



EXTERNAL EVALUATION REPORT

DEPARTMENT OF APPLIED INFORMATICS

UNIVERSITY OF MACEDONIA



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TABLE OF CONTENTS

The External Evaluation Committee

Introduction

I. The External Evaluation Procedure

- Brief account of the documents examined, of the site visit, the meetings that took place, and the facilities visited.

II. The Internal Evaluation Procedure

- Comments on the quality and completeness of the documentation provided, and on the overall acceptance of and participation in the quality assurance procedures followed by the Department.

A. Curriculum

APPROACH

- Goals and objectives of the curriculum, structure and content, intended learning outcomes.

IMPLEMENTATION

- Rationality, functionality, effectiveness of the curriculum.

RESULTS

- Maximizing success and dealing with potential inhibiting factors.

IMPROVEMENT

- Planned improvements.

B. Teaching

APPROACH

- Pedagogic policy and methodology, means, and resources.

IMPLEMENTATION

- Quality and evaluation of teaching procedures, teaching materials and resources, mobility.

RESULTS

- Efficacy of teaching, understanding of positive or negative results.

IMPROVEMENT

- Proposed methods for improvement.

C. Research

APPROACH

- Research policy and main objectives.

IMPLEMENTATION

- Research promotion and assessment, quality of support, and infrastructure.

RESULTS

- Research projects and collaborations, scientific publications, and applied results.

IMPROVEMENT

- Proposed initiatives aiming at improvement.

D. All Other Services**APPROACH**

- Quality and effectiveness of services provided by the Department.

IMPLEMENTATION

- Organization and infrastructure of the Department's administration (e.g. secretariat of the Department).

RESULTS

- Adequateness and functionality of administrative and other services.

IMPROVEMENTS

- Proposed initiatives aiming at improvement.

Collaboration with social, cultural and production organizations**E. Strategic Planning, Perspectives for Improvement and Dealing with Potential Inhibiting Factors**

- Short-, medium- and long-term goals and plans of action proposed by the Department.

F. Final Conclusions and Recommendations of the EEC on:

- The development and present situation of the Department, good practices and weaknesses identified through the external evaluation process, recommendations for improvement.

External Evaluation Committee

The committee responsible for the external evaluation of the Department of Applied Informatics at the University of Macedonia consisted of the following five (5) expert evaluators drawn from the Registry constituted by the HQAA in accordance with Law 3374/2005:

1. Dr. George Karypis (President)
Department of Computer Science & Engineering, University of Minnesota, USA.
2. Dr. Georgios Giannakis
Department of Electrical and Computer Engineering, University of Minnesota, USA.
3. Dr. Haralambos Hatzakis
Biotronics 3D Ltd., UK
4. Dr. Dimitris Samaras
Department of Computer Science, Stony Brook University, USA.
5. Dr. Costas Xydeas
School of Computing and Communications, Lancaster University, UK.

Introduction

The External Evaluation Committee (EEC) visited the University of Macedonia, Department of Applied Informatics (DAI) in Thessaloniki, on Tuesday 25th and Wednesday 26th of June 2013. Upon arrival, they were welcomed by the Rector Professor Yannis A. Hajidimitriou, Vice Rector Professor Eugenia Alexandropoulou, and the Chair of the Department of Applied Informatics Professor Maro Vlachopoulou.

EEC members met most of the academic departmental staff, as well as all secretarial and technical staff including staff in charge of internal quality evaluation preparations, leaders of teaching and research departmental laboratories, departmental administrative staff as well as a number of undergraduate, postgraduate, and PhD research students. In addition, and as a result of the recent merger of DAI with the Department of Technology Management (DTM) in Naousa, committee members also met with a small number of DTM academics. EEC members visited all departmental teaching and research laboratory facilities, lecture theatres, the University Library and Sports Centre, as well as other spaces used by students.

A number of detailed presentations were given to the committee, commencing with an overview of the structure, activities, and general aims of the Department delivered by the Department Chair. In addition, teaching activities at the undergraduate and postgraduate levels were highlighted, procedural rules explained, and information on topics such as student admission, progression, and achievements provided.

Research group presentations were provided on the second day of the visit (Wednesday), with emphasis in notable outputs. EEC members interacted with staff throughout the visit, and heard their questions and requests for further information were promptly addressed.

Thus, this quality assessment (QA) evaluation visit to the DAI at the University of Macedonia included the following activities:

- i) Meetings with:
 - Rector and pro-vice rector;
 - Chair of the Department;
 - Members of undergraduate and postgraduate teaching committees;
 - Academics responsible for the internal QA report;
 - Leaders and members of research laboratories (groups);
 - Laboratory assistants;
 - Postdoctoral staff, research and postgraduate students;
 - Undergraduate students; and
 - Administrative personnel.

- ii) Visits to:
 - Teaching laboratories I , II, and III;
 - Parallel and Distributed Computing laboratories;
 - Information Management Laboratory;

- Multimedia Technologies and Graphics Laboratory;
- Information Systems and E-Business Laboratory;
- Computational Systems and Software Engineering Laboratory;
- Algorithmic Operations Laboratory;
- Teaching Rooms and main University Amphitheater;
- Teleconference Center; and the
- Department Secretariat Office.

EEC was provided with the following documents:

- Internal Evaluation report April 2012;
- Program of Undergraduate Studies 2012-13;
- Program of Post Graduate Studies 2011-12;
- Examples of examination scripts;
- Examples of textbooks produced by departmental staff and also other “external” recommended books;
- Examples of PhD and MSc theses;
- Student questionnaire and staff-to-student-ratio related statistics
- Research group related information;
- Examples of intra-research group collaboration activities;
- Limited graduate employment/career information; and
- Erasmus and international collaboration activities.

Most of the aforementioned documentation was of high quality and was made available to the EEC from the start of the QA evaluation period. Further information that was also requested was provided along with appropriate explanations in certain cases. A few inconsistencies, particularly with respect to statistical data, as well as missing details related to aims, objectives, and strategy in general, were raised and also discussed during the visit.

Finally, the EEC's impression on the acceptance of academic staff in QA procedures was overall quite positive. However, from the first meeting of EEC with academic staff there were visible signs of disagreements in departmental direction and purpose. Certain senior faculty were absent throughout these two days of the QA visit.

A. Curriculum

To be filled separately for each undergraduate, graduate and doctoral programme.

APPROACH

Undergraduate Program:

The objective of DAI's undergraduate curriculum is to promote and further develop the science of informatics, with a special emphasis on the development of systems for managerial and economic applications, and the training of high-level executives of the public and private sector. In addition, the curriculum's objective is to provide both a solid theoretical education and practical training on developing software for economic and managerial applications.

The distinct feature of DAI's curriculum is its strong emphasis towards management, economics, and business applications, which differentiates it from the traditional informatics departments in other Greek Universities. This emphasis has been by design, and was the major factor influencing the curriculum's design objectives. The selection of courses was informed by taking into account the standard computer science (CS) curricula published by professional societies (e.g., ACM and IEEE), and also by surveying the type of courses offered by similar programs in foreign universities. However, given the cross-disciplinary nature of the program, there is no internationally accepted curriculum standard, and there is a significant difference between the types of courses offered by similar programs in universities outside Greece.

The curriculum is consistent with the Department's objectives, in the sense that it provides a comprehensive set of courses related to informatics theory and applications, economics, management, and business. These courses cover both introductory and advanced topics in CS/Economics/Management, and also on emerging topics in these fields.

The process by which the curriculum was decided was not very well articulated to the members of the committee. The committee believes that the inclusion of some (advanced) courses as core courses was influenced by the specific research areas of the faculty members, which may not necessarily be appropriate for achieving the overall objectives of the curriculum.

The department undertook a major revision of its curriculum in 2009 in order to better align its program with the latest trends in the field. In addition, there is an ongoing revision process performed by each professor (or team of professors) responsible for a course. However, the department does not have (and could benefit from) a permanent curriculum committee responsible for curriculum-related activities.

Graduate Program:

The objective of the MSc program is to provide advanced training in informatics, integrated systems, software methods, management of organizational processes, and reorganization of digital economies. Towards these goals, the MSc program offers two separate degrees: one on "Computer Systems" and the second on "Business Informatics." Over the years, the enrollment ranged from 48 to 85. In recent years however, the number of enrolled students is in decline, which can be a reflection of the country's economic condition.

The MSc program started in 2005, and its duration was four semesters (three for courses and one for thesis). However, the programs were revised in 2012 to reduce the number of semesters to three (two for courses and one for thesis). In addition, the revised curriculum

better aligned the offered courses with the educational background of the students and the requirements of each one of the two degree programs. This revision process was informed by both the findings of the internal evaluation, and also the student feedback. However, it was unclear whether the needs of local industry were surveyed/taken into account during the curriculum revision.

Doctoral Program:

DAI offers a doctoral program related to the Department's various subject areas. The curriculum of the doctoral program does not involve any course work, and is entirely focused on research. An MSc degree requirement was recently added to the requirements for admission to the Doctoral Program.

IMPLEMENTATION

Undergraduate Program:

The undergraduate curriculum is organized into a set of required and elective courses. The required part consists of 36 courses, spanning a period of three years and 12 elective courses to be taken from a set of 34 courses, during the last and final year of studies. The committee feels that the implementation of the curriculum needs to be revised, to better align it with the overall program's objectives and recent pedagogical trends. The split between required and elective courses needs to be revised in favour of increasing the number of elective courses. The recent trend in foreign Universities has been to limit the required courses to the equivalent of two years of studies, in order to enable students to customize their studies towards their own areas of interest. This is particularly important for DAI, which due to its cross-disciplinary nature, needs to cater to the requirements of a diverse set of students. In addition, some of the courses being offered represent fairly advanced topics in the Department's various constituent subfields (e.g., computer science, economics, management), which are not well suited for the cross-disciplinary nature of the undergraduate education that the department strives to offer. For this reason, a systematic effort needs to be undertaken to reduce the total number of courses being offered. The committee also feels that, once the number of required courses has been reduced, it should offer some of the introductory courses during each semester in order to provide greater flexibility to the students. This increase can be accommodated by decreasing the frequency of some of the elective courses, or by eliminating some of the advanced courses discussed earlier. Finally, the overall number of credit hours been taught by the faculty members is high, and it should be reduced in order to allow them to better focus on research.

Graduate Program:

The graduate curriculum is organized into a set of courses, among which the students are required to select 4-5 courses per semester. The total number of distinct courses per degree program is 15, with just a small number of common courses between the two programs.

The overall goals of the Department's MSc program are implemented well with the current curriculum. The set of courses associated with the two degree programs are reasonable and in line with international standards. The areas of the courses and degree programs are in line with the subject areas of the faculty members and the Department has adequate lab resources for the program.

Doctoral Program:

Even though the department has a large number of doctoral students, the majority of them pursue their degree on a part-time basis. This creates numerous problems related to the timely completion of the doctoral studies, and the uninterrupted focus on research.

RESULTS

Based on the discussions with current and former undergraduate students, it appears that the curriculum is effective in providing students with the necessary cross-disciplinary knowledge and skills. This is something that the students really enjoy, and consider to be a key differentiating aspect of the program. During 2005-2011, the grade point average (GPA) of the graduating students ranged from 6.98 to 7.56. Although these averages are reasonable and within the norms of comparable programs in Greece, the committee is concerned by the recent trend towards lower GPA.

The shortcomings discussed earlier, which also came up while talking with the students, are issues that the Department is cognizant off, and is planning to address in the near future. In terms of employment opportunities, there is no sufficient data available for the committee to form a comprehensive view of how well the department's graduates have performed in the market place. However, the department has a reasonable number of success stories, in which its graduates went to create companies and continued advanced studies within Greece or abroad.

IMPROVEMENT

The committee felt that the Department is aware of the fact that their undergraduate curriculum needs to be improved and plans to address this in the near future. However, since the current Department will be combined with the Department of Technology Administration from Naousa, the immediate focus of the Department is to combine and streamline the curricula of the two Departments, prior to undertaking a major curriculum restructuring.

B. Teaching

APPROACH:

Teaching in DAI follows conventional international guidelines, where lectures are combined with laboratory exercises and case studies offered by academic staff with help from a few teaching assistants. The “applications-oriented” approach underpinning the department’s teaching philosophy manifests itself in certain activities. This should be a major differentiator between teaching practice in this department and what is observed in conventional Computer Science Departments. Furthermore, the Department employs COMPUS, a University of Macedonia collaborative e-learning platform that is used to share and exchange information between students and staff. The use of modern e-learning type of interaction with students should be an evolving area with departments adapting over time to changes in student teaching and assessment practices as well as to progression monitoring activities.

The student-to-staff-ratio is well above the typical values observed in research-oriented European and other international higher education institutions. The number of active students is currently 767 (students that have been registered for 6 years or less), while the number of faculty is 25 (approximately a 31:1 ratio, though the last four-year average is 27.1:1). However, this ratio is typical and well aligned with those found in competing departments of the same or similar discipline in Greece e.g., in the Dept. of Informatics at the University of Piraeus, Greece.

Interaction between academic staff/teaching assistants and students occurs as required, and students do appreciate the availability and readiness of staff to advice and help in general. Since learning is done on the basis of “application-of-theory” type of coursework, laboratories and assignments, contact between students and teaching staff is reinforced. . This can be further reinforced during the diploma/final year project work which, unfortunately, is not mandatory and can be therefore a missed opportunity for students to operate within an industry-led framework, and thus obtain such a valuable experience.

The department provides students with access to three modern (recently refurbished) medium size computing Laboratories which are very well organized, and supported. A larger general-purpose centrally supported Computing laboratory is also available to students. The size of these laboratories seems currently to be adequate, with respect to the number of enrolled active students (767 students for a 100+ PCs, a ratio of approximately 8:1). Students have access throughout the day to these facilities, which are supported and efficiently managed by Departmental and central University technical staff.

The University library also provides reading room space as well as access to books in the form of hard copies or electronic versions. Whereas the library enjoyed in the past reasonable financial support, current budget cuts are severely affecting the role of this part of the University to serve student needs. It is worth noting the complete lack of access to electronic publication depositories that has been caused by the Government’s inability to pay for such service.

Student evaluation and assessment is performed in the most general case through a combination of laboratory exercises, examinations and occasionally individual and group type of project work and assignments. The use of conventional examinations is predominant in the department’s assessment policy; individual instructors/teaching staff are able to relatively easily change and adapt the nature and content of taught material. Laboratory

exercises are mostly done by academics with minimal input from PhD students. Students consent that laboratory exercises are at the right level, and very important in enhancing their educational experience. However, the forthcoming merger with the Department of Technology Management in Naousa and the subsequent considerable increase in student numbers will place severe strain in computing resources, facilities, and space.

Book assignment is done through the EVDOXOS platform, a system that allows the selection of textbooks for each course.

IMPLEMENTATION

The overall quality evaluation of teaching procedures is quite positive from the student's point of view i.e., high overall satisfaction as evidenced from feedback questionnaires and also as expressed to EEC members during student interviews. However, it should be noted that student feedback statistics were provided as averages over a large number of courses (e.g., 34) a process with high potential to mask small numbers of possibly problematic cases. What is more important here is the lack of evidence on how student feedback is taken into account by the department and appropriate actions generated and their subsequent effect in student satisfaction.

The balance between theoretical and practical content in currently offered courses seems to be reasonably well aligned with international standards and practices. Academic staff delivers lectures and coordinates activity and supervision arrangements during laboratory work/exercises. In most of the cases, modules are offered from faculty according to their research interests and this ensures a high quality of lectures while at the same time allows module content to be updated in a regular fashion and according to the latest technological trends of a given subject area. This can be viewed as strength but also as a weakness particularly for traditional core modules if there is no faculty members with research interests in such an area. As mentioned earlier, the balance between core and elective modules should be modified in favor of electives with more emphasis given to applications and related systems.

The department should also invest effort towards internationalizing its image via exchange programs and international agreements. Along this direction, the number of ERASMUS students and international teaching agreements should be enhanced particularly with well-known Universities and in a systematic and well thought manner. Student experience should be augmented with Industry oriented activities such as visits, internships, student placements, seminars and presentations. In this line of thought, educational student trips are to be encouraged by the department at both undergraduate and graduate levels. Furthermore, mobility as applied to academic staff needs to be encouraged too.

The same material been delivered by academic staff over long periods of time should be avoided, particularly in fast-moving technological subject areas. The complete lack of curriculum planning in association with Industrial advice and feedback should be addressed with the creation of an appropriate teaching committee tasked with facilitating and monitoring the design, implementation and effectiveness of teaching activities at both the undergraduate and graduate levels.

Student satisfaction is currently measured using hard copies of questionnaire forms distributed to the students at specific times. Given the expertise of the department in e-learning and associated platforms, on-line evaluation should be applied in an anonymous

fashion, also allowing for general comments. In addition, regular meetings of student representatives with academic staff should take place as an alternative forum for students to express their observations and views for improvement.

RESULTS

The department offers two specialization directions towards meeting student aims and needs, at both undergraduate and graduate levels. The departmental teaching practices are overall satisfactory, with no major issues to be reported, but they are incomplete. This deficiency relates mainly to absence of quality assurance mechanisms and the relatively small profile of Industry-linked activities. Student progression, number of graduates and their performance indicators are according to expectations and in agreement with those produced by similar courses run in other Universities nationally and internationally. Furthermore, there is evidence that the skills and knowledge acquired by graduates are sought after by employers. However, there is considerable room for improvement. EEC believes that the recently announced merger of the Department with that of Technology Management in Naousa is a unique opportunity for setting appropriate teaching quality standards and associated quality assurance mechanisms in general, and for redefining objectives, curricula and implementation practices in particular. The applications element of Informatics must be strengthened considerably in all possible different ways. Key to this must be a focussed unifying teaching plan that reflects the aspirations of all stake holders

IMPROVEMENT

The department is to undertake a complete revision of its curriculum while taking into consideration its merger with the Department of Technology Management of Naousa, and the interests of all stakeholders. The department also intends to review its quality assurance procedures, which are to be applied on a continuous basis, thus providing a rigorous monitoring of teaching activities framework that underpins teaching excellence.

Thus, improvements should lead to the adoption of clearly articulated curriculum designing procedures, which effectively and fully take into consideration the interests of all stakeholders, particularly those of current and alumni students as well as those of potential employers. There is definitely a need for more practically based, applications-related work that is aligned to the actual needs of society in general, and employers in particular.

C. Research

For each particular matter, please distinguish between under- and post-graduate level, if necessary.

APPROACH

According to the internal evaluation report, the department does not have a formal research policy and goals. Faculty have self-organised in ad hoc research groupings. Furthermore, in discussions with faculty members, it appears that a number of the faculty pursue research excellence at the interface of business and information science (which is the stated focus of the teaching mission of the department), while others in more conventional Computer Science directions. While both approaches have merits, the tension between them appears to be slowing down the strategic definition of the department's research identity. This in turn affects the possible research streams and future directions and hires.

Also from the internal evaluation report, it turns out that the department does not have internal standards for research assessment. In fact, neither the chairman nor any committee in the department has the institutional capacity to collect comprehensive and comparative research information that would allow for quantifying research expenditures and outcomes.

IMPLEMENTATION

The department/university offers travel support to attend conferences. There are some internally funded projects by the university. Research is conducted either by individual faculty members or ad-hoc groups of faculty based either on personal relationships or common research interests. Most of the ad hoc research groups cover traditional Computer Science areas with varying degrees of involvement into the Business Informatics that are the program's supposedly defining characteristics.

The department provides laboratory space and networking infrastructure through which the research teams are able to maintain an adequate number of machines in their labs. A major challenge is the lapse of subscriptions to journals in the library.

All the younger members of the faculty as well as some of the senior members publish regularly in peer reviewed journals and papers. Typically, these publications have PhD students as first authors.

Most faculty members have active research projects or are actively pursuing ones. Funding is mostly internal from the university or comes from Greek funding agencies. There are some junior partnerships in European projects. There does not seem to be significant funding from Industrial partners. There are some development projects from various Greek institutions, and municipalities.

There are no institutional research collaborations with other non-Greek universities. There are individual collaborations with a number of universities both abroad and in Greece. Within the department, collaborations are mostly between members of the ad-hoc research groups. There are a couple of efforts in terms of cross-disciplinary projects between CS and Business Informatics.

RESULTS

While certain faculty appear to have a consistent research output over the last few years, and the output of junior faculty is raising the overall research profile of the department, the department appears to be caught in a number of cross-currents stemming from the current Greek difficult environment, which highlight the lack of strategic planning in the research directions of the department. Some of the factors that are inhibiting the achievement of better research outcomes include the limited levels of funding, which leads most PhD students to work part-time; the lack of critical mass and large teams with complementary competencies pursuing common research goals; the lack of a differentiating research profile and/or flagship projects; and, the relatively large number of faculty that is not active in research.

The scientific publication record of the department is spread in terms of quality and quantity depending on the area. There are a few publications in world-class journals, and numerous publications in less visible venues.

Junior faculty members appear quite productive in general, although they seem less inclined to aim for high-impact venues.

The number of research projects seems to have declined as the Greek sources of funding have dried up. The department has not been as successful in replacing this support with EU projects. Although younger faculty members seem to try in that arena, they would clearly benefit from the proper mentoring and guidance to aim for larger projects.

Most collaborative efforts are within the research groups faculty members belong to. There is not a critical mass of collaborating faculty across the different constituent knowledge areas of the department to leverage the unique composition of the faculty.

Some spin-off companies were created by former graduate students of the Department. Some development projects/web-portals/e-health initiatives had impact outside the University. The department's quality assurance project for the control software of the Tempi tunnel would be a high visibility project, if it comes through. However, further high-visibility applied projects would need to go with the Department's title of Applied Informatics. There is not enough collaboration with Social and Cultural institutions.

In terms of research excellence and international recognition, 7 best paper awards have been awarded to members of the Department in the last 5 years, and a relatively small number of its faculty members have been awarded prestigious international honors. These are positive signs, and the Department should continue to raise the quality and visibility of its research by targeting high-quality and selective international conferences.

IMPROVEMENT

The DAI wishes to improve its research profile by reaching out in collaborations, and grouping researchers into synergistic research groups. However, these plans need to be well thought out and formulated, and more importantly they need to be based on a well-defined strategic plan that sets the Department's overall research identity.

D. All Other Services

For each particular matter, please distinguish between under- and post-graduate level, if necessary.

APPROACH

The Secretariat for non-MSc student services is located in the ground floor and also serves the needs of the academic staff and the department's assembly support. The corresponding office is served by four (4) full-time employees with different administrative skills and qualifications that are deemed adequate for the tasks performed. The office is supported by relevant hardware and software infrastructure. There is also an additional secretariat for the MSc program, staffed by two (2) part-time employees with relevant qualifications, located in the first floor. There is no structure, policy or budget for work-studies (students assisting the Secretariat in low-level administrative tasks). Introducing that may reduce workload to the members of the Secretariat, and help them focus to more strategic directions. Both Secretariats are not in control of budget(s), which makes trivial small tasks tedious, and leads to lack of strategic planning of operations.

Members of the Secretariat teams appear very friendly and approachable to the students with a very positive collegial spirit, and an "open door" attitude. The e-services provided from the department's secretariat work appropriately. The DAI secretariat uses software for most procedures and all the archive is stored digitally. The system has also a web interface for students, and all procedures related to courses are supported from this web-based service.

The department takes care for the accessibility of students with special needs. All facilities have the proper infrastructure to access and attend the lectures. The library also accommodates students with reduced hearing.

An attractive outdoor and indoor space is available to students for breaks and socializing. Perhaps the space is not enough to accommodate the needs of the registered students, however, during our visit, it appeared adequate. A reasonably equipped gym with a full size indoor basketball court, and 2 table-tennis tables were available to students. Hygienic conditions in toilets could be improved.

Information technology (IT) support is managed and provided mainly from an internal team comprising 2 full-time technicians and partially by the University's computer center. The teaching and lab facilities were equipped with newly acquired and modern equipment, and it appears that there is a structure for hardware refresh. DAI offers free wireless internet access in all places. Initiatives such as "bring your own device" were trialed with some success. The department has official license of the Microsoft Alliance program, and all students have free access to Windows operating system, software programs and software developing platforms. There are library facilities shared with the University.

In our visit, we have not seen evidence of the existence of a quality assurance team. QA activities (if any) are understood to be performed by the secretariat. In addition, there is no strategic vision or policy for simplifying administrative procedures.

IMPLEMENTATION

Members of the Secretariat expressed concerns related to the integration and support of the administration needs of the new unit to be merged (the Technology Management department

from Naousa). Concerns were also expressed related to the complicated and time-consuming procedures affecting productivity, the continuously changing legislation, the significant delays between the enactment of new legislation and the publication of their implementation guidelines/procedures, and the delays in obtaining implementation guidelines from the University's administration.

It is our observation that there are obvious synergies between the two Secretariats and a merge between them could increase efficiencies and simplify line-reporting structures.

A number of members of the faculty expressed concerns for the ratio of available technical and physical infrastructure to the large number of undergraduate students. Low attendance of students alleviates this issue currently.

The IT support personnel commented on the lack of recurring operational budget for maintenance and purchasing of software tool for academic purchasing.

Access to online academic databases is currently restricted due to unpaid subscription licences.

RESULTS

Given the challenges for changes in legislation, we believe that the administrative infrastructure performs very well and has attracted positive comments from members of our committee. The merge with the new department may present some temporary challenges from the increased workload, and the integration of operations.

It is our assessment that DAI's current physical and technical infrastructure is marginally adequate mainly due to low attendance levels from undergraduate students. It is expected that space will be restricted after the merge and expansion of the Department of Technology Management (from Naousa).

IMPROVEMENTS

The committee believes that although services provided to students and members of the staff are adequate, they can be improved. The merging of the new department even makes this improvement a priority. Currently, there is no mechanism in place to monitor this improvement, and although members of the Faculty and the Secretariat are capable of establishing improvement processes and procedures, there was no evidence that activities to this direction were undertaken.

Collaboration with social, cultural and production organizations

The Department does not have any collaboration with social, cultural, and production organizations. However, the individual faculty have a number of such collaborations.

E. Strategic Planning, Perspectives for Improvement and Dealing with Potential Inhibiting Factors

For each particular matter, please distinguish between under- and post-graduate level, if necessary.

The Department is in the middle of a major transition period as a result of its merger with the Department of Technology Management that is currently located in Naousa. The resulting Department, which will remain in Thessaloniki, will add 9 new faculty members and increase the number of undergraduate students by about 30%. In addition, there are 8 additional faculty members that have been elected but have not yet been appointed. As a result of this merge, the Department is in the process of combining the two undergraduate curricula, student services, administrative staff, and also re-organizing the research teams. The combined department is expected to encounter substantial challenges related to the availability of sufficient physical and technical infrastructure in order to perform its educational and research functions and responsibilities. Even at the current enrolment levels of DAI, the number and size of lecture rooms and research labs are barely sufficient, and the influx of new students will only make the situation worse.

In terms of research, the Department realizes the need to restructure its overall research enterprise in order to become both competitive in relation to various European funding opportunities, and also to leverage the cross-disciplinary nature of its academic program and faculty. Though many members of the faculty are already organized into small research groups, the Department recognizes that a more concerted, rational, and cross-disciplinary approach is due. Related to that, the Department also appreciates the need to further strengthen its collaborations with other Universities abroad, in order to explore potential research and funding synergies, and to also expand its faculty by hiring high-quality researchers.

In addition, the Department recognizes that it has not been very effective in maintaining close collaborations with its alumni, and has plans to pursue this in the future by creating an appropriate committee.

Overall the aforementioned goals are reasonable and the Department is doing a good job in articulating what it would like to achieve. However, the Department has not put forth a concrete plan on how it is going to achieve these goals.

F. Final Conclusions and recommendations of the EEC

For each particular matter, please distinguish between under- and post-graduate level, if necessary.

Executive Summary

The EEC believes that the Department of Applied Informatics (DAI) is in the midst of a major transformation period, the success of which has the potential for creating a uniquely positioned department that will be an asset to both the University of Macedonia and the Greek educational system. To this end, DAI needs to retain and further enhance its cross-disciplinary nature at both teaching and research. The EEC has identified the following three broad areas that the Department must address in order to make such a successful transition:

The Department needs to revise its curriculum and research program in order to reflect the cross-disciplinary nature of its program.

The EEC strongly believes that the cross-disciplinary nature of the DAI's program is its unique characteristic that differentiates it both from traditional informatics, business, economics, and management programs. The Department needs to embrace its cross-disciplinary identity by: (i) restructuring its curriculum by keeping as core those courses that are essential to all sub-disciplines and making the rest of the courses as electives; and, (ii) fostering cross-disciplinary research via well-integrated research groups, joint student advising, and research funding.

The Department needs to establish meaningful collaborations with industry, both within Greece as well as Europe, at multiple levels.

The EEC strongly believes that DAI needs to improve the links and further integrate the local and global industry at every level of its operations. DAI needs to establish a structure and a set of methods to systematically promote, measure, and evaluate meaningful collaborations with external organisations. Those collaborations should focus on the strategic positioning of the department rather than relying only on an ad-hoc process that serves only the faculty members research interest. There is a need to create an external industrial advisory board, to be used as a source of market knowledge, to offer feedback on the curriculum and research projects, and also provide potential sources of practical training, technology transfer, and employment opportunities.

Ideals and practices of Entrepreneurship should be practiced and encouraged within the department, and faculty members should lead by example. DAI's graduates should have the entire knowledge and Entrepreneurial attitude required to venture in business and convert their ideas to successful start-up companies.

The Department needs to establish a quality management system and appropriate quality assurance procedures.

The EEC strongly believes that DAI should adopt a quality control policy implemented via a Quality Management System to further support its mission and vision of providing applied informatics education and research in an atmosphere of responsibility and accountability through recruitment of competent staff, provision of an enabling teaching and learning atmosphere, and continuous improvement of students and staff through open channels of internal communication and external collaborations with other faculties and the Industry.

Effectively, this Quality Management System should be managed by a Quality Control

Committee and should contain a set of policies, and procedures required for planning and execution of teaching, research and collaboration processes in DAI. This system should inherently provide feedback methods enabling DAI to identify, measure, control and improve core business processes with the ultimate goal of improving performance in accordance with a set of key performance indicators. The goal of this process should be to enable DAI to consistently provide services that meet the academic and market expectations and pertinent regulatory Greek and European requirements, foster a culture of continual improvement, as well as prevent and correct non-conformities.

Specific Recommendations

Recommendations for Curriculum

1. The department needs to establish a permanent curriculum committee, whose first task should be to redesign its undergraduate curriculum. This redesign needs to be informed by (i) surveying both the needs of the industry within Greece and EU in general, (ii) the cross-disciplinary nature of the department's educational mission and objectives, and (iii) the courses been offered by other Universities.
2. The redesign should create a curriculum that (i) reduces the number of required courses to just those that are truly the core of the various sub-fields of study, (ii) differentiates it from other more traditional departments, (iii) provides a rich set of elective courses that will foster specialization, and (iv) reduces the frequency by which it offers some of the more advanced elective courses.
3. The new curriculum should eliminate courses that are currently in the books due to the fact that fall within the specific research area/expertise of one or more of its faculty members. If these courses are required for graduate student training, then they should be offered at the graduate level, and should not be part of the undergraduate curriculum.

Recommendations for Teaching

1. The department needs to establish teaching related committees and appropriate quality assurance processes. There should be a faculty-student committee where student representatives report student concerns, actions are generated and related progress is monitored over time. A process should be established where the structure, level of difficulty and different forms of assessment in general and conventional examination papers are compared and if necessary marks are normalized, in particular.
2. Students should have faculty members acting as academic advisors offering advice on general studies related issues, including the selection of elective courses and final year projects.
3. The committee recommends that final year projects become mandatory and in as many cases as possible be linked to real applications with local companies.
4. The adoption of external examiners at both undergraduate and graduate levels is highly recommended.
5. It is also recommended that at the end of each semester (or academic year) there should be a teaching review meeting of all faculty staff where all aspects of teaching activities and practices are considered, improvements are identified, and future actions generated.

6. It is very important that all aforementioned recommendations produce an audible trail that can be then used in future quality monitoring/evaluation exercises.

Recommendations for Research

1. The EEC recommends fostering cross-disciplinary research via well-integrated research groups, joint student advising, and research funding. This should not come at the expense of pursuing excellence in individual faculty members' core research fields, but in combination with it. The department should internalize this concept so that it is passed on to junior faculty. The department should create reward mechanisms for engaging in such research and recognize the risks and additional time costs required to establish such collaborations. In particular, junior faculty should feel safe that they will not be penalized for incurring such costs during promotion evaluations. Discussions with industry on how to apply algorithmic and optimization advances on particular problems that are of particular relevance to them would be a first step to establishing exciting cross culture.
2. The department should identify strategic areas in which it can achieve excellence and acquire critical mass (especially given the constraints on new faculty hiring). These groups should be cross disciplinary in nature so that faculty members with interest in business and computer science questions are brought in close "proximity" to interact.
3. Faculty should be encouraged to apply for EU funding to the largest extent possible. A culture of "revise-reposition-and-resubmit" should be encouraged. Grant writing workshops, visits to funding agencies and conversations with program managers should be facilitated. Junior faculty would benefit immensely from mentoring by senior faculty on assembling proposals and partnerships. If such capacity does not exist in the department's senior faculty, they should use their professional network to identify appropriate mentors in other Greek institutions and involve them in mentoring of the junior faculty.
4. The department should aim to increase its research visibility by encouraging and rewarding publications in top rank journals and conferences. One way would be to highlight any such publications in the department's web site and list them separately in the CVs of faculty members.
5. The international visibility of the department should be raised with collaborations with high ranked institutions. Faculty or student stays in such institutions with as much financial support as the fiscal circumstances would allow.

Recommendations for Other Services

1. DAI needs to establish a number of key performance indicators (KPIs) to monitor and assess the outward facing focus and collaborative efforts of the department. Those KPIs should be measurable, objective, repeatable, and represent a true and holistic reflection of activities. For instance KPIs can be based on:
 - a. Participation in Horizon2020 consortia (number of projects submitted as coordinators per year; number of projects submitted as partners per year; total number of Euros requested per year; success rate in number of projects; and success rate in Euros.)
 - b. Participation in other EU funded activities
 - c. Number of invitations for speaking engagements (academic and non academic related).

- d. Number of collaborative projects with the industry/Euros attracted from those collaborative projects.
- e. Percentage of graduates launching their own business within 5 years from graduation.

Annual targets should be established that would form part of ongoing evaluation reports. Having those KPIs is the only way to establish objectively how success or failure is defined in knowledge transfer and collaborations, tasks critical for the ongoing success and growth.

2. DAI needs to create a committee on knowledge transfer partnership (KTP), which may also consolidate the role of some other existing committees. The role of this committee should be to foster and create collaborations with industrial and social partners with priority to local organisations. We also believe this committee should submit proposals to the State for creating legal frameworks and incentives that will encourage local companies to engage with DAI (and other academic faculties in Greece). It is our observation that currently there is a structural and psychological divide between local industry and academia in Greece (for example some early attempts made by DAI to encourage engagement of the local industry have been met with scepticism). Eliminating those barriers could be a way to grow the local economy via bi-directional KTP, especially within today's globalised knowledge based economy environment.
3. External Industrial Advisory Committee (EIAC): In order to create better cohesion with the local economy, an EIAC should be established, recruiting from the pool of local successful entrepreneurs, ideally in the field of business informatics, ideally from the Alumni population of DAI. This new committee should be given authorities and opportunities to participate in establishing, implementing and monitoring the strategic plans of the department, including quality controls, changes to the curriculum, and input to research direction.
4. DAI should establish methods to inspire the new generation of entrepreneurs in Greece. One of the desired outcomes of the programme should be to produce young entrepreneurs starting new business ventures in the general field of business informatics. Our observation, based on the percentage of graduates starting businesses, is that DAI has not been successful in meeting this objective. Although, we appreciate that the current financial situation appears to prohibit the creation of new ventures, nevertheless, we believe success to this objective is critical for the local society. Certain actions could be established that may lead to that, such as:
 - a. Annual business plan competitions open to undergraduates and postgraduates with financial and/or academic merit prices and rewards.
 - b. The creation of an incubator to assist new graduates entrepreneurs with the creation and growth of startup companies. It is our observation that a very small number of graduates started successful applied informatics related startups (such as iMarketing.gr, tospitimou.gr, and e-leoforos) very often operating from within their department as part or as a result of their doctoral or MSc studies. Not only those activities should be encouraged and rewarded, but also they should be part of an incubation structure, resulting in mutual benefits for both parties (for example DAI could benefit financially by exploiting a minority ownership position in the company). The model for such incubator activities exist in other departments, however those models should be adopted to serve better the needs and characteristics of the local economy.

- c. The creation of a group of private or institutional investors with desire to potentially invest in similar start-up commercial activities. Perhaps financial incentives (such as tax breaks similar to those available in the UK) could be proposed to attract investors to such companies.
- 5. DAI should methodically foster a much stronger relationship with its Alumni.
An Alumni Committee should be created to systematically manage relationships with DAI alumni. Frequent communication with its alumni should create mechanisms and opportunities to leverage further outward looking activities, resulting to the creation of collaborations with external entities. A list of alumni should be created with up to date contact information. Statistical analysis of the population should be performed to establish employability, and the main career progression tracks of DAI alumni. This in return, can be one of the inputs for changes to the curriculum. Part of those communication activities should be the creation and dissemination of a newsletter, with current news from DAI, case studies, and success stories.
- 6. DAI should create a career office as part of the Secretariat activities, to promote pre- and post-graduate internships, and job opportunities within the wider local economy.
- 7. DAI should create a Social Sustainability Mission and lead by example in creating social related activities for the benefit of the society with emphasis to the local society. Often initiatives on social sustainability have a philanthropy or society integration core (both can be desirable contribution to the current society challenges). The new generation of entrepreneurs should be realised early on, and be inspired, by the notion that the boundaries of work and higher purpose are merging into one, and doing good is really good for business. DAI members should teach that by example, and even create a structure to promote such notions.

The Members of the Committee

Name and Surname	Signature
1. _____	
2. Georgios B. Giannakis	
3. _____	
4. _____	
5. _____	