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University Student Entrepreneurship (UNISTEP): an innovative approach to generate technological projects for commercialization

by Vassilios C. Kelessidis (TUC), Artemis Saitakis (STEP-C), Yiannis Fraggiadakis (UC), Anna Fourfoulaki (UC), Georgia Papadaki (UC)

EXECUTIVE SUMMARY

In this paper we present and analyze an innovative approach, applied for the first time in Greece, which enables University students to develop a prototype, testing their original idea and whose successful implementation may lead to new technological ventures. The approach involves the collaboration of students with technical and academic personnel, exploits existing academic knowledge and student creativity, provides access to large and expensive equipment of Institutes' laboratories required for prototype implementation and funding necessary for prototype development. The project specifically aims at University students and it is in addition to other spin-off support initiatives of the Organizations.

INTRODUCTION

Innovation was always a priority of European Union but formalized with the Green Paper on Innovation (COM95) and the First Action Plan for Innovation in Europe (COM96). The importance of innovation was highlighted by the March 2000 European Council in Lisbon which called for creating a challenging program for building knowledge infrastructure, enhancing innovation and economic reform and modernizing social welfare and education systems (COM2000, 567). European Commission has implemented hundreds of measures aimed at innovation, one of which is the support of innovative actions in European Regions. For the Region of Crete, CRINNO (CRete INNOvation) is the program implementing such innovative actions for the period 2002-2005. CRINNO is coordinated by the Region of Crete and has thirteen actions, one of which is UNISTEP (UNiversity Student EntrepreneurshiP) which fosters the Nursery of Ideas. The successful implementation of this program will create a supportive environment for fostering innovative ideas within universities and research centers, will enable faster commercialization of research and development results and will achieve high quality preparation of would be entrepreneurs for the operational stage.

There is increased emphasis on entrepreneurial activity within universities and research centers (Liu and Jiang, 2001; Nindozuau et al., 2002) and a social imperative has emerged for these institutions to become engines of economic development (Powers and McDougall, 2005). At the same time around the world there is increased reporting that low rates of technology transfer from universities and research institutions to productive companies and local environment through the many existing avenues of technology transfer like technological support, research and development, spin-offs, the most productive way for technology transfer (Nindonzuaou et al., 2002) is rather the rule than the exception.

Initiatives supporting such technology transfer activities within universities have been implemented around the world in the past years with predominantly high success rates. We present some of these initiatives and while the list may not be exhaustive, they are indicative of the range of such actions. Implementations of similar concepts have been reported in Finland, Sweden, Norway, Germany, France, USA, Spain and the Netherlands. To the authors' knowledge, this is the first time such an initiative has been taken in Greece.

In Norway, the scholarship program that started in 1982, aimed at providing scientists and academics the necessary time, competence and money to assess whether it was the right time to launch an

enterprise. It has been deemed a success by maintaining a very high 74% survival rate of the created high-tech businesses (89% start-up rate) but the program has been assessed as not contributing significantly to employment creation (Reitan, 1997).

University of Arkansas and Arkansas Science and Technology Authority, USA implement I², Innovation Incubation, an outreach program targeted at increasing the number of business start-ups in the state. It operates as a matching service pairing the needs of the knowledge-based start-up company with on-campus facilities, equipment and researchers so that the company can develop a prototype for an idea of a product or a service, and the program is considered a big success (www.innovationincubator.org).

In University of Bielefeld, Germany, the Institute for Innovation Transfer operates the pre-incubator to promote the creation of spin-off companies from the university, with target groups students, graduates, scientific staff and professors. They support technology based business ideas focusing on training and coaching of potential entrepreneurs, providing legal cover for business activities and access to scientific equipment and technical staff. The idea has been followed-up by a consortium of Universities, led by University of Bonn, who started a similar project in 2000, the USINE project, funded by European Commission, involving three countries, France, Spain and Germany. The project has been deemed a success and a methodology and best practice are provided through the project's web site (www.usine.uni-bonn.de).

The Centre for Innovation and Entrepreneurship (CIE) in the University of Linköping, Sweden, offers to students (and researchers) a one-year long non-credit course targeting those who have a business idea and would like to develop it with access to mentors, tuition in writing a business plan and workshops in order to develop their entrepreneurship. More than 40 companies have been developed during the first 4-5 years of implementation.

Helsinki Technical University implemented the SPINNO program, a top down approach for supporting potential entrepreneurs by providing network structure, training programs, laboratory infrastructure while also having flexibility on IPR issues.

In the Netherlands, Twente University has implemented what is being considered as a huge success, TOPS (Temporal Entrepreneurial Positions) which offers support to would-be entrepreneurs for one year by means of technical facilities, staff support, regional industrial mentor and interest free loans.

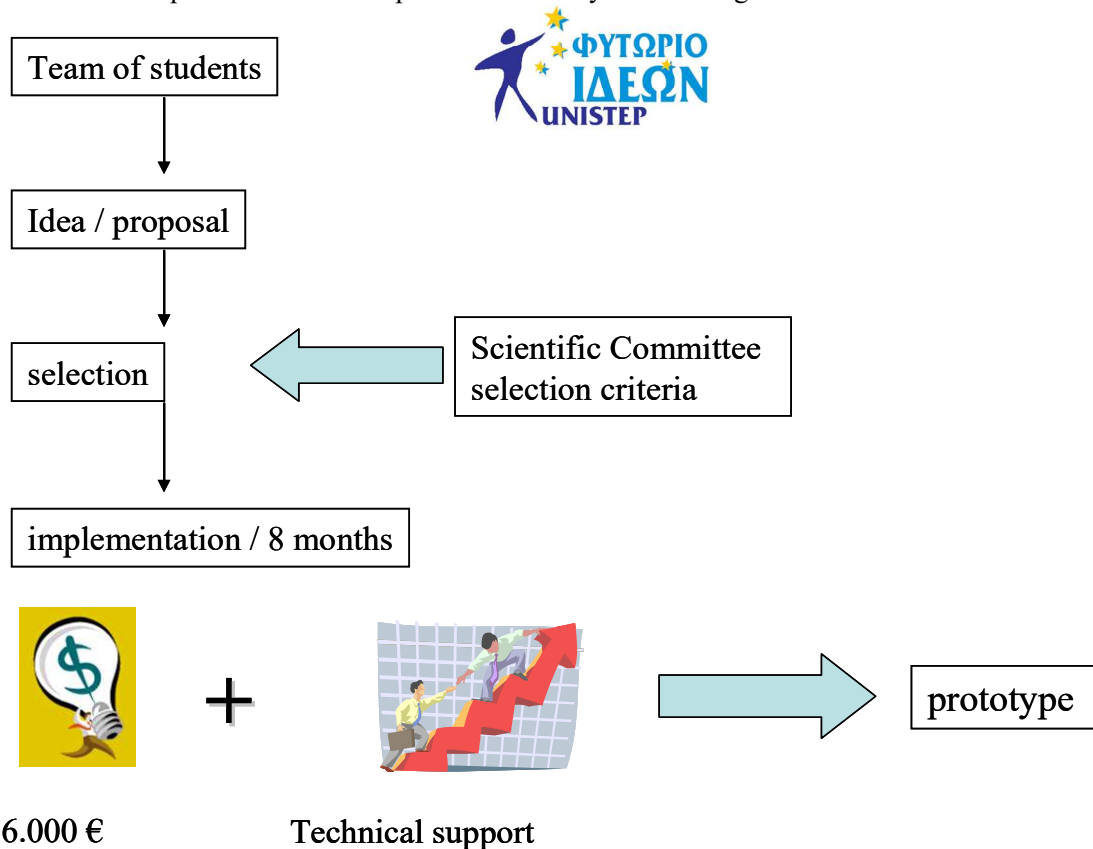
All these and other similar activities aim at fostering an innovation and entrepreneurial culture within the academic environment of universities and research centers which will aid potential entrepreneurs to start technology based businesses utilizing all resources available in these institutions.

BASIC CONCEPT

UNISTEP is a pilot action, financed by European Commission and the Greek Government through CRINNO, the Innovative Actions Project of the Region of Crete. It focuses on creating a positive environment for cultivating entrepreneurship among University students. Greek students get good and sound education in many scientific and engineering principles, however the entrepreneurship culture is at its infancy, similar to some countries, for example France (Carayannis et al., 2003) but contrary to students from other countries, for example USA (Carayannis et al., 2003) and Singapore (Wang and Wong, 2004) among others. With the aid of appropriately structured and targeted educational seminars and the implementation of the Nursery of Ideas the project aims at cultivating the entrepreneurship culture to Greek students and researchers of Higher Educational Institutes and Research Centers in Crete.

UNISTEP is a joint effort between Technical University of Crete (TUC), University of Crete (UC), Foundation of Research and Technology Hellas (FORTH) and Science and Technology Park of Crete (STEP-C). The action aims at promoting the creativity and entrepreneurship of TUC and UC students while exploiting knowledge of academic personnel and research infrastructure of these four Institutions, This action involves the creation of an appropriate lab type environment where groups of students or post-graduate students can work for creating, developing and testing a prototype based on their idea, and which could be the basis for development of a new product or service leading to a new technology based enterprise. Laboratory type places are created with basic tools and infrastructure which can be used by all students. The two Universities and FORTH provide access to the use of large and expensive laboratory equipment, under the supervision and direction of academic personnel, necessary for the successful development and testing of the prototypes while STEP-C offers space for the placement of created enterprises.

The basic concept with the main steps for the Nursery of Ideas is given in Schema 1.



Schema 1. Basic steps for the implementation of the Nursery of Ideas

The supporting environment provides for appropriate training of the students participating in the Nursery of Ideas, helping them in their effort to become successful entrepreneurs. Four training modules are given, Introduction to Entrepreneurship, Entrepreneur and the Legal Environment, Developing a Business Plan and Financing of a New Venture. In addition, a network of Mentors from successful entrepreneurs is established, who can guide and support the students during the development of their prototype and finally help them develop their business plans to seek additional funding and to establish start-up companies. Links to appropriate infrastructures such as Incubators

and Science and Technology Parks are also provided for potential set-up of start-up companies. The full support of the innovative environment of the Science and Technology Park is thus fully exploited as a support to University students.

IMPLEMENTATION

The project is currently implemented, for the first time in Greece, in Technical University of Crete (TUC), in University of Crete (UC) and in FORTH / Science and Technology Park of Crete (STEP-C). Short descriptions of activities of these Institutions are given in Appendix A.

The project aims to support twenty teams of students to develop twenty prototypes in fields of research of the Institutes over a period of twenty four months for a total budget of 400.000 euros. It is in full operation for more than a year now. The first six months were allocated to project and environment preparation. There are two eight month cycles for projects' implementation for a total of sixteen months, and a final two month period for wrapping up the project and making the final assessment. In addition to the development of prototypes, UNISTEP aims to train and educate through seminars eighty students from the teams of the Nursery of Ideas but also students from the universities interested in learning more about entrepreneurship.

The project started by first taking the necessary steps to get required approvals from authorities of the institutions and informing the academic and student community. It was deemed necessary to create a logo for the project (Schema 1, Fytorio Ideon (in Greek) – Nursery of Ideas) which was finally assessed as a successful move because now the word has spread around in the academic community. In parallel, various forms and procedures were established for submitting and evaluating the proposals, for seminar evaluation by the students and progress reporting on the prototype development. The scientific committees were also established at the institutions with faculty members of the two universities. Since the project operational plan called for two execution cycles, there were two calls for project proposal submissions and also two calls for participation in the training seminars.

In the first call for prototype proposals, 20 projects were submitted of which 10 were selected to be implemented. In the second call for prototype proposals, 20 proposals were submitted and 10 were selected. Four prototypes have already been developed while sixteen prototypes are currently under development. Short descriptions of these projects together with their contributors are given in Appendix B. Similarly, some pictures of already developed prototypes are provided in Appendix B.

For the four modules of the training seminars, there were about 30 students on the average attending the seminars during the first cycle, while during the second cycle the number has increased to 45. Full evaluation of the seminars of the first cycle provided the feedback to optimize the seminars of the second cycle. In principle, student satisfaction, after the first cycle, was more than 80% in almost all areas, organization, content, instructors, lessons learned. The sessions that were assessed as most useful were the sessions where company executives from local and regional companies were invited and shared experiences about starting up and running a business with the participating students.

REASONS FOR SUCCESS

Critical factors for success of such endeavors within universities and research centers seeking entrepreneurial success have been identified in prior studies as availability of faculty of top quality, well organized technology transfer offices and participation of industry through joint funding and collaboration (Powers and McDougall, 2005). Science and Technology Parks can be the catalysts for successful technology transfer and company creation through the provision of high-tech facilities for incubation and the provision of technology transfer services that can be developed and exploited

(Kelessidis, 1998; Saitakis, 2003). At the same time, the local environment should be taken into account before starting out and expanding such activities (Kelessidis et al., 1999).

Although the project has not ended, input from students, academics but also from people from the market indicates that the project will be deemed as full success. Continuous interaction with the students provides the feedback on their assessment of the project which is deemed as an excellent project, never before materialized in the area. It has uncovered hidden talents and ideas, existed in at least some of the students, which could never be realized without such a program. Students attending the training seminars of the second phase already inquire about the continuation of the program. At the same time, other institutes are also inquiring about participating in such a project.

The reasons for success appear to be the concerted set up and proper organization and the integrated design of the action, the full commitment and support from the Organizations (the two universities, the research center and the Park, the availability of potential entrepreneurs, the collaboration with the appropriate laboratories for having access to large and expensive instruments and the necessary technical support, given from the laboratory either from academic or technical personnel. In addition, the complementary actions of the project which included both theoretical and practical implementation with the support of a mentoring network have proved very helpful to the success of the project. Apparently, the project covered a need for commercial exploitation of ideas and prototypes that could be produced in the Institutes through the academic and research activity. Moreover, the students, the academics and the research staff, as well as the Administration of the Institutes engulfed the project and its implementation with willingness and enthusiasm which had an impact to the success of the Nursery of Ideas.

All of our students have technical background with most of them having little or no exposure at all to issues like starting up and running a business. The seminars given during the period of prototype development have greatly benefited the potential entrepreneurs. Seminars on subjects like business plans, financing new ventures, sharing experiences, starting new ventures, have already been identified as key components for the success of such projects (Reitan, 1997).

The implementation of a project such as UNISTEP inside the research/university labs is very innovative and pioneering for a new and peripheral academic system. The collaboration of the two universities, the research center and the Science & Technology Park of Crete (STEP-C) in the area was very important because there is a collaboration on technological products and services generated by the educational and the research institutes and the space provided to new technology companies at the Park, established by graduates as well as by some students from the University of Crete. This was one of the main initiatives to support the idea of the development and implementation of the project.

UNISTEP is the first programme supporting student entrepreneurship in Greece so far. It is also the first attempt to encourage university students to work towards commercialization of their ideas in an organized and structured way. Greek academic institutions are not very supportive for the creation of an entrepreneurial culture within the academic community. During the last 2-3 years, there is an attempt to change this climate through different measures financed by the CSF programme. The Ministry of Education and Religious Affairs is supporting entrepreneurship in education through the programme entitled "Promoting Entrepreneurial and Innovative Applications". Of the measures which have already been integrated and are carried out by the higher education institutes, most concern the incorporation of courses on entrepreneurship, where there were previously none, elective courses and a cross-curricular approach and also support the establishment of Career Offices, organization of events with the participation of the business community.

The Ministry of Development is financing, through the Operational Programme “Competitiveness”, the exploitation of research results by research teams, academics, researchers and students through various measures like spin-off creation and university / research centers liaison offices. There is also support for the development of intermediary organization like Science & technology Parks and Incubators, Intermediary technology Transfer Organizations and support for innovative companies to participate to RTD programmes.

This new environment is very much supportive to the academic and research people willing to participate. Competition for awards in higher education which is open to students was initiated by some Universities and the Greek Patent Organization has awarded the best patents filed by Greek research teams.

Another factor which is supportive to the success of the UNISTEP Programme is the creation of a Seed Fund in the region of Crete. The fund was created in the framework of the CRINNO Programme (Crete Innovative Actions Programme) with the participation of a Regional Bank, the Chamber of Commerce of Heraklion, the University of Crete, private investors and the Greek Fund for New Economy (TANEO, www.taneo.gr)

What is necessary for the successful continuation of the UNISTEP Programme, is the support for the creation of a new entrepreneurial culture within the academic institutions in Greece and improvement of the conditions for the establishment of a new business by creating a more friendly administrative framework with the simplification of the procedures and the reduction of the required documentation and bureaucracy for starting up and running businesses.

DIFFICULTIES

During the design of the project there were significant concerns about the degree and level of acceptance of such an endeavor by the academic community because of the almost non existent entrepreneurial culture within Greek universities. Opposition was expected from those thinking that the role of universities is teaching and research and not commercialization activities among not only academics but also among students, a notion common to many countries (Rasmussen et al., 2005). Hence, the whole operation started cautiously with information provision to all involved partners and the project started smoothly. However, implementation of such actions are never difficulty free.

The main difficulties faced during the first stages of the project, are related mainly with administrative and managerial issues. These problems were the following:

- a. Full mobilization of students for starting something entirely new and totally different from today’s students’ culture in Greek universities. Furthermore, time was not sufficient to enable full promotion of the project and relay the scope and aims of the project. Steps to encourage more student involvement included full administrative and technical support, face-to-face consultations. In reality, it was essential to have a product champion to promote the project in each institution, who had also the full support of appropriate administrative, technical and scientific staff, like the scientific committees which aided greatly the dissemination and promotion of the project and the project selection process. It is felt that after the completion of the first cycle, the project became widely known to the communities which enabled more students to participate in the project.
- b. Ownership of the IPR. Ownership of the Intellectual Property in Greek Universities and Research Centers is not clear, and problems were encountered in the beginning of the project related with the participation of the students to the IPR of the developed prototypes. Further progress on the project will heavily rely on appropriate resolution of this difficulty.
- c. The project selection procedure. Since universities are very open and full transparency should prevail throughout all the process, scientific committees were created which took over the selection process. Criteria for selection were established and a methodology was developed in

order to aid the selection process. In the end, no significant complains were made by the participants.

- d. The participation of students to the first cycle of seminars was not as expected by the organizers. This was a result of different problems related with the schedule as well as the limited information about the programme and the entrepreneurial culture within the academic community. During the second cycle the schedule was more relaxed, with four afternoons in a two week period for each module as compared to the exhaustive two full days per module in the first cycle. This change probably resulted in more students participating in the seminars in the second cycle.
- e. There is concern about moving to the next step and finding possible financing for creating potential start-ups. Sufficient information about potential funding for the next steps should be provided at the early stages so that necessary steps should be taken early on.

TAKING THE NEXT STEP

The implementation of the UNISTEP Programme is the first attempt to cultivate an entrepreneurial culture and support university students to test their business ideas, in a Greek peripheral region. The training and financial support of the students, is very important during the first stages of the program while physical scientists should also go beyond personal business training but think about hiring specialist business management skills as the business grows for increasing their chances for survival (Oakey, 2003). The establishment of a group of Business Mentors, who will support students during their work as well as after the end of the project, is also an important element of the programme. The successful implementation of the first projects, in addition to the continuation of the programme, will create an environment, which will promote entrepreneurship and innovation within the academic institutions.

The students have to be encouraged to continue their work after the end of the project, by networking them with business angels and venture capital companies. The Science & Technology Park of Crete will offer them space and business support services in very low prices, in order to establish their own businesses.

The new national strategy that seeks to develop “Regional Innovation Poles” to bring all regional actors together in order to promote economic development though innovation is also a tool which will support the continuation of this endeavor. The project, having proved its feasibility in this pilot action, will be incorporated into the proposal for the development of the “Regional Innovation Pole of Crete”. This specific action in collaboration with other horizontal measures supporting entrepreneurship and exploitation of research results through the synergy of research institutions with the public and private sector will, in the end, establish a solid infrastructure that supports innovation resulting in successful research results exploitation through new company formation. This will then generate the need for the development of new incubators in the area to house these activities which, upon further expansion will necessitate the establishment of Science and Technology Parks, in addition to the existing one in the Region. Hence, islands of technical development are created fully exploiting the existing knowledge in the universities and research centers allowing not only the graduates to remain in the region but also aiding the successful luring of highly talented students and professionals to the institutes and the region.

FINAL METHODOLOGY

The implemented measures should be compatible with other initiatives aiming at similar target groups and goals. If one thinks of the establishment of new technology based companies as a baton race, additional support stages beyond the Nursery of Ideas should exist in the region and provided by public or private entities (Reitan, 1997). Length of funding period was fixed for this pilot action.

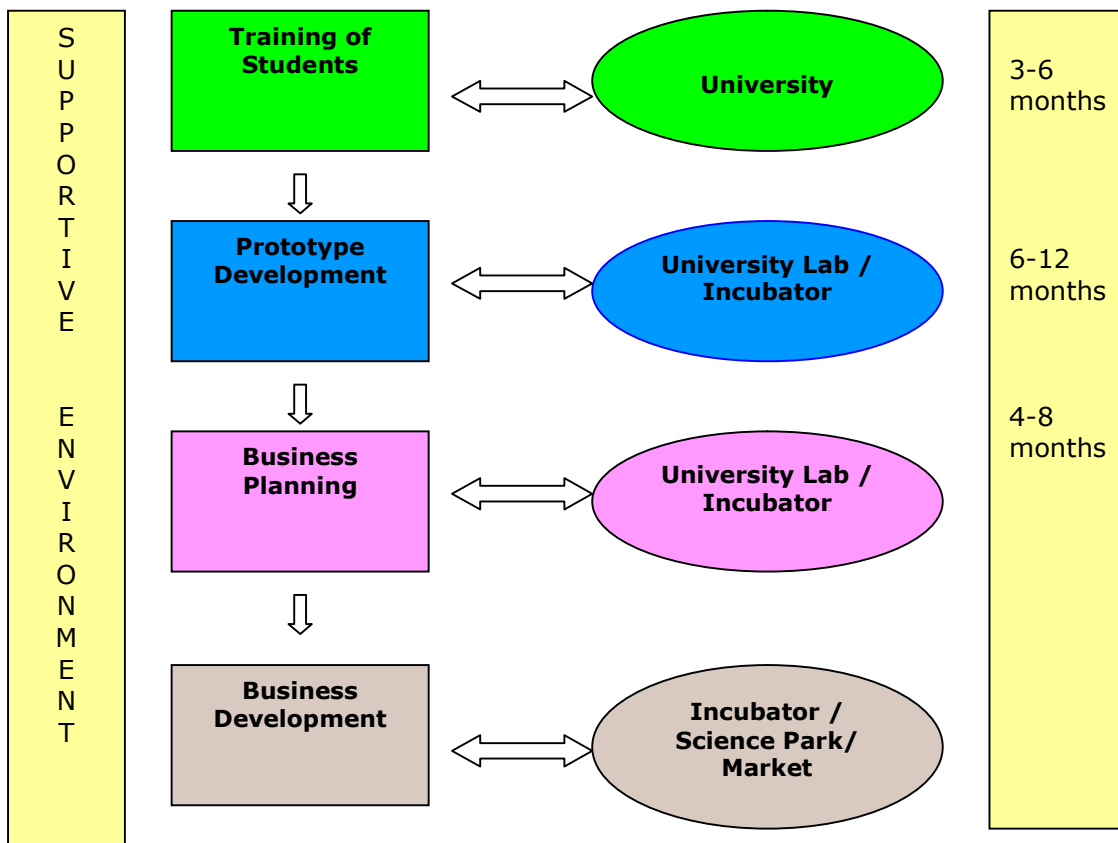
However, the needs of every individual and of any project are different; hence, the program should be flexible and accommodate different duration times.

From our experience, after the implementation of the UNISTEP Program and from other successful examples throughout Europe and other places in the world, it became quite obvious that developing and implementing a successful student entrepreneurship program through the Nursery of Ideas, requires a supportive environment with at least the following elements:

- An entrepreneurial attitude among the students and academics
- Education and training of the potential entrepreneurs by offering elective courses and practical exercises in entrepreneurship, business planning, financing and management of new ventures.
- The support of the Universities and research institutions, which will offer laboratory equipment, mentoring and guidance.
- The existence of supportive intermediary organizations and mechanisms like Technology Transfer Offices, Liaison Offices, Incubators and Technology Parks.
- The availability of seed and venture capital, business angels and other financial institutions. Possible procedures for access to funding of would be entrepreneurs
- A framework which encourages the establishment of new business by simplifying the required procedures and lowering the initial cost.
- The support of mobility of research and business people.
- The full operation of the network of mentors who can aid potential entrepreneurs each time they feel a need for support and to take them through the first and difficult steps of starting up a business.

The final methodology is presented in the following diagram:

Schema 2. Schematic for implementation of Nursery of Ideas



CONCLUSIONS

A concept implemented in various forms and shapes in other parts of the world for exploiting ideas residing unexplored in universities and research centers, in the form of a Nursery of Ideas has been implemented for the first time in Greece. The project, UNISTEP, provides an environment in the academic world conducive to enterprise creation by university students, exploiting laboratory infrastructure that would be unavailable outside the academic community and helping them to develop a prototype based on their idea, to check whether the idea could be taken further towards company creation. Training and business mentoring are also provided thus linking research with business. After more than a year in operation, four prototypes have already been developed while sixteen more are under development, with the expected finish at the end of 2005. Feedback from the students, the academics and people from the market already points out to the success of this pilot action giving support for its continuation through the upcoming regional innovation pole of Crete and by expanding its operation to other institutions of the island of Crete. The reasons for the success so far have been identified as the proper organization of this action, the integration and complementarity of the work performed, the full support of the Region and of the participating Institutions and, in the end, the latent supply and availability of ideas by our students, awaiting to be explored through the implementation of such a program.

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APPENDIX A

PROFILES OF THE ORGANIZATIONS IMPLEMENTING THE PROJECT

Technical University of Crete (TUC) was founded in 1977 and is in operation since 1984. The goal of the University is to provide undergraduate and graduate studies in modern engineering fields, to conduct research in cutting edge technologies as well as to develop links to Greek industry. TUC has six departments, the General Department, the Department of Production Engineering and Management, the Department of Mineral Resources Engineering, the Department of Electronic and Computer Engineering, the Department of Environmental Engineering and the Department of Architecture. TUC educates about 2000 students and about 500 graduate students There are 92 faculty members and 121 academic staff, with the appropriate number of technical and support staff. The campus is located in a panoramic site on the peninsula of Akrotiri and covers an area of 750 acres, 7 km northwest of the city of Chania.

University of Crete is multi-disciplinary, research-oriented University, situated in the cities of Rethymnon and Heraklion. It is a well-known Institute both nationally and internationally, with considerable research activity and initiatives that reflect its character. It was established in 1973 and operated during the academic year 1977-1978. Today, more than 10000 students attend the University. The University's staff consists of 580 Teaching and Research Staff members. Its operation is supported by more than 400 administrative staff. The University of Crete is developed in two cities and three campuses. At Rethymnon, the seat of the University operate the Faculty of Letters consisting of Departments Philology, History-Archaeology, Philosophy and Social Studies, the Faculty of Social Sciences consisting of Departments Sociology, Economics, Psychology and Political Science and the Faculty of Education consisting of Departments Primary Education and pre-School Education. In the second city at Heraklion the following Faculties operate,

the Faculty of Science consisting of Departments Physics, Mathematics, Chemistry, Biology, Computer Sciences, Applied Mathematics and Material Science and Technology and the Faculty of Health Sciences consisting of Department of Medicine.

The Foundation for Research and Technology Hellas (FORTH) consists of 7 Institutes located in the cities of Heraklion, Rethymnon (Crete), Patras (Peloponnese) and Ioannina (Epirus). FORTH was created and grown gradually since the 80's. Currently, the following institutes comprise FORTH: Institute of Molecular Biology Biotechnology, the Institute of Electronic Structure and Laser, Institute of Computer Science, Institute of Chemical Engineering and High Temperature Processes, Institute of Applied and Computational Mathematics, Institute for Mediterranean Studies, Crete University Press. In 1988, the Marine Biology Department of IMBB was detached from FORTH to become an independent institute, the Institute of Marine Biology of Crete which is one of the most successful research institutes in the country and leads the research in the area of Marine Biology and Biotechnology. During the 90's, FORTH established three Science & Technology Parks. The Science & Technology Park of Crete, the Thessaloniki Technology Park, and the Patras Science Park. In 2001, the Biomedical Research Institute, associated with the University of Ioannina (Epirus), joined FORTH, to become its 7th Institute.

The Science and Technology Park of Crete, was established in 1993 by FORTH. The idea was to promote the creation of a third thrust of development on the island, in addition to agriculture and tourism industry. It collaborates closely with the private sector as well as with the University of Crete (UC) and Technical University of Crete (TUC). STEP-C gears itself to become an ever increasing attraction as an Incubator, nurturing spin-offs and small innovative companies in the areas of Medical Equipment, Biotechnology, Telecommunication, Telematics and Teleworking, Microelectronics and Laser applications, Environmental Technology, Polymers and Applied Mathematics. The Park operates in two buildings and has 4000 sq.m. of floor space with more than 100 offices and 12 labs, accommodating about 25 technological and service companies, at a privileged physical location, nearby Heraklion, which is the business centre of the island. It is situated at a short distance from the main town, 12-km away from the international airport of Heraklion and 4 km away from the beach. The Park has developed one of the first "Resort Office" prototype in Europe, introducing an integrated concept for working and relaxing in an environment that promotes creativity, encourages commitment to new technologies and offers ample opportunities for all year-round enjoyment.

APPENDIX B

PROJECTS SELECTED AND CURRENTLY IMPLEMENTED AT NURSERY OF IDEAS

Here below are listed the titles with a short description of the twenty projects currently being implemented in the Nursery of Ideas, ten at TUC and ten at UC and FORTH/STEP-C.

Project title: Interferometric cochlea, E. Keskilidou, Assoc. Prof. S. Moustazis, TUC

The aim is to develop an interferometric cochlea, a transmitter and a receiver of acoustic signals in liquids exploiting the principles of operation of mammal's cochlea.

Project title: Software and electronic library for the synthesis of furniture, F. Papadopoulos, Ass. Prof. Y. Nikolos, TUC

The aim is the development of an electronic database for parametric design of furniture as well the development of associated software for integrating parts of furniture into a complete system.

Project title: Development of a seismic dampener with the use of smart elektro-rheological materials, I. Zaharakis, Assoc. Prof. K. Providakis, TUC

The aim is to develop a seismic dampener using electro-rheological fluids.

Project title: Pilot study of geophysical methods to a construction site in the TUC, N. Spanoudakis, Prof. A. Vafeidis, TUC

The aim is the pilot application of an integrated methodology for the extension of geotechnical parameters from reference points (e.g. drill sites) with the use of geophysical methods and algorithms.

Project title: Autonomous robotic vehicle, S. Piperidhs, Ass. Prof. N. Tsourveloudis, TUC

Development of a robotic vehicle equipped with autonomous computing power and a full sensor system to be used in the lab but also in the field.

Project Title: Design and development of a prototype flight system for an unmanned airborne vehicle of vertical landing and take-off (VTOL). N. Vitzilaios, Ass. Prof. N. Tsourveloudis, TUC

The aim is to design and develop a prototype system for unmanned vehicles of vertical take-off and landing which will be utilized for flying a bench scale helicopter available at the laboratory.

Project Title: ‘Nuclear’ energy from peaches, A. Kalpakas, Assoc. Prof. N. Vamvuka, TUC

The project aims to exploit the available thermal energy from the burning of peach cores which result after the canning process of peaches from the regions of northern Greece, with a prototype methodology and equipment for the burning of cores.

Project Title: Production of an ecological hydraulic lime, G. Traintafyllou, Prof. T. Markopoulos, TUC

The aim is to develop an ecological hydraulic lime powder using as raw material limestone from Crete.

Project Title: Blue tooth reconfigurable run time environment, K. Kazakos, Prof. A. Dollas, TUC

The aim is to develop this system capable of reprogramming, control and qualify Bluetooth systems based on field programmable gate arrays.

Project Title: Forecast fires, E. Vardakis, Assoc. Prof. S. Moustazis, TUC

The aim is the development of a system consisting of a mobile unit and a central station for the detection, transport and monitoring and processing of data and images.

Project Title: “CONFIOUS – Conference Nous”, E. Papaggelis, UC

The project idea is the development of a system prototype, for management of scientific conferences. The system combines precise algorithms and operability which provide effective support to the management of a conference.

Project Title: “Development of a set of bio-indicators for genetic improvement of plants”, P. Sarris, UC

The aim of the project is the proof of concept for the development of a set of bio-indicators, which will be applied to classical genetic improvement of plants, which are economically important.

Project Title: “FCool: Electro mechanic system for monitoring of truck cold rooms”, N. Papadakis, UC

The idea is the development of an automatic system for monitoring and control of temperature inside the cold room of a truck. The system will automatically provide information and offer the possibility to control the conditions inside the cold room.

Project Title: “Biosynthesis of plant flavonoids with biotechnological applications from *Saccharomyces cerevisiae* and application for the protection of vine”, E. Trantas, UC

The project idea is the mass production of flavonoids for the integrated protection of vineyards, using biotechnological methods. This will support organic farming as well as the wine and food industry

Project Title: “Quality control of aquatic systems using photosynthetic flow of electrons through inductive fluorescence”, C. Neonaki, UC

The aim of the project is the use of inductive fluorescence as a bio-indicator. The use of microalgae under controlled conditions will allow the measurement and evaluation of the quality of every aquatic ecosystem as well as public water and irrigation systems.

Project Title: “Cultured skin for transplants”, V-I. Alexaki, UC

The aim of the project is to cultivate keratinocytes for the production of skin transplants. The project will demonstrate the possibility to produce enough transplant skin, in short time.

Project Title: Alkali catalyzed, two-stage process for biodiesel production from used vegetable oils mixture and evaluation of its fuel properties and specifications. S. Terzakis, Mentor: E. Stephanou, UC

The aim is to develop a simple and safe methodology for producing biodiesel of acceptable quality (under the EN 14214 specifications) from a mixture of used oils feedstock. to establish a simple formula of the quantity of the catalyst needed, and to estimate the diesel fuel properties of the biodiesel product.

Project Title: BlueVibe platform, K. Mastorakis & P. Pasxalis, Mentor: E. Marazakis, UC

BlueVibe platform is a complete solution for providing localized mobile multimedia and information services. It supports a wide range of mobile devices capable of communicating either via Bluetooth or IR. BlueVibe Platform design focuses on modularity and flexibility in order to allow easy integration of new technologies and services according to the customer needs

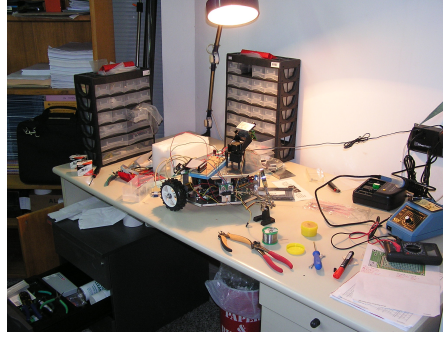
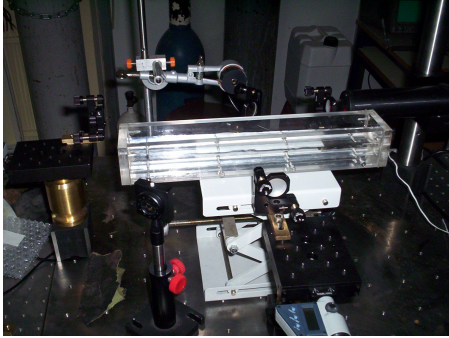
Project Title: Development of methodology for evaluation of visual performance when driving at night, P. Sapountzis, Mentor: S. Plainis, UC

The aim of this project is to develop and evaluate a methodology for the acquisition and the spatio-chromatic analysis of the natural scenes that encountered when driving (especially at night-time conditions), taking into account the neurophysiological characteristics of the visual system.

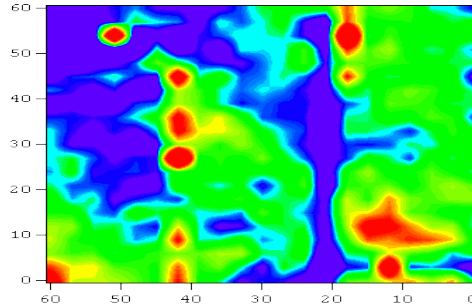
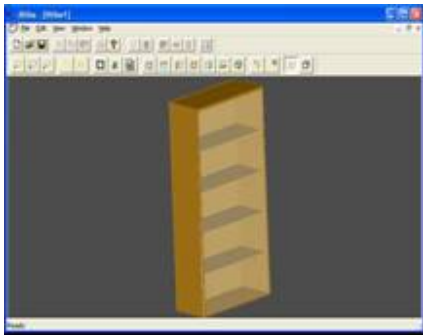
Project Title: Development of a product for the Confrontation of the Bee Parasite Varroa destructor, D. Isaakidis, Mentor: X. Katerinopoulos, UC

The goal of this study would be the development of a ready to use product by Apiarists through the isolation of potentially drastic parasiticides or parasite-repelling substances that are contained in the plants *Ditrichia viscosa* and *Anageris foetida* and the preparation of samples which will be used for biological in vivo studies.

PHOTOS OF SOME OF PROTOTYPES ALREADY DEVELOPED



Left: Interferometric coherence, Right: Autonomous robotic vehicle



Left: Software database for furniture creation, Right: Geotechnical assessment through geophysical methods



Left and right: Biodiesel preparation from used oils