The First Steps in Establishing Informatics PhD Studies in English at Faculty of Mathematics, University of Belgrade

Vladimir Filipović
Faculty of Mathematics, University of Belgrade
Outline

➢ Organization I come from
  ● University of Belgrade
  ● Faculty of Mathematics
  ● Department for Computer Science

➢ SWOT analysis
  ● Strengths
  ● Weaknesses
  ● Opportunities
  ● Threats
Outline (2)

- Objective: Informatics PhD Studies in English
  - Current situation, potential benefits, anticipated problems

- SWOT analysis of the Objective

- Steps for achieving the Objective
  - Building consensus at Department level
  - Shaping future PhD study program
  - Project 2005: Defining the core of future PhD program
  - The newest development

- Conclusion
University of Belgrade

- Facts about University of Belgrade:
  - a public university
  - the oldest and the largest university in Serbia
  - 6,427 academic staff, 3,724 administrative staff
  - 94,458 students, 4,171 international
  - $172 + 194 + 66 = 432$ study programs
  - one of the most important educational and research centers in Southeast Europe (6,174 research staff)

- University of Belgrade strives:
  - to set the strongest standards in higher education
  - to cherish and encourage intellectual and personal growth
  - to stimulate meaningful work and effort which serve to the well-being of the entire society
University of Belgrade

Performance in Academic Ranking of World Universities

Performance in Academic Ranking of World Universities by Subject Fields

Subject Fields | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015
--- | --- | --- | --- | --- | --- | --- | ---
Mathematics | / | / | / | / | 101-150 | 151-200 | /
Physics | / | / | / | / | / | 151-200 | /
Chemistry | / | / | / | / | / | / | /
Computer Science | / | / | / | / | / | / | /
Economics/Business | / | / | / | / | / | / | /
Faculty of Mathematics

- Within University of Belgrade, faculties are very independent
  - Faculty of Mathematics is one of several faculties from University of Belgrade that offers studies in Computer Science

- Facts about faculty:
  - we have three academic programs at BSc, MSc and PhD level (Mathematics, Informatics, Astronomy and Astrophysics)
  - up to present day, we have more than 6000 graduate mathematicians, 400 PhDs and 700 MScs and specialists
  - more than 150 professors and assistants with about 2000 students on undergraduate and postgraduate studies
Concerning scientific achievements, Faculty of Mathematics performs very well in comparison to rest of the University.

Global position of University of Belgrade on the world university ranking lists (column UB) and its positions in the subject Mathematics (column MATH)
Department for Computer Science

The largest Department on the Faculty of Mathematics

Facts about Department:

- formally established in 1987 (first Informatics courses in 1961)
- In 2017/18 there are 15 teachers and 24 assistants; among them, 21 women and 18 men; average age is less than 29 (for assistants) and less than 43 (for professors)
Department for Computer Science

Main research areas within Department:

- Algorithmics
- Automatic Reasoning
- Bioinformatics
- Data Mining
- Natural Language Processing
- Optimization
SWOT analysis

SWOT analysis aims to identify the key internal and external factors important to achieving an objective.
SWOT analysis

Properties of SWOT analysis:

- It may be used in any decision-making situation when a desired end-state (objective) is defined.
- Analysis may view the internal factors as strengths or as weaknesses depending upon their effect on the objectives.
- The external factors may include macroeconomic matters, technological change, legislation, and sociocultural changes, as well as changes in the marketplace or in competitive position.
- It can be used as a tool to identify positive and negative factors within organizations, communities, and the broader society that promote or inhibit successful implementation of the change.
Informatics PhD Studies in English

➤ Current status:

- in this moment, every program should be accredited
- in this moment, in order to be offered to foreign students, the program should pass accreditation process
- in this moment, there is no accredited PhD study program in English offered by Faculty of Mathematics

➤ Potential benefits:

- better visibility
- easier communication with researchers and experts from abroad
- eligibility for participation in wider range of international projects
- easier engagement of foreign researchers and experts
Informatics PhD Studies in English

Experience from the past:

- In previous years accreditation was not necessary, several PhD students from abroad started, but only a few successfully finished.
- Main reason for that outcome is lack of systematic approach - almost everything was up to adviser.
- At that time, Department have to solve important problems (increasing workload, various organizational issues) so we couldn’t deal with all problems simultaneously.

Initially, one problem is anticipated:

- PhD Studies should have focus, and at the same time all professors (with various research interests) should be included to the widest possible extent.
### SWOT matrix for the objective

<table>
<thead>
<tr>
<th>Internal origin</th>
<th>Helpful</th>
<th>Harmful</th>
</tr>
</thead>
</table>
| **Strengths:**  | 1. People - potential for research within Department  
2. Consensus that studies should be carefully planned and managed  
3. Successful PhD Studies Program for Serbian students  
4. Space and equipment – a year ago, we enlarged space for 60%  
5. Efforts to agree on topics that should be offered to foreign PhD students | **Weaknesses:** 1. Possibility that some research areas “covered” by Department won’t be offered on PhD Studies  
2. Knowledge level of the prospective PhD Students  
3. Difficulty in achieving balance between domestic and foreign students |

<table>
<thead>
<tr>
<th>External origin</th>
<th>Opportunities:</th>
<th>Threats:</th>
</tr>
</thead>
</table>
| **1. Position of Department within Faculty**  
2. Position of Faculty within University  
3. Good collaboration with other faculties and institutes  
4. Recognition that Education and Research in Informatics is very important for society  
5. Recognition that High education should be open and prepared for collaboration | **1. Changes in huge systems, like University of Belgrade, tend to be very slow**  
2. Some educational organizations (either within University, either outside of University) are already taking the similar steps, or will do that soon  
3. Legislative changes are very often in the High education area  
4. Financial issues – accreditation is not cheap |
Steps for achieving the objective

- We decided to establish accredited PhD studies in Informatics in English language

- Building consensus at Department level should be done very carefully

- One problem is defining PhD Study program:
  - PhD Studies should have focus
  - At the same time, all professors (with various research interests) should be included to the widest possible extent
  - Program should be flexible and extensible
  - At the beginning, number of disciplines courses should be small, otherwise program won’t be sustainable – so we decided to think about small number of, so called, core courses
Shaping future PhD program

- Initial idea is to select one research area studied at our Department, which have clear and good connection with most other research areas, and to structure core courses around it, taking into account other areas

- We choose Bioinformatics
  - Bioinformatics is relatively new and very hot, with great potential
  - Researchers from our Department already have significant contributions in that area
  - Bioinformatics is naturally connected to research areas (algorithmics, data mining, natural language processing and optimization) that are successfully studied by researchers from our Department
Project 2005

In December 2017, Serbian Ministry of Science’s have Project 2005 call within Program for Development of Higher Education

- With the support of the Faculty and the Department, I’ve submitted a project proposal, related to developing the PhD studies in Informatics in English
- Project was approved for funding and we have just successfully completed its implementation.
- Project team consists of three full professors, two associate professors and three assistant professors from our Department
- We selected six courses and produced curriculums for them, as well as elaboration of course materials

Produced document contains analyses about relations among proposed courses contents
Primošten, 2018

Project 2005

- We used curriculum of similar PhD courses in Serbian, but contents of “general” courses is slightly changed to be compatible with Bioinformatics

- Curriculum for following courses are created as a project outcome:
  1. Nature-Inspired Metaheuristics in Optimization
  2. Computational Intelligence
  3. Machine Learning
  4. Selected Topics in Bioinformatics
  5. Data mining in Bioinformatics
  6. Information Retrieval and Web Searching
The latest development

Now, we are well prepared to submit program for accreditation when the time comes:

- Core (prepared in Project 2005) can be easily expanded
- There is consensus on the Department
- Management of the Faculty support that idea

However, things are changed in the last ten days!
The latest development

Produženje su dobili studenti koji su fakultet upisali po starom planu i programu, koji su školovanje morali da završe do 30. septembra, ali i "boloncici" koji su potrošili maksimum od osam godina za četvorošodišnje studije.


Pomoćnik ministra provesti za visoko obrazovanje Bojan Tubić kaže za Tanjug da će stari studenti dobiti još jednu šansu, još godinu da okončaju studije po starom planu i programu.

Novina u Zakonu je i da fakulteti mogu organizovati deo nastave na stranom jeziku ukoliko imaju sposobljeni nastavni kadar, a da im za to nije potrebna posebna, dodatna akreditacija.

"Do sada su fakulteti morali da akredituju posebne studijske programe na stranom jeziku. Samo nekoliko visokoškolskih ustanova je imalo akreditovane studijske programe na engleskom jeziku", kaže Tubić.

Mogućnost da se deo nastave i ispiti organizuju na stranom jeziku uvodi se zbog sve veće potrebe za internacionalizacijom fakulteta, privlačenjem stranih studenata, ali i zbog gostovanja studenata i nastavnika iz inostranstva koji dolaze na razmere preko projekta Erazmus plus.

Predviđeno je da se u Zakon unese odredba kojom se priznaju osporeni doktorati stopeći na fakultetima koji u momentu izdavanja diploma nisu imali dozvolu za...
Conclusion

➢ It seems that it won’t be necessary to formally accredit PhD Study program in English

➢ However, whole process, discussion and work that is conducted is very useful:
  ● PhD study in English is analyzed in depth, using SWOT
  ● Department agreed that PhD study in English should be systematically supported
  ● Proposal for consisted and focused PhD study program is prepared and discussed
  ● Ties with other organizations are strengthen
  ● Curriculums for selected subset of PhD courses are created
Thank you!

➡️ Contact

vladaf@matf.bg.ac.rs

➡️ Any questions?