

A Preliminary Analysis of Business Information Systems Master Programme Curriculum Based on the Graduates Survey

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Abstract. *The most recent economic crisis forced western companies to cut their IT budgets. This was possible in many cases by outsourcing IT projects in countries like Romania. For Romanian Information Systems graduates outsourcing has steeply increased the job offer. But it also changed the required skills (competencies) ratio between technical and business issues. When crises erupted a lot of ERP projects had been launched but since then only a few have been completed and recently very few have been initiated. New IS jobs require more technical skills and urge for curricula recalibration. This paper presents some preliminary results of a survey conducted in 2013 and 2015 for the graduates of IS master programme at Al.I.Cuza University of Iasi. The survey main objectives were to identify the required skills on the IT market, graduates opinion about the programme, including curricula, syllabi, internship, infrastructure, teaching staff, and program strengths and weaknesses and re-align curricula to the industry demand.*

Keywords: Information Systems Curricula, Graduates Survey, R, SharePoint

JEL classification: M15

1. Introduction

As academic discipline and research topic, Information Systems (IS) has followed a convoluted trajectory. Its never ending identity crisis [1] [2] combined with a steep decline in enrolments after 2000, especially in US programmes [3], rose questions about its future. Amidst funeral moods, Romanian (and other Eastern-European) IS programmes have thrived at both undergraduate and graduate levels [3]. Romania's increasing attractiveness for IT outsourcing (lower wages, technical skills, proficiency in foreign languages) created a big appetite for IT professionals and consequently IS enrolment has constantly risen.

As technologies change quickly, so the industry requirements. IS programmes must adapt their curricula based on *similar programmes curricula*, including model curriculum guidelines published by Association for Information Systems [3], *listening to the industry needs* (involving industry representatives), and *getting feedback from graduates*.

This paper presents some results of a survey targeting *Business Information Systems* master graduates at Al.I.Cuza University of Iasi (UAIC). Technical solution for analysis was developed using Microsoft SharePoint Server platform and R/RStudio language/platform.

2. Information Systems Undergraduate and Graduate Programmes Curricula

As technical and business topics could be mixed in various proportions, diversification of IS programmes manifests not only among universities from different countries, but also within

the same country [3]. At UAIC both undergraduate and graduate Information Systems programmes curricula were developed following recommendations ACM/AIS [3][5][6]. Figure 1 shows the main courses proposed in IS2010 undergraduate curriculum [5] model and their relation to the career tracks of the IS graduates.

Career Track:	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
Core IS Courses:																	
Foundations of IS	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Enterprise Architecture	○	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
IS Strategy, Management and Acquisition	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Data and Information Management	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Systems Analysis & Design	●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
IT Infrastructure	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
IT Project Management	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Elective IS Courses:																	
Application Development	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Business Process Management		●	●			○	○	○		○	○				○		
Collaborative Computing						○								○		○	
Data Mining / Business Intelligence		●	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Enterprise Systems		●	●	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Human-Computer Interaction	●				○	○				○						○	
Information Search and Retrieval		○		○	○												○
IT Audit and Controls	○		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
IT Security and Risk Management	○		○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
Knowledge Management		●		○	○	○			○								
Social Informatics														○	○		

Key:
 ● = Significant Coverage
 ○ = Some Coverage
 Blank Cell = Not Required

Figure 1. Structure of ACM/AIS IS2010 undergraduate curriculum [5]

At master level, MSIS2006 [6] nominated 24 possible career tracks (such as: Academia; Knowledge Management; Computer Forensics; Managing the IS Function; Consulting; Data Management and Warehousing; Mobile Computing; Database and Multi-tiered Systems; Decision Making; Project Management; Security; Systems Analysis & Design; Enterprise Resources Planning; Telecommunications) each with suggested courses. Despite the relative obsolescence of the MSIS2006 (the next curriculum model for IS graduate programmes is expected within a year or two), we claim that since 1997 (undergraduate) and 2007 (master), IS programmes at UAIC have been properly aligned to ACM/AIS recommendations.

3. Graduates survey brief description

Graduates survey was designed in 2013 and made available for graduates from September to December 2013 and from January to March 2015. Some of the sections of questionnaire are: *Personal details* (e.g. age, gender); *Graduation path* for both bachelor and master levels; *Carrier path* (year of first employment, company profile, location and stakeholders, income level); *Free/open messages* (for teachers, colleagues, future students, five positive and five negative features of the programme); *Level of satisfaction* about teaching staff and activities, different areas of interest (programming, modelling, databases, etc.) research opportunities and administrative components of master degree, all using a Likert scale from 1 to 5.

The questionnaire was distributed through social networks (mainly on Facebook, where graduates have pages organized by enrolment year). There were 84 answers, but only 74 were kept as the 10 of them were flawed (seven respondents did not respond to any questions, and three seem to be still students and not graduates) etc.

Proportion of the respondents' genre follows the proportion of students' genre for BIS (figure2, left). 58.9% of respondents are females and only 41.1% males. This contradicts a much-debated anxiety - the scarcity of women in computing.

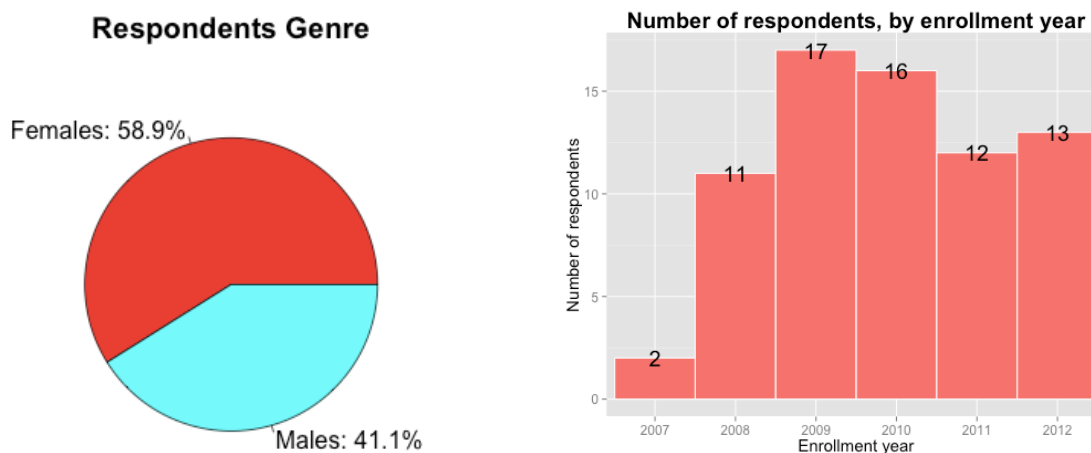


Figure 2. Respondents' genre (left) and enrolment year (right)

Analysing the number of answers per admission year (figure 2, right) one can notice some discrepancies between 2009/2010 and 2011/2012. Based on the number of enrolled students and the "fresh memory" factor, we expected the number of 2011/2012 respondents to be bigger than for 2009/2010. The figures indicate the opposite. Somehow ironically, this psychological factor of memory freshness might be part of the explanation.

4. Technical platforms

As students BIS graduates had extensively used (Microsoft) Share Point Portal. So, we chose it as platform for the questionnaire instead of an equivalent free solution. Share Point assures a better control over the respondents (as former UAIC students). Free Internet surveying tools allowed anonymous answers but malicious people might fill in multiple malformed answers and alter the results. Even if the free tools surveys could be protected by the uniqueness of an IP address, it is largely acknowledged that any person can access many devices connected to the Internet, or can use proxy servers to access and respond multiple times to a survey.

A basic requirement for surveys is the anonymity of respondents [7] [8]. SharePoint is a powerful tool that authenticates the user but also anonymizes the respondent without coding. Another Share Point strength is the definition question branch logic if necessary. Also SharePoint provides a graphical summary of answers in real time, determining key users to react in promoting the survey on multiple media: e-mail, social media, and specific websites. Almost any question format can be implemented in a SharePoint survey: *Single line of text, Multiple line of text, Choice, Rating Scale, Number, Date and Time, Yes/No*. All answers are saved into the server database. Results can be exported as RSS, spreadsheets or .csv files.

For data visualization and analysis we chose an increasingly popular open-source platform, R/RStudio. R is the most dynamic data language [9], [4]. Main R packages used in this analysis are: *stringr, reshape, plyr, dplyr* and *ggplot2*.

5. Preliminary results concerning graduates employability

As expected, most of the respondents work in IT industry (90.54%). As figure 3 (left) shows, graduates employability is quite satisfactory (98%). 85% of graduates had been hired before master completion. First and second year of study are most frequent moments of getting the

first job. This data is consistent with a recent survey targeting current second year BIS master students. Out of 66 current second year students, 57 (86%) said they are already hired.

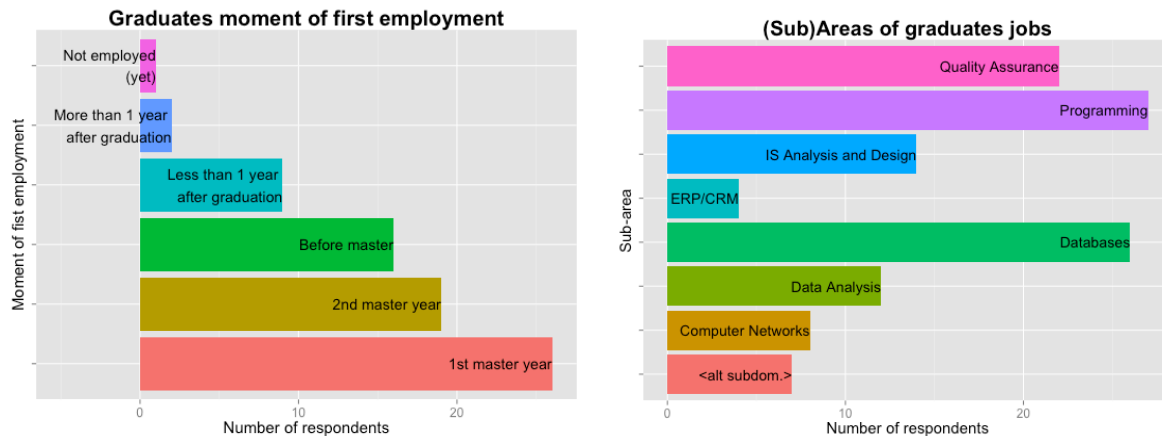


Figure 3. Respondents' first job moment (left) and job area (right)

This is good news for the programme and reflect not only the increasing demand for IS/IT professionals, but also suggests a proper alignment of IS programme to the industry needs. Later years have witnessed a growing number of applications for both undergraduate and graduate IS programmes.

Graduates jobs areas/fields are very important in calibrating the curriculum. As seen in figure 3 (right) most of the jobs are technical. This is natural since graduates get managerial positions (project/team managers) only after a few years of experience and proof of their competencies in working within and/or assembling a team. Jobs are concentrated on five main areas - *Quality assurance*, *Programming*, *Databases* and *IS analysis and design* - which covers 85% of total answers. Most of graduates' professional careers are related to Software Development.

Figure 3 confirms the hypothesis of increasing number of western outsourced IT projects. Moreover one can infer that the outsourced projects target the final stages of software development (i.e. programming, testing and deployment) and the first stages (requirements analysis, design) remain mostly at headquarters.

Also figure 3 shows a specific trait for what employers demand from IS graduates. Generally Western IS programmes focus on business/managerial issues, whereas most of the Romanian IS graduates must cope with technically oriented jobs, i.e. programming, databases, computer networks. Before 2010 a larger proportion of graduates was hired in ERP/CRM projects as consultants, implementers and mostly business related activities. As the crisis hit most of the ERP projects, demand for business related jobs has shrunk. Fortunately ERP scarcity was outpaced by more technically outsourced projects.

Recent changes in the IT jobs urges recalibrating the proportion of business and technical courses in IS curricula. They also suggests ERP syllabus to be more process-oriented and provide better background for further courses such as Business Process Management.

6. Programme evaluation by the graduates

To evaluate the master programme, graduates were asked to assess, using a five-level scale (very bad, bad, average/neutral, good, excellent), the following items: the *programme* (at general level), *courses* (utility for their professional activity, teaching, link to practice, research content), *professors* (teaching, availability, attitude towards students), *infrastructure* (labs, classrooms, public spaces), *administrative staff performance and attitude* towards students/graduates, *internship*, etc.

Figures 4 and 5 show high score for teaching staff, master programme and courses (94%, 69% and 59%). Adding half of the average level assessments, the positive percentages reach 96%, 84% and 77%. This suggests proper teaching skills, availability and proper attitude towards students, a very positive image about programme and positive opinion about courses.

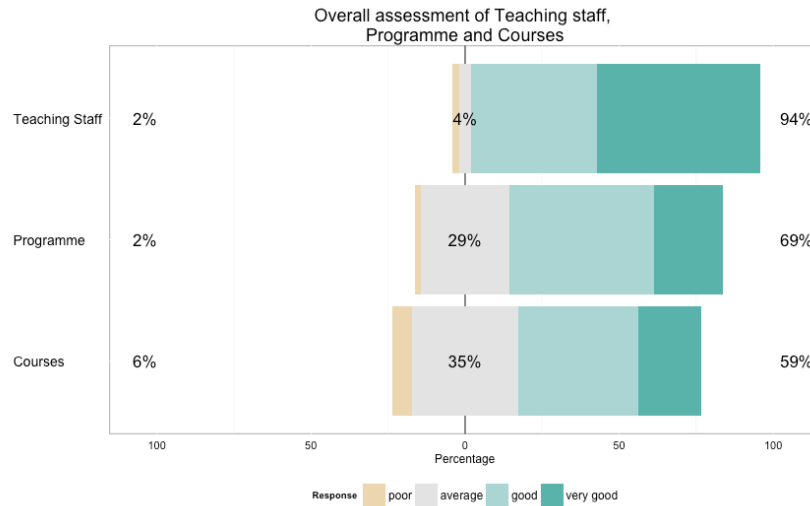


Figure 4. Evaluation of teaching staff, programme and courses

These findings are also enforced by the mean values – 4.45, 3.90 and 3.73 - out of a maximum of 5, and the relative low standard deviations (figure 5).

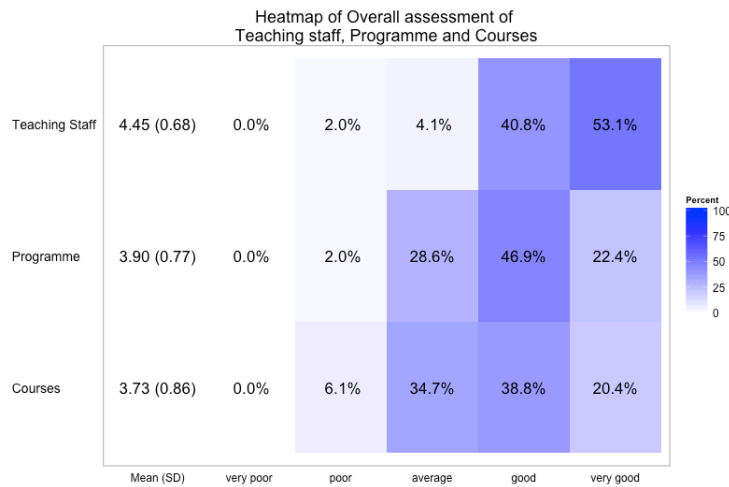


Figure 5. Evaluation of teaching staff, programme and courses as a heatmap

Overall programme assessment ranges between teaching staff and courses assessments and that the latter has a negative contribution on the programme score. Therefore, we think it will be necessary to conduct a more detailed survey in order to find out which courses have to be updated or even which revisions on IS curricula are requested and consequently get the proper alignment of the programme to the industry needs. Also, the new study has to validate the hypothesis of increasing need on technical courses and diminishing business-oriented ones.

7. Limits, discussions and conclusions

This article analyses curriculum issues of Business Information Systems Master Programme from the perspectives of alumni, based on them experience during the studies and how they

were influenced by this program in career. Privacy and malevolent actions were taken into considerations when survey was developed and disseminated.

There are some limitations of this study. The number of respondents is satisfactory, but one can ask if the graduates who filled in the questionnaire faithfully represent the entire population of BIS graduates. It is possible that unlucky or ill-prepared graduates who have not succeeded in getting a rewarding job avoided answering. Also the distance between survey and graduation time could affect the quality of some answers.

Our study revealed a proper alignment of IS programme to the industry needs and a very satisfactory graduates employability. We also found out that most of graduates' professional careers were related to Software Development, especially the final stages of software development and that the IT market, and that the technical skills were required more than business-oriented ones. These finding might explain why the courses issue had a negative contribution on programme reputation compared with the teaching staff issue. Unlike Western IS programmes Romanian ones must cope with technical skills, i.e. programming, databases, computer networks, etc.

In the next stage of our study we will check the hypothesis of increasing the weight of technical courses in the master programme curricula to the injury of business-oriented subjects.

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