For my surprise businessmen from my country do not like to talk on this topic – they prefer to talk about their success, about technologies that they use and about the job opportunities in their companies. Their idea is to attract the students and hire them. And they really attract the students – every time very many students participate in the seminar.

Why SOA is innovative point of view to MSIS 2006? How MSIS 2006 is described and implemented in many curricula – it for all in Information systems, which means for nothing. There is no common backbone that gets together all the courses. Such an idea is service orientation in our implementation that spans in all courses. Our idea is to teach students in service oriented implementation of information systems.

Some comments about the IS profiles on the job market in Bulgaria, that are not applicable only to the country. In the last several years there is increasing demand on specialist in service oriented development of information systems. This demand is initiated by the government structures. SOA contracts have been wined by international consortiums of companies in which participated leading on the SOA market international companies and Bulgarian ones. Some of these contracts failed as result of lack of specialists not only in Bulgaria, but in the international market. There is need of SOA specialists not only for Bulgarian companies, but for the international labor market too. Our intention is to change the situation at least in Bulgaria preparing specialists with knowledge on SOA. We have one more dramatic action establishing new Master curricula on IT services that is based on SSME curricula of IBM, but it is out of scope of that paper. The increased demand of SOA specialists is the guarantee for success of this approach. After some consultations with the leading software companies in Bulgaria (international and local ones) we started these innovations with SOA. We are strongly supported by the main companies that are employers of our degreed students.

Teaching SOA in the different courses is difficult at this time. Some of the courses are held totally by professionals from the industry. Traditional ones are held mainly by the permanent staff of the faculty, but some parts are presented by external professionals. Usage of external lecturers is a temporary solution and our intention is in the near future all the lecturers to be from the permanent staff of the faculty that has to be with PhDs.

For practical training we use many courses from academic initiatives of IBM, Microsoft, Cisco etc, but we have found that they are not useful for academic training - they are useful to train students of tools features, but not on the concepts. Our intention is to develop our own academic courses for practical training.

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