ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ

Α.ΔΙ.Π.

ΑΡΧΗ ΔΙΑΣΦΑΛΙΣΗΣ & ΠΙΣΤΟΠΟΙΗΣΗΣ ΤΗΣ
ΠΟΙΟΤΗΤΑΣ
ΣΤΗΝ ΑΝΩΤΑΤΗ ΕΚΠΑΙΔΕΥΣΗ

HELLENIC REPUBLIC

H.Q.A.

HELLENIC QUALITY ASSURANCE AND
ACCREDITATION AGENCY

EXTERNAL EVALUATION REPORT

DEPARTMENT OF INFORMATICS

ATHENS UNIVERSITY
OF ECONOMICS AND BUSINESS

March 2012

TABLE OF CONTENTS

The External Evaluation Committee
Introduction
    I. The External Evaluation Procedure
- Brief account of documents examined, of the Site Visit, meetings and 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 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 Informatics of the Athens University of Economics and Business consisted of the following five (5) expert evaluators drawn from the Registry constituted by the HQA in accordance with Law 3374/2005:

1.   Prof. John N. Tsitsiklis
       Massachusetts Institute of Technology, Massachusetts, USA   (coordinator)

2.   Prof. Nikolaos Bourbakis
       Wright State University, Ohio, U.S.A.

3.   Prof. Costas Iliopoulos
       King's College London, University of London, London, United Kingdom

4.   Prof. Nikos Paragios
       Ecole Centrale de Paris & Ecole des Ponts – Paris Tech, Paris, France

5.   Prof. Nicolas Spyratos
       Unversité de Paris-Sud XI, Paris, France

Introduction

The External Evaluation Procedure

The external evaluation committee (EEC) visited the department of Informatics of the Athens University of Economics and Business (AUEB) on Monday March 19 and Tuesday March 20.

The EEC first met with the AUEB rector and vice-rector, and the department chairman. This was followed by presentations by several faculty members, on the department's self-evaluation, the educational programs, and the research program. EEC members also met with a number of faculty individually. Overall, the EEC had the opportunity to interact with about two thirds of the department's faculty. The EEC also met with most of the department's teaching, technical, and administrative staff. Finally, EEC members toured the department's facilities (labs, library, etc.).

The EEC had two sessions with undergraduate students. EEC members visited classes, unannounced, and had a fruitful discussion of student concerns. Furthermore, there was a pre-announced open meeting with students, during which some additional information was obtained, although some of the time was consumed in a discussion of the need for external evaluations. A further meeting with graduate students (Masters and doctoral) was very informative.

Overall, the EEC obtained a fairly complete view of the department's activities (especially activities associated with the faculty who were present during the visit), its status, and its strengths and weaknesses. Before and during the visit, the department made available a large number of documents and much information. Additional documents were provided promptly, whenever requested by the EEC, in the course of the visit. The documents considered by the EEC included:
- The department's internal evaluation report
- A document summarizing the department's activities, and a document on the department's strategy
- Course guides for all educational programs
- A list of "excellent" activities (καταγραφή αριστείας)
- A list of recent faculty publications
- Short CVs of most of the faculty
- Information on the department's Career Day
- Lists of conferences organized by the department, of external visitors, and of seminars
- A list of exchanges through the Erasmus program
- Information on teaching loads
- Sample titles and abstracts of graduate theses
- Electronic copies of all presentations

Overall, the EEC found the department extremely cooperative and was impressed by the speed with which any requested information was put together, an indication of a well-functioning administration.

The EEC views the information provided as thorough and complete. While the amount of information was very large, the department chairman was successful in compiling and presenting a summary of the department's profile and strategy.

The Internal Evaluation Procedure

The internal evaluation report (IER) was very well written and informative. The EEC considers that the IER met its objectives (once supplemented by a subsequent and more detailed articulation of the department's strategy). The only caveat is that the IER did not seem to reflect any systematic student input (other than course evaluation data), although the EEC recognizes that this is consistent with other IERs that it has seen.

A1. Curriculum (undergraduate program)

APPROACH

The **goals and objectives** of the undergraduate curriculum are to offer a program in Informatics (Computer Science) with applications in business, management, and economics. The department aims to:

a) educate and train students to develop a foundation in informatics (and related mathematics), supplemented by practical experience and skills, in order to apply information technology in industry and in order to further economic development;

b) continuously update the curriculum, especially in areas of specialization such as communication systems & networks, information systems, security, and information management;

c) guide and motivate students to either pursue graduate studies (Masters or Ph.D.) or join the workforce in industry, education, or government.

Graduation requirements consist of the successful completion of 36 courses plus one course in a foreign language. There are 22 required courses: 15 core courses in informatics offered from the 1st to the 6th semester, 5 core courses in mathematics offered from the 1st to the 3rd semester, and 2 core courses in economics and business offered in the 1st and 2nd semester. Students must also choose 10 courses from 6 specialization areas (tracks): theoretical computer science, computer systems and networks, information systems and security, databases and knowledge management, operations research and the economics of information, computational mathematics and scientific computing. These courses are offered from the 5th to the 8th semester. (The department has certain concentration requirements so that students acquire some depth in at least two of the tracks.) An optional diploma thesis and/or an optional practical training engagement can be carried out in the last year of studies, and is equivalent to one course.

Curriculum design. The department was established in 1984, under the name of Statistics and Informatics. In 1995, it was renamed department of Informatics in order to promote education and research in the field of computer science and information management, and to offer the opportunity for a competitive program that meets international standards. The current curriculum was developed after examining Greek and European programs, and international benchmarks such as:

> *International:* reports by the Association for Computing Machinery (ACM), British Computer Society; Institute of Electrical Electronics Engineers (the IEEE Computer Society) curricula in Computer Science and Information Systems;

> *National*: Greek curricula in Informatics, and Management;

Faculty expertise: background and expertise in Computer Science, Information Management, and Mathematics;

Trends: awareness of local, national, and international needs and demands in the private sector, academia, and government.

Process for curriculum revision. The department has put in place a systematic process for regularly revising its curriculum, and keeping it up to date with respect to international standards, especially the ACM standards. The process involves faculty meetings in which changes, modifications, and updates are evaluated and approved. The department also has a process in place for obtaining student feedback on courses taught. In the future, it will be useful to also obtain and rely on feedback from alumni and potential employers.

IMPLEMENTATION

The department's implementation of the curriculum and its effectiveness.

Some mechanisms for achieving the curricular goals are: i) the organization of courses into required and elective ones; ii) the development of specialization tracks that include core and elective courses; iii) practice through projects; and iv) student feedback for courses and professors. These mechanisms ensure that the students acquire a solid broad background, supplemented by a deeper knowledge in some of the six specialization areas. Overall, the curriculum has a reasonable structure and functionality, reflects the department's goals, and implements them effectively.

While the core and elective courses offer a broad background in several areas, the department is aware that there are important areas of informatics that are not adequately covered, e.g., computer engineering. This is not necessarily a problem, given the department's orientation. On the other hand, if there is consistent student demand, some computer engineering additions to the curriculum should be contemplated. Another area of possible concern is software engineering; there are two courses offered (one required, one elective), which appear to be covering too much material in too little time for students to learn this material in depth; adding a third course is an option to consider.

An area of concern is that more than half of the students who eventually graduate take at least 6 years. To a great extent, this is due to the tolerance (at least until now) towards students that take a long time to graduate. On the other hand, the ideal of having most students graduate within the normal 4-year interval may be hard to attain because of the large number of courses with substantial technical content, and the ambitious objectives for breadth and depth. Furthermore, the regular load results in a rather large number of hours of classroom attendance each week. Finally, it appears that student load is not well balanced across the four years of the

program. In particular, the first two years involve a heavy load of challenging required classes; students who fall behind on that material have serious difficulties in succeeding in subsequent, more advanced, elective classes. A reduction of the total load (number of required courses) until graduation would not only make graduation in 4 years easier to attain, but would also allow a better-paced learning experience.

Comparison with universally accepted standards

The curriculum offered is to a great extent similar to typical Computer Science curricula offered by CS departments in the EU and the US. It also includes some unique positive aspects because of its orientation towards business applications of informatics.

The curriculum is aligned with the European Credit Transfer, allowing the exchange of students through the Erasmus Program.

There are also some important differences from accepted practices and common trends. For instance, there are no course prerequisites, something that can be detrimental to effective instruction in more advanced courses. Furthermore, the program does not conform to the EU-mandated Bologna Agreement, according to which basic (B.S.-level) computer science studies must be completed in 3 years. Finally, the curriculum involves a larger number of courses "in the major" than is usually the case abroad. This is due to some historical and cultural reasons; for example, the association of a course with a specific faculty member makes it harder to eliminate courses. Somewhat surprisingly, it is also due to student demand for instruction on more subjects, giving them broader skills. Regarding the issue of student demand for more skills, the department should make an effort to articulate a philosophy that is more appropriate for our age: specific skills quickly become obsolete; what matters the most is a solid understanding of principles, and the ability to learn new material as required.

Adequacy of the course content. For the majority of the courses offered, the course content is at an appropriate level. On the other hand, the amount of material, number of courses, and the effort required makes it difficult for an average student to learn the material in depth and also graduate in a timely manner (in four years).

Teaching staff and resources. The department has well qualified faculty members for teaching the various courses. However, resources and facilities (space, laboratories, and teaching assistants) are inadequate for implementing the curriculum with a large number of admitted students (close to 250 per year).

RESULTS

The curriculum covers comprehensively most areas of informatics (with the exception of hardware and computer engineering). It offers the opportunity for a broad and deep education, delivered by knowledgeable and dedicated faculty, and provides a strong preparation for subsequent professional work by the program's graduates. A strong evidence of positive results is the fact that the department's graduates seem to have very good employment prospects.

IMPROVEMENT

Possible improvements to the curriculum are interrelated with the tension between breadth and depth, the challenges caused by students that take too long to graduate, the state of the department's facilities, the situation in the job market, as well as broader issues concerning the AUEB and the Greek economy at large. The department is well aware of the importance of these challenges and their complexity, and strives to meet them within the framework of the new law for higher education.

The department is considering ideas for revising the undergraduate curriculum, while preserving the strength, uniqueness, and diversity of courses offered. In doing so, it may have to overcome obstacles due to inertia (past practices, and established "culture"), including the sense of "ownership" of courses and labs by individual faculty.

A2. Curriculum (Graduate programs)

APPROACH

The **goals and objectives** of the graduate programs are to:

a) Educate a new breed of computer scientists through an intensive sequence of specialized courses, and/or high quality projects, and/or a thesis.

b) Prepare graduate students to obtain attractive employment and have a positive impact on economic development.

c) Perform high quality original research, conforming to international standards.

In order to meet these goals and objectives, the department offers three different

Masters programs (with tuition fees) and a doctoral program. Similar to the undergraduate program, the graduate programs were based on Greek and international graduate programs, current trends, and the faculty's expertise. The different programs are as follows.

The first **Masters** program, in **Information Systems**, was established in 1993 and has two tracks: a part-time track that has a duration of 24 months (4 semesters) and a full-time track that has a duration of 15 months. In either track, students must take 11 courses (6 core and 5 elective), a seminar on Technology and Administration of Information Systems, and a project thesis (required). This program can admit up to 35 students each year. It is successfully aimed at generating a pool of competent and highly employable professionals who can provide informatics services in a variety of private and public sector environments.

The second **Masters** program, in **Computer Science**, was established in 2002, and aims at a more thorough foundation in the fundamentals of the field. Thus, one of its purposes is to prepare students for doctoral degrees and academic careers. It aims to admit 20-25 students. The duration of studies is 3-4 semesters. In this program, students must take 10 courses (4 core and 6 electives), a seminar on scientific methodology, and write a thesis.

In both of the above Masters programs, course attendance is mandatory; a student who misses 30% of the classes is dropped from the class.

For both programs, the number of applications has been declining over the last few years. The apparent reason is the introduction of tuition fees (the programs were initially free of tuition) in conjuction with the general economic environment. This drop has been most marked for the Computer Science program, with only 8 students enrolled in the latest cycle.

The third **Masters** program, in **Business Mathematics**, is a collaborative partnership between two universities (the departments of Mathematics and of Economics of the National Kapodistrian University of Athens, and the department of Informatics of AUEB); a committee of 9 professors administers its operation. The program focuses on mathematical models and methods related to business and production issues, at a much more technically sophisticated level than MBA programs. The admission rate is near 50%. The duration of studies is at least 12 months. Students must take 13 core courses and 5 electives. There is an option for a project-based thesis, which counts as 3 elective courses.

Admission to all Masters programs is based on academic performance, recommendation letters, CVs, and personal interviews. All Masters programs charge tuition to the students. There is a small number of scholarships, as well as some opportunities for reduced tuition in return for work by the students.

The **doctoral program** (PhD) prepares students for academic careers or high-level jobs in the public or private sector. It admits students based on academic performance, a Masters degree or equivalent, research skills, resume, recommendation letters, personal interview from a 3 faculty-members committee, and a decision from a faculty meeting. Graduation requirements include original research contributions, published in reputable peer-review international journals or in conference proceedings that require full papers and have a low acceptance ratio. Students must perform teaching duties in one course per semester (with the exception of the terminal semester). The average duration of a doctoral program is 5.75 years. This is longer than the international practice, and is due to some extent to the teaching requirement. The doctoral program does not offer specialized courses other than the graduate courses in the Masters programs and special seminars. Each doctoral student has one or more advisors and a 7-member committee.

Based on state and department rules, each faculty member (Full, Associate and Assistant professor) is allowed to supervise up to of 5 PhD students and 4 Masters students.

The curricula of the Masters programs are being regularly revised and updated by the graduate committee. A new update and revision is in the works, tuned to the new law for higher education.

IMPLEMENTATION

Curriculum structure and effectiveness of the Masters programs. Although some of the Masters programs are relatively new, they are competitive and well-known to the academic community, with a favorable reputation. The structure of the graduate curricula appeared rational, coherent, functional, and clearly articulated. The material and the courses are to a great extent well-designed and appropriate for the duration of the program. The feedback received from the graduate students that the EEC met with was favorable.

Adequacy of staff and other resources. The available resources (faculty, teaching assistants, and space) are limiting factors. They probably have a negative effect on the visibility of the programs and on well-deserved recognition.

Implementation of the doctoral program. The implementation of the doctoral program is based on the usual mentoring and apprenticeship relations, whereby students are affiliated with a research group and interact closely with their faculty supervisors. As mentioned earlier, a drawback is the lack of advanced (doctoral level) courses. Another drawback is the teaching load of graduate students.

RESULTS

Masters programs

The combination of the three Masters programs offers a rich menu. While there are synergies between the different programs, they each have a somewhat different emphasis. Taken together, they cover important national needs, because of the unique combination (especially in the first and third program) of informatics and that they offer. Overall, these programs are very successful: they attract a strong pool of students. Students receive a high-quality education and graduate in time. According to information collected by the department, graduating students are sought after by potential employers and have excellent employment opportunities, despite the difficult economic conditions.

One important concern is that the latest enrollment in the Computer Science program has experienced a drop, threatening the viability of the program.

Doctoral program

The doctoral program is in very good shape because of the high quality of many of the department's faculty, and because of the department's success in raising research funding from a variety of resources. The only caveat to this assessment is that the PhD student-to-faculty ratio could be higher. Given that the main activity of the doctoral program is original research, we refer to Section C for further discussion.

IMPROVEMENT

In general, the department has a good understanding of the main limitations and weaknesses of its graduate programs. It also understands that many of these limtations are due to factors beyond its own control (limited resources, official rules and regulations, limited autonomy, etc.).

The department has the mechanisms in place for curriculum improvement, and is aware of the issues that it needs to address. In particular, attention is being paid to the critical issue of increasing enrollment in and enhancing the viability of the Computer Science Masters program. Some additional EEC recommendations on the Masters programs follow.

a) Carry out student evaluations of graduate classes more systematically, and also

use alumni feedback in updating and streamlining the curricula.

b) Enhance contacts with industry to improve further the employment prospects of the students.

Regarding the doctoral program, a first recommendation is to find ways of shortening the average length of the program. This is certainly related to the problem of alleviating the burden of the teaching requirement for doctoral students. A second recommendation is to involve the students in collaborations with other departments (nationally or internationally), e.g., through co-supervised doctoral theses, thus improving visibility and research opportunities. A third recommendation is to increase the number of doctoral students, so as to broaden the research portfolio and also produce more highly qualified personnel for academia and industry.

B. Teaching

APPROACH

Overall, the department takes teaching very seriously. Some details on the teaching approach follow.

The department strives to offer all elective courses every year, except in the rare case of a sabbatical by a faculty member for whom a replacement cannot be found.

The department relies on the usual **teaching methods** of classroom lectures, overhead transparencies, white board use, etc. Some of the courses also have a lab component that is taught in the department's computer labs.

As usual in Greece, the department has a significant fraction of students who remain enrolled for a long time. Even if we only consider the number of students who have not exceeded the nominal graduation time of four years, which is 925 for the current academic year, the **student-to-faculty ratio** is 925:32, and approximately 29:1, which is rather high. As a result, some required courses have an enrolment of over 250 students, which makes the classes difficult to manage, especially in the absence of enough teaching assistants.

On the basis of our discussions with a random sample of students, there seems to be good **teacher-student collaboration**. At the undergraduate level, this came as a rather pleasant surprise given the number of adverse factors such as:
- the severe lack of classroom space,
- the dispersion of university facilities,
- the location of the main building in the center of the city,
- the degraded quality of the main university building and the space surrounding it.

Adequacy of means and resources. The department seems to be rather well equipped at the graduate level. However, this is less so at the undergraduate level where the equipment in the teaching labs is quite old. This is to blame mostly on the extreme complexity of the state bureaucracy and the ensuing unacceptable delays that render any planning effort by the faculty futile. There also seems to be inadequate technical staff for manning the teaching labs.

The students we spoke to were very satisfied from the support that they receive from the department's secretariat.

Use of information technologies. The department uses information technology basically for course administration, i.e., as a tool for distributing course notes and projects, communication between staff and students, etc. The department does not seem to make use of information technology directly for teaching. However, the

department plans to introduce distance learning (e-learning) in the near future, and this will contribute in partly solving other problems as well, such as overloaded classrooms or transportation problems for the students. It is to be noted that the students can access all university services, including the central library, through the internet.

Examination system. Several courses have a lab/assignment component that counts towards the final course mark. There have been some student complaints for the low weight assigned to laboratory assignments or projects towards the final mark of the course. All courses have final exams with the exception of one course whose nature requires a lab examination. The exam style seems to be non-uniform, in the sense that for some courses there are parts of questions that could be considered as drill problems, while for other courses all questions require problem solving. The level of difficulty of the exam questions, from the samples that we checked, was found to be at a reasonable level.

IMPLEMENTATION

Course materials. In addition to the one book per course that the students can select from the EVDOXOS system, students also receive lecture notes. However, there were complaints by students about the adequacy of some of the books. Books related to the courses taught can be found in the library, although in a limited numbers of copies.

Linking of research with teaching. The students at the Masters level have a required project, which is usually research-oriented. In some (rare) cases, undergraduate students have the opportunity to participate in research projects and are allowed to follow graduate courses.

Mobility of academic staff and students. The mobility of academic staff could be higher. The department does have a few Erasmus projects with some good European Universities (e.g., Ecole Polytechnique in France) which concern mainly research mobility of the academic staff. Student mobility through the Erasmus program is very low. This appears to be due to language barriers, financial reasons, student reluctance to move, and partly due to misconceptions that a course passed abroad may not be accepted as equivalent with a home course. However, academic staff attitude to mobility seems to be very positive. Mobility is an issue that needs to be addressed by the department in the very near future. A related point is trying to create joint master degrees with other universities abroad, and to take advantage of existing European programs for student/teacher mobility.

Student evaluations. There are evaluation forms for every undergraduate course, distributed to the students towards the end of the semester. The evaluation process is pre-announced for each course separately, it is anonymous, and overseen by a person not related to teaching. In general, the students were positive, both about the

process and the courses. However, student participation seems to be rather low. According to some of the students we spoke to this is due to the fact that the forms are distributed too late in the semester, when many students are absent for various reasons (e.g., preparing for exams). This is a point that could be easily addressed by the department. Another issue is that students do not seem to have access to the results of the course evaluations.

RESULTS

Class evaluations together with discussions with students gave the EEC the impression that the vast majority of the faculty is dedicated in teaching their classes well; there are very few problematic courses. Furthermore, with the exception of a few courses that the students found "too heavy" (i.e., with too much material), the students were satisfied with course content. The feedback on the performance of teaching assistants was more mixed, as some (a minority) of the teaching assistants are less motivated or do not necessarily master the subject matter.

Efficacy of teaching. The teaching methods followed are traditional and the EEC did not perceive any negative aspects.

Participation and failure rates. Participation in the exams is rather low (61% of registered students, with a 41% of the students who take the exam passing the class). Low participation is explained by the presence of inactive students. The relatively high failure rate can be partly attributed to students not having taken previous classes, that is, essential prerequisites. (The curriculum does not include formal prerequisites.) According to students, other possible factors behind the failure rates may be that: (i) the load (and difficulty) of different semesters is unbalanced; (ii) within a semester there may be several substantial projects whose due dates are clustered in a small time period.

Time to graduation. The time to graduation for those undergraduate students who eventually graduate seems to have a median of about 6 years. Graduation times are not atypical in comparison to other Greek Universities. However, they are too long by international standards, and also long with respect to the "n+2" graduation time expectation under the new law for higher education. The department recognizes that the graduation time statistics should be improved. According to the department faculty, the length of the graduation times can be attributed to several factors, some outside the department's control:
- the number of students that the Department deems reasonable to admit every year (80) is virtually tripled: the ministry sets the number of students to be admitted to 160, and an additional 80 students (approximately) enter the department through other channels (e.g. transfers from other departments); transfer students tend to have weaker credentials
- some students have financial problems and need to work in parallel with their studies (although it is not clear what fraction of the students falls in this category)
- lack of course prerequisites

- rather heavy course load (under a full program, over 30 hours of class time attendance per week)
- not enough technical staff (teaching and lab assistants)
- not enough recitation sessions

To the above factors one can add the general situation in all Greek universities, as well as student fatigue after the national entrance exams.

IMPROVEMENT

The following is a list of issues related to the improvement of the teaching provided by the department and that the department is aware of. However, the lack of resources does not allow appropriate solutions to some of these issues in the near future.

a) The main inhibiting factor in the department's day-to-day operation, and also in the department's development, are the lack of space and the bad state and dispersion of the existing space:
- small amphitheatres, inadequate for the existing number of students, degraded classrooms, graffiti in corridors, etc.
- shortage of space in the labs for storing unused equipment
- shortage of study rooms for the students (many students work in the corridors)

These factors are in sharp contrast to the generally high quality of students and teachers in the department.

b) The department is organized in three sections (τομείς) and six course tracks. However, this organization is not "easy to read," as the sections do not necessarily reflect the courses of the tracks they cover. An effort should be made to render the relationship between sections and tracks more coherent and therefore more "comprehensible" from the outside.

c) The current duration of the undergraduate program is four years. A plan should be considered for making the program compatible with the Bologna agreement.

d) The students that we spoke with brought up the following points that the department might wish to look into:
- occasional delays in delivering the results of exams (up to two months, according to some students we spoke to); fortunately, this appears to be an issue for only a handful of classes
- lack of various statistics, e.g., on the percentage of students who find employment less than a year after graduation; this lack was attributed by some faculty to personnel shortages
- inconvenient class times (e.g., 7-9pm)
- large gaps between classes
- teaching assistants in labs whose knowledge background is not closely related to the subject

- limited number of teaching assistants, due to the small number of doctoral students
- limited professor accessibility, sometimes due to the dispersion of offices
- relatively little lab work
- assignments that in some cases fall due during the exam period

e) There is currently little done in terms of: (i) promoting the distinct characteristics of the department to the Greek and international scene, and (ii) keeping track of the careers of the department's graduates. This is clearly due to the lack of enough personnel but needs to be addressed by the department rather urgently. Hiring public relation personnel would improve the visibility of the program and would help attract better qualified students. In the absence of resources, the part-time employment of graduate students to work on this task could address the problem, temporarily, while waiting for a more stable solution.

f) According to faculty we spoke with, each course is usually taught by the same faculty. There is no doubt that several years are necessary to adapt course material to the state of the art, and to shape the content in a way appropriate for teaching. However, the members of this EEC believe that the department should introduce a system of teaching rotations for at least two reasons:
- to allow young faculty members to inject new ideas into teaching
- to allow evolution in the "character" of each course

C. Research

APPROACH

The department's policy and main objective in research.

The department's current objective is to produce cutting edge, long-term, sustainable, internationally recognized, externally funded research in a number of informatics areas that lie at the intersection of computer science, economics, and business, and which are chosen so as to increase the department's attractiveness. It also aims to have high scientific impact through publications in top-tier venues, editorial activities, and service to the scientific community.

The department's research activities are organized to a large extent into five research labs. Most of these labs have a reasonable active critical mass and a coherent thematic spread, which allows for natural interactions and facilitates collaboration between faculty members. In parallel to the research labs, there are some research teams that are either on the way to becoming research labs or reflect the research activities of recently appointed faculty. The process of lab creation is adaptive and dynamic. This allows the emergence of new core research domains within the department and provides natural means of integrating incoming faculty.

The department's internal standards for assessing research.

The department's internal standards have been mostly set in an implicit manner, through a broad consensus on expectations for quality and volume of research, but also more explicitly through the expectation that doctoral theses contain publishable results of a certain quality.

IMPLEMENTATION

Promotion and support of research. The EEC observed that research has evolved over the past two decades and has become a top departmental priority in recent years. This transformation is promoted mostly by hiring exceptional new faculty.

Quality and adequacy of research infrastructure and support. The research infrastructure is insufficient and inadequate. Faculty/research labs working in related thematic areas are dispersed in different buildings, which inhibits the creation of synergies and the promotion of scientific excellence. Due to the lack of regular state funding as well as the rigidity of administrative processes, important and necessary modern computer architectures are missing (clusters, cloud, etc). Having said that, the department/faculty should be praised for its efforts to replace regular ministry funding by international and national competitive funds. In terms of administrative support, the department relies mostly on central university

services (ΕΛΚΕ) that are dysfunctional, inefficient, and time-consuming.

Scientific publications. The department's average publication record and quality is constantly increasing towards meeting, and in certain areas exceeding, top-tier international standards. The EEC noticed (through the presentations of the labs and individual discussion with faculty members) the ambition to have a continuous presence at the best journals and conferences associated with the department's active research areas.

Research projects. The department seeks support from European Research, National Research, and Infrastructure (e.g., ΕΣΠΑ) grants. This blend allows an appropriate balance of fundamental and applied research. It also provides the means to support both short-term research activities and a long term research portfolio.

Research collaborations. Internal research collaborations are well structured within research laboratories and do happen in a bottom-up and volunteer basis. It was observed that the overall atmosphere at the department is extremely collegial. Furthermore, the process of adding new faculty has been smooth and efficient. Research collaborations at the national level are increasing, something that was clearly seen in the number of national collaborative grants. International collaborations are driven mostly by individual professors and their individual professional networks rather than through institutional agreements.

RESULTS

Overall assessment of success. The department during the last two decades was able to make the transition from one focused on teaching to an internationally recognized one, through the addition of new faculty with excellent credentials and potential, thus raising substantially the average quality. This transition was carried out in an organized way by prioritizing research activities and by creating clusters of excellence that benefited the most from the unique position of the department within an Economics/Business school. The EEC acknowledges this effort, congratulates the department, and encourages it to maintain such an effort towards excellence.

Scientific publications. The overall recent scientific publication record in the active areas of the department is impressive in terms of quantity and quality. The department's record shows a constant and solid growth during the last few years and the impact of the department's publications is constantly improving. The EEC encourages the department to continue along this path, including an effort to further raise its standards in a uniform manner across the department.

Research projects. The snapshot of current research projects in the department reveals an ideal balance of research funding, with roughly equal amounts from National Research, European Research, and Infrastructure grants. At the national level, the EEC observed the outstanding performance at calls for proposals

(THALES, ARISTEIA), which definitely puts the department among the top performers at the national level in all disciplines. The EEC also acknowledges the department's continuous presence in EU grants in certain areas, a source of extremely competitive and generous funding (STREP, IP). The ability of the department to achieve solid external funding, along with its rather strict policy of only admitting PhD students that can have some level of financial support, has resulted in a very large percentage of financially supported PhD students; this percentage is among the highest ones observed in the engineering disciplines in Greece. The EEC applauds the department for this effort.

External research collaborations. The overall average quality of the external research collaborations of the department is excellent yet still improving.

Patents and technology transfer. The department has a notable number of patents. However, these are mostly due to the past affiliations of the department members rather than ongoing research activities. During the visit, no evidence was provided to the EEC that the department is pursuing an aggressive policy of transferring research results to industry. It was mentioned by the rector that the university is in the process of establishing an incubator, to facilitate technology transfer and eventually the creation of spinoff companies with the involvement of faculty and PhD students. The department would certainly benefit from such an initiative.

Visibility and awards. The department has a number of professors with high international visibility and reputation, and a substantial number of assistant professors with outstanding credentials, despite the early state of their career. It can claim in its portfolio international scientific awards in conferences and workshops (best paper awards, etc.), as well as individual distinctions of professors (e.g., participation at boards of very prestigious journals, test-of-time awards). The EEC feels that the department ranks at the top compared to the other AUEB departments in terms of international visibility of research.

IMPROVEMENT

The department should facilitate more communication between research labs, and especially allow PhD students to benefit from the interdisciplinary environment.

The department should make an effort to facilitate grant administration and relieve faculty from time and effort-consuming ΕΛΚΕ-related processes. One possible strategy could be the employment of administrative personnel supported through grant overhead withholding.

The department should make an effort to increase the number of admitted PhD students and consequently the expected scientific outcome. The EEC realizes that the number of admissions is constrained by the department's commitment to admissions with financial support, but believes that there is capacity for a larger PhD

program.

The department should increase the mobility of its members as well as the ability to attract high quality sabbatical visitors. International mobility can facilitate the creation of new collaborations, increase the department's visibility, and benefit faculty research.

The department should make an effort to increase collaborations with industry and take advantage of the opportunities offered from the university's ecosystem, which includes connections with industry and business.

The department should make an effort to increase collaborations with other departments within the AUEB. The department has the unique advantage of being in an environment that provides exposure to interesting computer science problems that arise in other domains/disciplines and with the potential of technology transfer to the society at large.

The department should find ways to explicitly recognize research achievements by students and faculty, and also to ensure that standards of excellence are uniform across all faculty and groups.

The department should make an effort to formally recognize the international standing of its faculty through nominations of IEEE and ACM Fellows. Similarly, it is recommended for young faculty to seek EU-recognition and funding through the highly competitive and prestigious grants of the European Research Council.

The department should find ways to accelerate faculty promotion. The EEC noted a number of cases where highly-credentialed young scholars were hired at a relatively low rank. Such individuals could have obtained better positions, at higher rank, in comparable or even better quality departments world-wide.

D. All Other Services

APPROACH

Overview of services provided

The university and the department make a substantial effort to provide quality services to its staff and students. There is a secretariat dealing with the undergraduate program and staff hiring, as well as separate secretariats for each Masters program (supported from the tuition fees of these programs).

Almost all procedures are carried out electronically. (For example, exam mark handling is carried out on Excel sheets; course and staff evaluations are scanned and processed electronically.)

Student registration is also carried out electronically. (Some of the students mentioned that they relied on other students' help to navigate the registration process, even though instructions are available online. Perhaps some students are not fully aware of the available support, and the department may wish to make an extra effort to publicize it.)

The department has a well-maintained and thorough web site. Besides providing a lot of useful information, it is also an entry point for certain administrative services (many of which are carried out electronically), as well for coursework. In particular, the department has developed "e-class," a web-based platform for posting class materials for easy student accessibility. (The department has also made e-class available to the rest of AUEB, which is an important service to the university.) The EEC found e-class, as well as other departmental web pages, to be very well-organized and informative.

Finally, the technical staff that provides computer and networking support is knowledgeable and prompt, leading to high satisfaction levels.

The university tries to keep the building clean but almost all walls are covered by posters and graffiti. There is plenty of cleaning staff who clean all facilities on a regular basis.

The student dining facilities are small, colorful, tidy, clean, and well organized. The food presentation is good. Almost all students can apply for a dining card and eat for free; in any case, meals are inexpensive. There is a popular coffee-bar for the students. There is no official university accommodation for the students, and the

university rents rooms in a nearby hotel. The above help to maximize student presence on campus.

Regarding handicap accessibility, most of the main building is accessible to people with mobility problems. There is an elevator that services the main building, although a bit small for persons on wheel chairs. There are elevators at the other two buildings — sufficiently large for a wheelchair. The main building has many places that are reachable through stairways, which are made handicap-accessible by either ramps or special lifts. There is no provision for visually impaired students.

IMPLEMENTATION

Organization and infrastructure of the department's administration

The undergraduate secretariat is located in the main campus, in one of the wings of the main building. (We note here that the secretariat's staff find their working space to be ample but poorly lit. Some improvements, to provide brighter lighting, would be welcome.) The graduate secretariat is located in the Evelpidon building, which is about 1 km away from the main building. The hours at which these offices are open to the students are limited to no more than two hours per day (with the exception of one of the Masters programs). Most requests are handled through a web-based system.

The secretariats seem to be very well organized. Students can fill up their requests online, and the secretariat staff prepares the requested documents electronically. Furthermore, the staff is flexible, and will accommodate students outside the standard hours, if needed. Furthermore, the secretariat staff does respond to email and telephone student requests. Students seemed to be pleased with the level of service they get from the department's secretariat.

Infrastructure for students

The department offers academic advising to all of its students. However, students do not seem to take advantage of this service.

The university's library is very small, with a limited number of books. It seems to keep 3-4 copies of books related to the main courses of the department.

There is free wifi access for students and staff from almost everywhere, except for some offices in which wired access is provided.

There is a psychiatrist, available for student counseling, as well a doctor, both

located in the main campus of the university.

The students have free use of the sporting facilities of "Panellinion," located just behind the main campus building. The staff can also use the facilities for a small fee.

There are several student cultural group activities in theater, cinema, music, dancing etc. A special room is available for these activities.

There is a large hall for graduation ceremonies, with 400 seats. It is used for 8 ceremonies per month.

IT facilities

On the main campus, most of the personal computers were dated, the vast majority being Pentium 4, and some with dual- or four-core Intel processors. Almost all run windows XP; there are no Linux machines. The main server is Dell Xeon cluster, running a Linux SAMBA server. Several out-of-service pieces of equipment were stored in the server room.

Departmental Labs:

There is a small server room with a cluster of HP PCs. The various department labs contained the following:

Lab (I): Minimal equipment, mostly desks.

LAB(II) Better PCs, mostly dated Pentium 4s.

LAB(III) Better PCs, mostly dated Pentium 4s.

Lab (IV) this seems to be up to date but not with top-end computers.

Main Lab: 45 positions, dated PCs, lots of dead monitors.

The graduate labs on the Evelpidon building were also dated.

According to students, lab facilities are often crowded. On the other hand, there is an expectation that this problem will be alleviated over time, as more students start using their own laptops.

RESULTS

The administrative services offered to the students are adequate and functional. Students (both graduate and undergraduate) and the department's staff are generally pleased with the secretariat's support.

Technical support is helpful, but is housed in a distant building, which may lead to some delays in providing service.

The information system of ΕΛΚΕ is viewed as dysfunctional, inefficient, and time-consuming.

IMPROVEMENTS

The IT infrastructure is less than desired. The department is in the process of acquiring new PCs, most of which will be running both Linux & Windows (dual boot). The necessary funds have already been approved.

To address the issue of student accommodations, a "student dormitory" (shared with TEI) is now available, 2km from the main campus. More convenient accommodations (closer to the campus), would of course be preferable.

Some students have expressed a desire for more hours during which the secretariat stays open. The EEC trusts that the department will find the best way of balancing student needs with the need for the secretariat to carry out certain tasks without too many interruptions.

Collaboration with social, cultural and production organizations
Students participate actively in the university monthly blood donation. Students and staff participate in the cultural events organised by the University.

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

The department offers a unique combination of informatics and management/economics, with multiple strengths: many high caliber faculty, internationally recognized research, solid curricula, a brand name, well-functioning operations and administration, and recognition of the department's strengths by potential employers. There are several factors that create favorable conditions for this department, such as the strong need for informatics professionals with an interdisciplinary background, of the type offered by the department.

The long-term **objective** of the department is to establish itself as a center of excellence in education and research within its niche (informatics with an emphasis on connections with management and economics). In contrast to traditional programs that focus on management with a side-emphasis on information systems, this department is special in that it aims to build business and economics applications on top of a solid technological background. This orientation is reflected in the undergraduate and graduate curricula, and in the choice of research directions. All of these features set this department apart from other informatics or business departments in Greece, and serves an important need.

In the EEC's view, the department's **objectives** can be articulated more concretely as follows:

a) offer the best undergraduate education in Greece within the department's niche;

b) offer Masters programs that are of high-quality relative to European standards;,

c) run outstanding research programs that are internationally recognized.

The department's **strategy** to fulfill its objectives, as articulated by the department chairman, includes the following items. Comments by the EEC are added in brackets.

a) The hiring of high caliber faculty, in targeted areas.

b) The development of critical mass, with an international presence, in areas such as resource allocation, information management, networks, security, etc.

c) The pursuit of interdisciplinary activities, within AUEB, as well as outside, e.g., on the economics of information or in digital curation, and an expansion to new application areas such as energy, health care, social networks, and distributed systems. [While these are worthwhile goals, the EEC understands that the

department cannot realistically expand to all of the above areas, and that choices will have to be made.]

d) Remaining abreast of latest developments in academia and industry, and accordingly engaging in continuous updating of the curriculum.

e) Efficient allocation of available resources to best support education and research.

f) Administering the department in an efficient manner, with the active involvement of all faculty members.

g) Increased participation in international graduate (including doctoral) programs, exchange programs such as Erasmus, and possibly in European Masters degrees and joint doctoral degrees. [The EEC considers this as a priority item.]

h) Development of alumni relations, e.g., tracking of their careers and creation of an alumni association. [The EEC considers this as another high priority item.]

i) Development of life-learning programs.

The department, despite its relatively short history, has made major steps towards attaining its above stated long-term objectives and in carrying out its strategy. For example, the average quality of research in the department has been raised through the faculty hires of recent years.

The department expects that in the near future there may be few faculty openings, at best. For this reason, the department has not tried to make choices regarding new areas to be developed and in which new faculty would be sought. In fact, the department is afraid that due to the current economic conditions, some faculty may accept appointments at universities abroad. As some of the faculty are of very high caliber and could easily find good positions abroad, this is a justifiable fear.

The EEC considers all of the strategic action items listed above as worth pursuing. Some additional comments will be offered in Section F, which lists some of the EEC recommendations.

Inhibiting factors

The strategic direction of the department is unfortunately affected to a very large extent by factors beyond its control, related to legal, political, and societal issues. The best that the department can do in this respect is to be engaged in the public discourse, trying to influence government policy. The main inhibiting factors and the EEC's views are listed below.

a) Disorder and lack of safety on campus. The appearance of the university, the state of its facilities, as well as the illegal commercial activities around its entrance are unacceptable, and do not correspond to an environment conducive to

learning. In addition, students and staff are unsafe because of non-academic persons entering the university grounds, as well as because of incidents involving occupations and destruction of property. The government (in collaboration with the university) must carry out its duty, which is to enforce the law and guarantee a safe learning environment.

b) Large number of admitted and transferred students. In 2010-2011, there were 165 regularly admitted students, plus transfer students who brought the total to over 240. Even if all students were to graduate in 4 years (which is far from being the case), this would amount to about 30 students per faculty, which is a high ratio. (As the average time to graduation is higher, the actual ratio is even higher.) Furthermore, transfer students tend to have lower qualifications, which brings down the overall educational level, and has undesirable side effects on the attitude of the better prepared students. The department has argued that, given available resources, the total number of students (regular plus transfers) should not exceed 100. The EEC agrees that the number of entering students (especially transfer students) should be reduced.

c) Inadequate buildings and other infrastructure. The department is scattered in different buildings. The geographical distance between them is a major hindrance, leading to fragmentation of activities and interactions. It would be best to consolidate the department into contiguous buildings. In addition, the number of classrooms is inadequate, leading to scheduling problems as well as overflowing classrooms. The same comment applies to laboratory facilities.

d) Lack of autonomy; slow and cumbersome administrative procedures. Decision-making authority should reside at appropriate levels, in conformity with international university practices, without micromanagement from above. Unfortunately, the opposite is the case. For example:

(i) The department does not have its own budget and needs to go all the way up to the rector even for minor expenses, e.g., buying a PC. Ideally, minor purchases should only need the approval of a faculty and a departmental overseer.

(ii) The delays in the faculty hiring process are long: it takes several years from the time that the department decides to try to hire in a certain area until the position is announced, a faculty is chosen, and a faculty is finally appointed.

(iii) A program such as the Masters in Business Mathematics should have autonomy, with oversight from the departments involved, rather than having decisions going through multiple councils in multiple departments.

(iv) Hiring of research staff, to work on funded research projects, or curricular changes should be a matter internal to the department.

(v) At least until now, the department has not had the option of listing and enforcing course prerequisites, which has well-known undesirable side-effects (e.g., higher

failure rates, hence overcrowding of classes, etc.)

In addition, frequent changes in laws, rules, and procedures create uncertainty and difficulties. Of course, if there were more autonomy, with more of the procedures guided by internal rules and regulations (εσωτερικός κανονισμός), this problem would be mitigated.

e) Domestic funding is erratic. Proposal calls by the state agencies do not have a fixed or predictable cycle. There is a very long (and unpredictable) lead time between proposal submission and the time that funds are finally made available.

f) Inadequate number of teaching assistants. Teaching assistants are indispensable, given the large size of many of the classes and the nature of the subject matter, but state funding is not available. Hence the department forces doctoral students to serve as teaching assistants throughout their studies, which is undesirable for several reasons (lack of motivation, distraction from research, etc.)

F. Final Conclusions and recommendations of the EEC

This is a relatively young department, but has nevertheless established a strong presence, with great potential to become even stronger. It is an outstanding informatics department in terms of the quality of its curricula, research, and faculty. It includes an exceptional number – by international standards – of very strong faculty that have been hired in recent years, together with some excellent senior faculty in a number of department priority areas.

Besides the high quality and academic presence of many of its faculty, a unique asset of this department is its intellectual positioning, as it ties together informatics with management. This results in several advantages:

a) it brings the department in contact to important application domains, and hence new intellectual challenges and opportunities for interdisciplinary research;

b) graduates of this department (at both the undergraduate and graduate level) have very good employment prospects.

The department is functioning well, with a collegial environment and provides good services, to the extent allowed by its limited facilities and resources, and despite the heavily bureaucratic system within which it has to operate.

General recommendations to the department

Promotion of the department in order to attract the best students. For various reasons, the reputation of the department in non-academic circles, and even in the eyes of the its own undergraduate students, has not fully kept up with its quality. As a consequence, the students that it attracts at the undergraduate level (that is, the admission threshold) is not as high as it should be. Similarly, some of the graduate programs have somewhat limited demand. Even though the department is already making an effort, it should find proactive and imaginative ways of promoting its public image, in order to attract a broader and stronger pool of students. Given the quality of its faculty and programs, the department should be able to compete with all other universities and polytechnics in Greece for the best students.

Improve the image of the physical aspects of the department. The department should find a creative way to reach consensus with the student community (including most of the political organizations) and start a campaign to clean the buildings from unnecessary graffiti and to agree on rules for more orderly displays of posters (political or otherwise).

Offer Masters programs in the English language. The Masters programs offered by the department are of very high quality, and well tuned to employment

opportunities. Accordingly, if offered in English, and given their moderate tuition (by international standards), they should be able to attract many well-qualified foreign students. As a first step, the department should identify the closest existing European Masters programs, and devise a strategy for competing with them.

Provide rewards for excellence. Even though the department offers a few awards for undergraduate student performance in classes, there could be more awards to recognize excellence in teaching, research, etc., for both students and faculty. Even if financial resources are not available, any kind of recognition can improve morale.

Increase the integration of the different groups. To some extent because of the geographical separation, interaction between different research groups is less than desired. The department can address this issue by encouraging interactions between groups. The practice of having a special day when each group presents its research to the entire graduate student community should be made regular.

Take better advantage of the AUEB's academic "ecosystem." For example, there could be stronger curricular and research links with other departments. Furthermore, students should have more opportunities of taking courses from other AUEB departments.

Address the question of program duration. The department needs to contemplate possibilities for programs that conform to the Bologna guidelines. In addition, and independent of the Bologna guidelines, it should seek to understand and mitigate the main bottlenecks that cause the average active student to take a long time to graduate.

Better faculty promotion strategies. There seem to be a number of faculty who are at a lower rank than they deserve. The department should try to overcome bureaucratic hurdles and expedite promotions, whenever appropriate, staying closer to international rather than Greek practices. And the Ministry should give universities real autonomy in hiring and promoting faculty and staff, based on internal rules and regulations.

Bring business and entrepreneurship one step closer to the students. There is a number of courses that address business and economics issues, and there is also a special course on entrepreneurship. Yet more can be done for students to appreciate at an early stage what it takes to invent new products or start a company. For example, students should be strongly encouraged to participate in innovation competitions.

Prepare for changes in the delivery of education (online learning). There is a real possibility that university education will be radically transformed over the next decade through the emergence of scalable online courses (see, for example, iniatives such as http://www.udacity.com/, http://see.stanford.edu/default.aspx, or http://mitx.mit.edu/). The department should contemplate forming a strategy.

Given that the department has been instrumental in developing e-class, a tool that is used by the entire university, it may have the momentum in further developing various online capabilities. (Videotaped lectures would be a first-step, but online learning goes much further.)

Recommendations at the University level

a) Consolidate faculty office space and make efforts to physically locate all personnel at the same area.

b) Facilitate the grant-management process (through ΕΛΚΕ) and reward the department for its great success in securing national and international grants.

c) Provide additional support for the department's graduate programs, e.g., in the form of secretarial support.

d) Make the department a central component of the university's strategic plan, and promote its image, capitalizing on the department's student quality, research, international standing, and importance of its thematic area.

Recommendations at the state level

It is vital that the government eliminate as many as possible of the following inhibiting factors. (See Section E for a more detailed discussion of these factors.)

a) Enforce the law and promote a safe and orderly environment.

b) Reduce the number of admitted students.

c) Plan and eventually implement improvements to the physical infrastructure (buildings, classrooms, laboratories).

d) Provide autonomy and flexibility by providing decision-making authority at lower levels.

e) Reduce delays in the hiring process.

f) Streamline the process of domestic research funding.

g) Provide the means to support teaching assistants.

These steps will result in significant improvements not just for this department, but for the entire system of higher education.

Finally, the EEC believes that the state should make computer science and informatics a priority area within the higher educational system. It is a modern discipline that could be a driving force for the country's economic renaissance; this

is because well-trained personnel is already available, and because high economic and societal impact is possible with minimal investment. For some concrete steps, the state should facilitate the creation of inter-disciplinary, inter-departmental graduate programs, and also promote the creation of new informatics companies, including university spinoffs.

The Members of the Committee

ATHENS UNIVERSITY OF ECONOMICS & BUSINESS

DEPARTMENT OF INFORMATICS

Name and Surname   Signature

Prof. John N. Tsitsiklis

Massachusetts Institute of Technology, Massachusetts, U.S.A.

Prof. Nikolaos Bourbakis

Wright State University, Ohio, U.S.A.

Prof. Costas Iliopoulos

King's College London, University of London, London, United Kingdom

Prof. Niκos Paragios

Director of the Center for Visual Computing of Ecole Centrale de Paris &

Ecole des Ponts - ParisTech, Paris, France

Prof. Nicolas Spyratos

Université de Paris-Sud XI, Paris, France