

A photograph of four young adults (three women and one man) sitting on a lush green lawn. They are all smiling and looking towards each other, engaged in conversation. They are holding various books and notebooks. The background shows a line of green trees under a bright sky.

Making the difference...



**Eastern Macedonia & Thrace
Institute of Technology**

EMaTTech Strategic Plan

2014-2020

**Making
the
difference...**



EMaTTech Strategic Plan

**Eastern Macedonia & Thrace
Institute of Technology**

2014-2020



Letter from the President



As the President of the Eastern Macedonia & Thrace Institute of Technology, I'd like to thank you for your interest in our institute. During the years of my presidency, I, my Vice-Presidents, academic and administrative staff have done our best to modernise the institute, raising the bar to establish what is viewed as one of the most successful institutes of technology in Greece. Over those years we've populated our institute with people who we believe can really help us raise the standard in both education and research & development. We have looked for shared interests and philosophies, but we embrace differences as well. We strongly believe that the team effort can lead to great success and accomplish the current and future goals of the institute.

The Greek educational system has undergone many changes during the past number of years and will most likely continue to do so. The political and financial uncertainty in the country has led to significant cuts in public spending and increased competition for research funding. These challenges can be an opportunity for us to evolve, to push forward with reform, to stand out from the other educational institutes in Greece through higher standards of education, research and innovation.

This Strategic Plan has been developed as a response that changing higher-level landscape in Greece and will provide the institute with an ambitious forward-looking plan with our vision, mission and goals for the upcoming years. It begins with an introduction to the institute, who we are and what we've been doing for the past number of years and then continues with our mission, our shared vision for the upcoming years, what we think we will have to do to get there and how we can determine if we are being successful with our plan. It can help us achieve our full potential by playing to our strengths, exploiting our past achievements and overcoming our weaknesses, and can also help the student recognise the distinctive research-led education we can provide.

Prof. A. Ch. Mitropoulos



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How can we enhance
our academic quality in
the context of the limited
resources at our disposal?

Approach

The priorities laid out in this strategic plan have been carefully selected and planned by a Priorities Committee made up of the members below. The committee made an early decision to focus on the institute as a whole, with the following important question to answer: how can we enhance our academic quality in the context of the limited resources at our disposal?

The committee acknowledged early in the planning process that the aims of the Strategic Plan should be ambitious but also realistic regarding the current and potential resources available to the institute. The committee has worked closely with the heads of departments and relevant faculty members to establish five priorities. The three main principals used to develop these priorities are outlined in later sections of the document.

Chairs

Prof. A. Ch. Mitropoulos - President
Prof. E. Vansant - Head of Hephaestus Lab
Prof. D. Bandekas, Director of the Electrical Engineering Dpt.
Prof. N. Theriou, President of Special Account and Research
Prof. A. Christoforidis, Director of Petroleum and Mechanical Engineering Dpt.

Committee Members

Dr. J. W. Nolan
Ph.D. Candidate N. Vordos
D. A. Gkika



Approach

Vision



There's no doubt that the years ahead will be difficult. The environment in which we have to operate is aggressive, and due to the political and financial uncertainty, is one of fluctuation. However we are determined to achieve our vision; to ensure that our institute evolves into a Centre of Excellence.

By doing so, we will achieve international distinction for creativity, innovation and excellence, enhance the institute's research culture and develop new research partnerships that expand on our research strengths. This will ensure that we can meet the changing needs of society through innovation and hard work and by creating value, original ideas, and leadership.

Gender issues are a cross cutting activity at the heart of the institute's vision and includes promoting women in science through the Association for Women in Action initiative.



Vision



The institute is committed to creativity, innovation, and excellence and to the dissemination of results to society to enhance society in meaningful and sustainable ways.

We transform lives and serve society through education, creating knowledge and putting knowledge to work on a large scale. We will provide access and opportunity to all students and to offer excellent programmes of teaching and research, backed up by excellent services.



Mission

13

Strategic Plan
2014-2020



History Who we are

Phase 1

Kavala Institute of Technology
(KavTech)

2008-2012



The Kavala Institute of Technology was founded in 1976, and its current form is a result of many institutional reforms and changes. It was originally established as an Educational Centre for Vocational Studies and upgraded to an Institute of Technology in 1983. In 2001 it became a Higher Educational Institute and since 2007 is a University-level institute. The institute is split into three faculties, the School of Technological Engineering, School of Management and Economics, School of Agricultural Technology and an additional branch in Didimoticho where the Department of Nursing is located.

In 1985 the first campus outside of Kavala, housing the Department of Forestry and Natural Environment Management, was established in the nearby city of Drama. In 1992 the institute was relocated to the main campus in St. Louka, having previously been situated in different buildings around the city.



Who we are History

In 2012, the Kavala Institute of Technology was ranked 8th among the 16 Institutes of Technology and 25th among 50 Universities and Colleges throughout Greece. Globally, it is ranked in the first third (1/3) (3,744) of the world's top 12,000 Universities as determined according to the indexes of the Cybermetrics Lab, which are based on the production and publication of scientific knowledge.

The graph below in figure 1 shows the flow of students into the institute for the 2008 – 2013 period per department, as well as the number of students that graduated during that period.



Who we are History

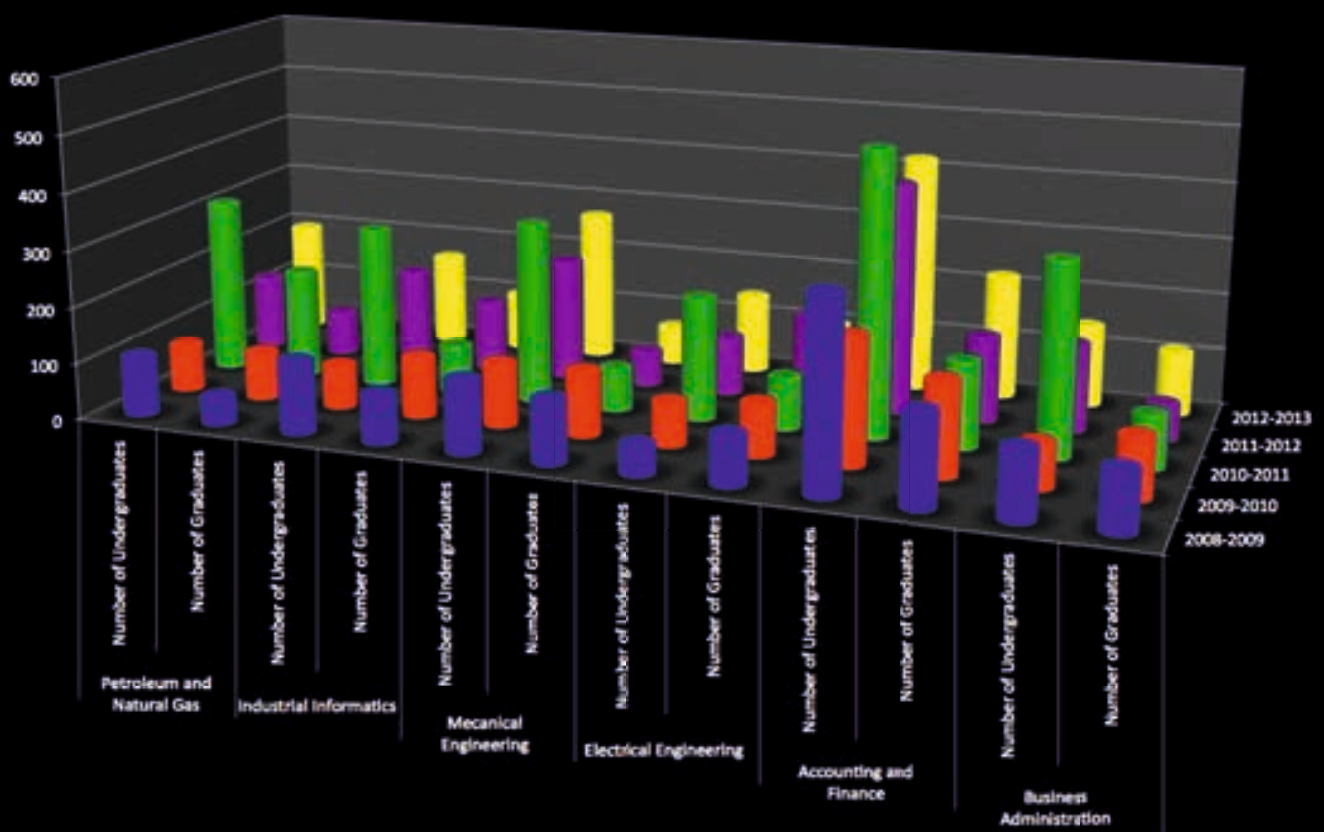


Figure 1. Intake of undergraduate students and output of graduates, per department for 2008-2013.

Internationalization



nationalization

nationaliz

Internationalization

As part of its strategy to improve standards at all levels, the institute has pursued international collaborations with some of the finest academics and universities from around the globe.

Some of these academics have agreed to work with the institute on a daily basis by participating in the institute's Board of Regents.

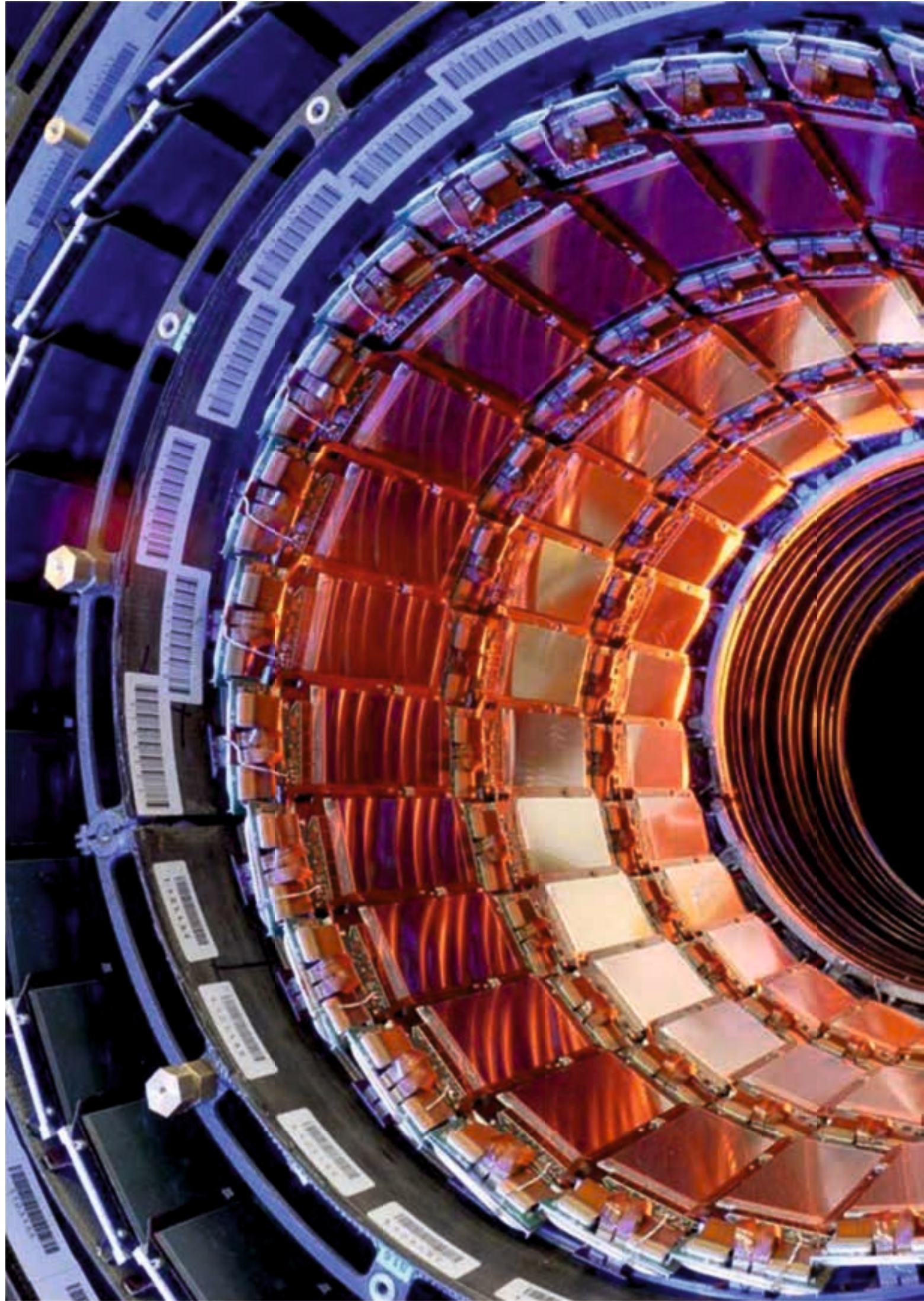
President of the Council

- Prof. N. Katopodes / University of Michigan

Members

- Prof. Leonard C. Feldman/Rutgers University
- Prof. Schuyler Korban/University of Illinois
- Prof. George J. Moridis/Lawrence Berkeley Laboratory





Collaborations

Other major collaborations include those with:

- National Centre for Scientific Research 'Demokritos' (through the Kavala branch)
- Centre National de la Recherche Scientifique (CNRS), France
- University of Antwerp, Belgium
- University of Alicante, Spain
- Lomonosov Moscow State University, Russia
- Fraunhofer Institute of Technology, Germany
- Texas A&M, US
- CERN
- University of Oxford, UK

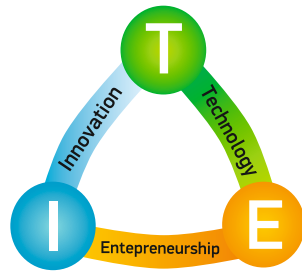
Working with such experienced and distinguished personnel has undoubtedly helped us to raise our standards in management, in education and in research and motivated us to reach out to other institutions.



EMaTTech MSc Programs



MSc in
Oil and Gas Technology



MSc in
Innovation in Technology
& Entrepreneurship



MSc in
Water Resources
of the Mediterranean



***MSc in Accounting, Audit and
International Transactions***



**Master in
Business Administration
MBA**

A Leader in the Field

The institute has undertaken a number of initiatives to enhance its standing in both education & research, activities which are unique in Greece. These include:

6 self-sustaining M.Sc. Programs, more than any other Institute of Technology in Greece.

- M.Sc. in Oil & Gas Technology
- M.Sc. in Innovation in Technology & Entrepreneurship
- M.Sc. in Business Administration
- M.Sc. in Water Resources
- M.Sc. in Accounting, Audit and International Transactions
- M.Sc. in Management and Information Systems



JOURNAL OF Engineering Science and Technology Review

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Scientific Journals

Scientific Journals:

The institute is dedicated to achieving the highest standards in research and the promotion of knowledge, and is actively involved in a variety of areas, including computer science, chemistry, chemical engineering, and material science. The institute publishes two English-language scientific journals in relevant fields:

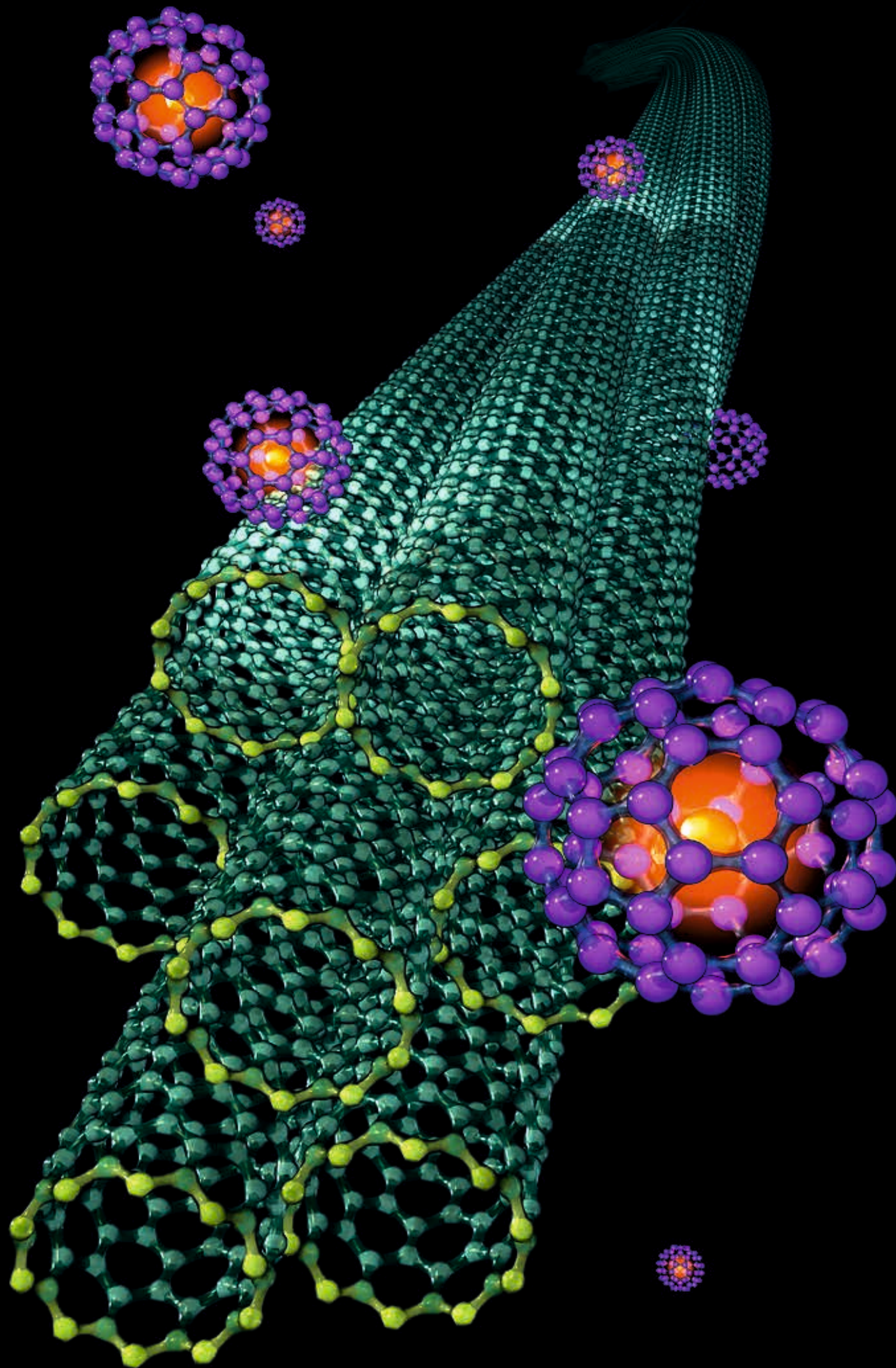
- a) The Journal of Engineering Science and Technology Review, is edited by Prof. D. V. Bandekas and is indexed by SCOPUS, ACS, DOAJ and EBSCO.
- b) The International Journal of Economic Sciences and Applied Research (IJESAR) which is edited by Prof. A. Karasavoglou

These journals contain:

- original scientific work (research articles)
- announcements (review articles)
- letters (letters to the editor)

These journals are open access; the contents can be obtained and viewed online for free.





Upgrading of research infrastructure

During the 2009-2012 period, the institute invested more than €10,000,000 to acquire new research infrastructure. This was done through the National Strategic Reference Framework.

Highly advanced instruments, such as a Transmission Electron Microscope, X-Ray diffraction, Atomic Force Microscope, Mercury and Nitrogen Porosimeters, Protein Analysis, Contact Angle, Langmuir–Blodgett film deposition and Gas Chromatography Mass Spectrometers, Wind Tunnel, Robotic Arm, high-powered Laser, instruments for Thermo Gravimetric Analysis and Differential Scanning Calorimetry, a Smart Sensor System and Geophysical Analysis Instruments were acquired.



Hephaestus Advanced Lab
Eastern Macedonia & Thrace
Institute of Technology

**Petroleum
Engineering**
Division

1



**Electrical
Engineering**
Division

2

3

**Mechanical
Engineering**
Division

Hephaestus Advanced Laboratory



Establishment of the Hephaestus Advanced Laboratory: the laboratory first operated in 2007 serving the needs of the Oil & Gas Technology, Electrical Engineering and the General Science Departments, under the title of Centre for In Situ Studies. The original field of research was the characterization of materials using small-angle scattering and electron microscopy. The vast majority of the new instruments purchased in 2012 have been housed in the Hephaestus Laboratory.

With the new research infrastructure, came the ability to expand our research capacities, which is now focused on characterization of materials, measuring technology and metrology and robotics, and now incorporates researchers from the Departments of Petroleum Engineering, Electrical Engineering and Mechanical Engineering, as well as researchers from the National Centre for Scientific Research 'Demokritos' in Athens. The laboratory has also developed strong partnerships with both industry, such as Kavala Oil and Prisma Electronics, and the academic community, such as the Universities of Oxford and Antwerp, CNRS, Alicante, Lomonosov and Texas A&M.

The laboratory has been supported by the region through a €10 Million ESPA grant for purchase of infrastructure, and is currently receiving Greek/EU funding of over €1 Million. External researchers from European universities having a combined total of over 2,000 publications and 100 patents also support the activities of the thirty laboratory researchers.

Kavala Section of Association of Women in Science



AWIS

ASSOCIATION FOR WOMEN IN SCIENCE

Kavala GR

E

Establishment of the Kavala Branch of the Association for Women in Action:in the past number of years women have become more active in science in general, however they are under-represented in the various core areas and don't always get the same opportunities as their male counterparts, despite how much they have to offer. The institute supports and collaborating with the Association for Women in Science (AWIS) to rectify imbalances between women and men, and integrate a gender dimension in research and innovation programming. The Women in Action theme is leading to a better understanding of men and women's needs, behaviors and attitudes that contribute to the scientific quality and societal relevance of produced knowledge, technologies and innovations. Such initiatives can also lead to the production of goods and services better suited to potential markets.



AWIS





Society of Petroleum Engineers

KAVALA SECTION

INFO : <http://spe-kavala.org/>

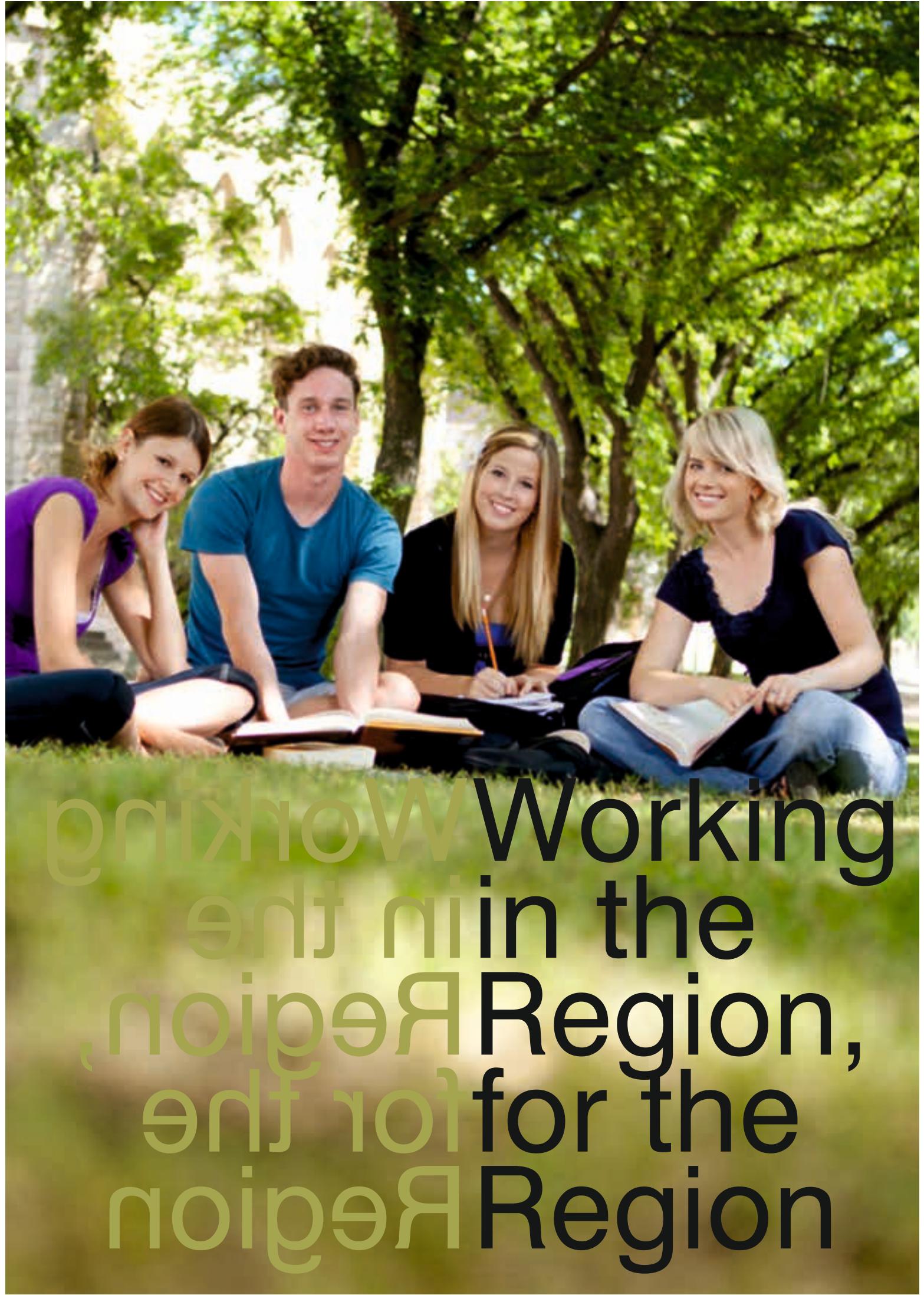
E Establishment of the Kavala Branch of the Society of Petroleum Engineers (SPE):

SPE is the largest individual-member organisation serving managers, engineers, scientists and other professionals worldwide in the upstream segment of the oil and gas industry. The society offer a unique opportunity to contribute to the profession through programs and activities and many accomplishments are driven by the dedicated members.



SPE





Working
in the
Region,
for the
Region



Working in the Region, for the Region

Over the years the institute has built close ties with regional companies, including SMEs. This level of collaboration varies from sending the institute's students to these companies for work experience, to closer ties for development of regional policies. At last count, the institute has collaborated with over 2,500 companies based in the region.

Additionally, the institute has worked closely with regional authorities, to develop the region's smart specialization strategy and to gain an understanding of how it can appropriately address the needs of society. The regional governor has also greatly assisted the institute during the planning and provision phases of the institute's recent infrastructure upgrade.



Phase 2

Eastern Macedonia & Thrace
Institute of Technology
(EMaTTech)

2012-2020



C

Cost-cutting and administrative changes in the Greek higher educational system has led to a number of alterations in the institute, the most visible being a name change from Kavala Institute of Technology to Eastern Macedonia and Thrace Institute of Technology (EmaTTech). Additional changes include the merging of some departments and budget cuts. As a result of these changes, the institute's management identified the need to modify how the institute operates at such a critical time to enhance the institute's position as a leader in education and research. A strategic planning phase was initiated to redefine the institute's vision, mission, and the methodology needed to achieve these, to turn the challenges we face into an opportunity. Our aim is that EmaTTech re-affirms its position as one of Greece's leading research universities, by building on the good work that has already been done, exploiting our achievements and overcoming our weaknesses by following the actions detailed in this strategy. Research plays a fundamental role in the institute's strategy; research is understood to be one of the key drivers of technological innovation, which in turn is a key force in economic growth. In this context, the government should plough money into research, but the high risks inherent in funding research programmes prevent it from doing so at times of economic crisis. It is therefore the responsibility of stakeholders such as the institute to demonstrate to governments and policy makers that scientific findings can lead to marketable products, and has the potential to lead the country out of crisis. One of the key objectives here is the development of spin-offs that can commercialise the institute's knowledge, scientific results and marketable products.





E Excellence
M Mission
A Awareness
TT Trust/Target
E Efficiency
C Creativity
H Human Oriented



Excellence in Education

The highest standards of excellence will be: achieved by offering a practice-informed academic programme that is intellectually stimulating and relevant to the students and their high aspirations. New ideas and new teaching methodologies such as providing access to digital environments, and data, and utilisation of world-class research facilities can all be used to enrich the learning environment. Excellence in education also means providing excellent career prospects which is done by keeping up to date with the changing needs of employers and developing well-motivated, engaging individuals with the necessary critical thinking skills to succeed in professional, academic and research environments. The graduate programmes also aim at the development of an entrepreneurship mentality.

A constructive partnership with our students will ensure that the informed student voice is engaged in all our decision-making, and puts the students at the heart of our approach. Additionally, a modern educational institute should provide excellent career support services to both undergraduate and master's students. The institute's Career Office provides individual and group counseling on vocational guidance, graduate curricula, funding postgraduate studies in Greece and abroad. The office's activities are provided free of charge to students and graduates of the institute to better understand their particular inclinations, abilities and vocational interests. Organised activities include briefings seminars such as Career Guidance Days, workshops on simulation interviews, training on CV and cover letter writing, simulated staff selection interview.



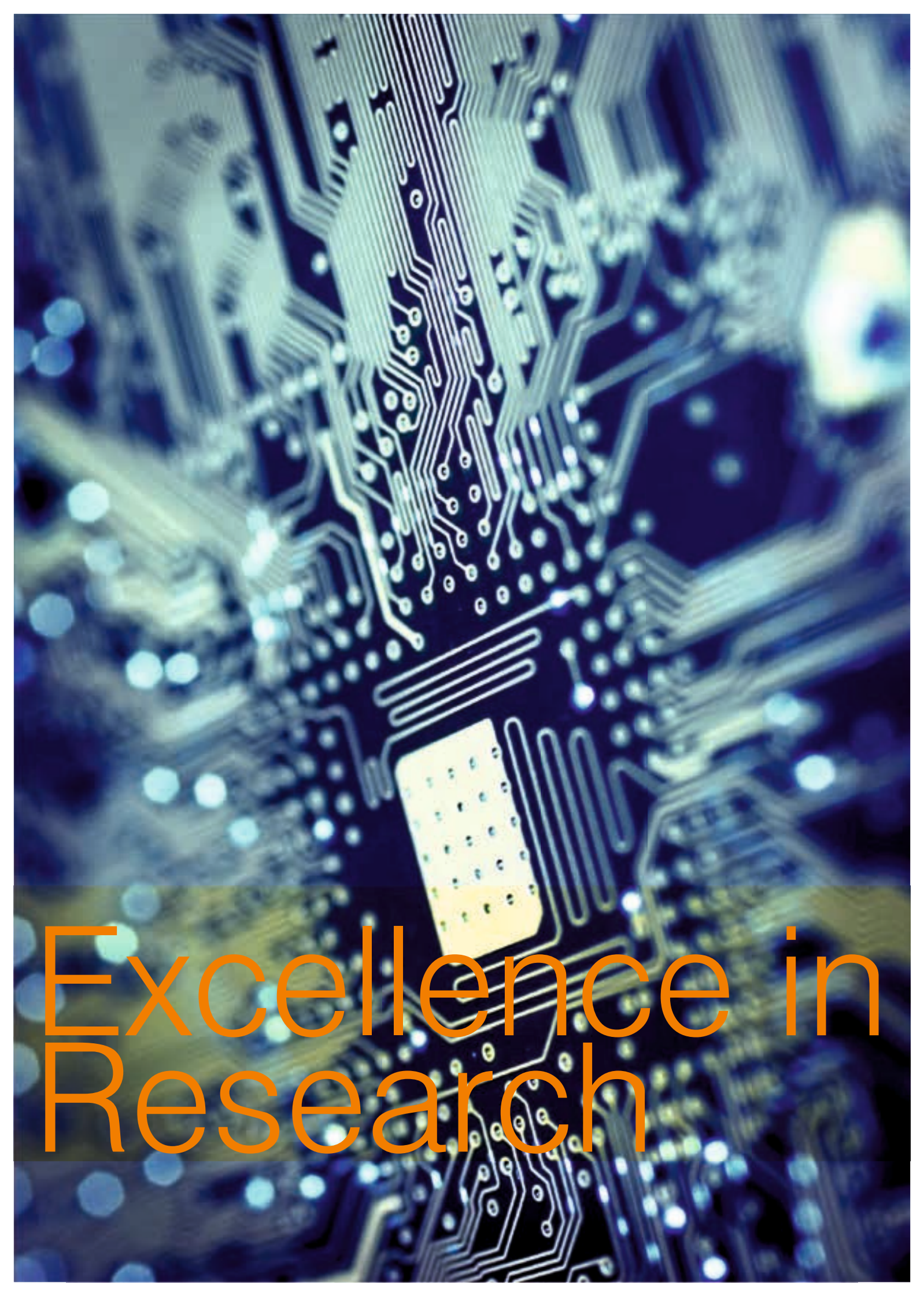
Excellence in
Innovation
Excellence in
Innovation

Excellence in Innovation



It's universally accepted that research is one of the key drivers of innovation. Innovation procedures and management of ideas include many techniques such a morphological box of ideas, a theory of inventive problem solving (TRIZ), brainstorming, experience exchange (ExEx), etc. However, as already stated, investing in innovation is a big decision; although R&D successes are eagerly advertised, failures are scarcely reported. As a result, a large amount of useful information is lost.

Although speed in moving ahead with new technical ideas is an attractive concept, by itself, it can invoke poor decision-making and result in ill-fated products. Entrepreneurs need to see things from the right angle. In the western world, rapid commercialisation has become inevitable for those wanting to be competitive. Entrepreneurs are forced to take risks and address the fears of the market in order to gain advantage. Policy makers contribute to this end by approving more funds for innovations. On this ground research and technology driven educational organisations have a key role to play, to create a new generation of entrepreneurs and encourage them to act by providing them with necessary tools and results which can help them overtake the limitations and minimize risk.



Excellence in Research

Excellence in Research



Excellence in Research: is at the core of our mission, and our vision for upgrading of the institute to a Centre of Excellence and will ensure that it becomes an internationally-engaged, research-intensive university with the ability to make a major contribution in addressing societal challenges. We recognise that there's a lot of work to be done to make our vision achievable, but there are many benefits; the establishment of a Centre of Excellence and will boost competitiveness and support the creation of jobs and new sources of growth through innovation. New knowledge, technologies and innovations can turn societal challenges into an opportunity for the region, and for Europe. For example, the digital economy can bring benefits through enhanced productivity, efficiency and innovation. New opportunities through innovation can lead to new growth sources through entry into new markets. It can be argued that for innovation, economic growth, and job creation, Greece needs access to the best researchers, the best research groups and the best research-facilities.

Additionally, being an excellent performer in research can help raise the profile and awareness of the institute, providing potential for enhanced international collaboration, so that the brightest minds work together for greater impact on societal challenges. Highlighting and increasing the attractiveness of research to existing undergraduate and graduate students can motivate them to become involved.

Excellent research in the institute is supported by European researchers having over 2,000 publications and 100 patents. The Greek National Centre for Scientific Research 'Demokritos' has also opened a branch in Kavala at the Hephaestus Laboratory, sharing researchers and also providing a flow of Ph.D. students to the laboratory to ensure a critical mass of laboratory members.

important actions



Some important actions have been identified to move us towards our vision are:

- **Participation in the European Research Area**
- **Provide focus and critical mass in research programming**
- **Address the main challenges in the region**
- **Improve collaboration between relevant departments**
- **Increase international peer reviews and rankings**
- **Unleash a transformational change by exploiting the creativity and ambitions of aspiring and existing entrepreneurs**
- **Undertake periodic review of our research profile**





The following research priorities have been identified by the heads of each department and faculty members. These priorities are further elaborated upon in the institute's Research Roadmap document, which has been developed in parallel to this Strategic Plan. The priorities are presented per thematic area

Petroleum Engineering

- Oil & Gas Upstream, Middle Stream and Downstream services
- Development of Hybrid Technologies
- Quality control of regional natural resources
- Material Synthesis & Characterisation

Electrical Engineering

- Smart sensor system for agriculture
- Fault detection and prognosis in industry
- Power system Modelling
- AI Control Systems
- Microelectronics
- Non-destructive control

Mechanical Engineering

- Renewable Energy Sources
- Robotics
- Metrology
- Development of Smart Materials
- Design and Development of New Devices

Information Technology

- GRID development and use
- Computer Forensics
- Smart app development
- Image processing
- e-learning methodologies





Agricultural Technology

- Multi Criteria Decision Analysis in Forestry Management
- Water Management
- Risk Management in Natural Habitats
- Preventing, Monitoring and Confronting Debris Flow phenomena
- Landscape architecture
- Services for monitoring and protecting natural environments
- Use of IT for the promotion of Environmental Tourism
- Tackle Air, Water and Soil Pollution.

Management and Economics

- Technology transfer and cooperation with enterprises, especially SMEs.
- Advanced support services for enterprises; organization and administration (management), marketing, and design of new products, etc.
- Development of SME activities, support entrepreneurship and new business development (including support innovative new business spin offs and spin outs).
- Developing and promoting commercial services to tourism
- Promote product orientated research in the institute
- Development of a Technological Incubation system to support entrepreneurs; infrastructure support, entrepreneurial training and Intellectual Property Rights(IPR) facilitation





Principals for Strategy Development

Principals for Strategy Development



The Priorities Committee using the following three principals has identified the institute's priorities:

Principle 01

Collecting Ideas-
Planning/Methodology
Cultivating Leadership
President
Vice Presidents
President Of the Council
External members
Internal Members
Head of the Hephæstus Lab
Hephæstus Lab Members
Other Labs

Methodology

Collecting Ideas/Strategy
Planning
Financial Strategy
Sustainability Strategy
Understanding the needs of industry
Understanding societal needs
Progress and Success
(SWOT Analysis/PEST Analysis)



Financial Strategy

Financial Strategy



Principle 02



Figure 2. Financial income from the state, and research projects.

The institute's financial strategy is based on a number of incomes, the most basic coming from the Greek state for day-to-day operation of the institute (electricity, heating, wages of Adjunct Professors, consumables). As shown in figure 2, this budget for running the institute has been cut due to government spending cutbacks. Such challenges can lead to new motivations to reforming operating principals, streamline and focusing research programming, and search for new sources of income. The institute has reacted sufficiently to overcome these cuts by bringing in funding to support research activities.



Analysis

SWOT

PEST

SWOT Analysis

Strengths

1. Strong collaboration between the institute's management and research staff
2. Council Members from external institutes
3. Collaborations with external internationally renowned institutes
4. Location of the institute
5. Society of Petroleum Engineers (SPE) branch in Kavala
6. Association for Women in Science
7. Masters programmes
8. Strong collaborations with the region

Weakness

1. Lack of high tech companies in the region
2. Lack of experienced personnel in specific scientific fields
3. Lack of students and personnel from outside Greece
4. Reduction of financial income from the state due to the economic crisis

Opportunities

1. IT tourism
2. Exploitation of external collaborations through the institute's council
3. Change of attitude
4. Raise standards
5. Improve the quality of research
6. Increase flow of PhD's through collaborations
7. Involve M.Sc. students in the laboratory's research activities
8. Raise the awareness of the institute

Threats

1. Lack of desire for competition
2. Inability to obtain funding
3. Country's policies
4. Inability to host provide Ph.Ds. due to the Greek law



PEST Analysis

Political Factors

1. Government policy on higher education
2. Government regulations that govern institutions' mandatory functions
3. Political stability and hence student political ideology and motives
4. Changes in education policy if different party elected

Social Factors

1. Demographic factors – types of students
2. Types of students and their level of competency
3. Expectations – parents, students and employers
4. Attitudes of stakeholders
5. Learning habits, culture and diversity of stakeholders

Economic Factors

1. Type of economic policies and system
2. Comparative advantage of the country for higher education
3. Unemployment rates
4. Skill levels of work force
5. Budgets limited by government
6. Country in economic crisis

Technological Factors

1. Recent technological developments and opportunities
2. Technology's likely impact on institutional mandatory functions
3. Impact on cost structure

Priorities



Priority 1

Priority 1:

Pocket of Excellence in Education

Trends

Short Term Objectives

- Increase talented staff
- Provide top quality research-driven education
- Enhanced student experience and employability
- Provide opportunities for students at all levels and in all academic areas to participate in research
- Engage employees
- Provide academic advisement
- Motivate undecided students
- Create a new generation of entrepreneurs

Long Term Objectives

- Establish an Honours Institute
- Increased national and international visibility
- Become a national model of excellence
- Improve distinction of our young professionals, providing them a competitive edge.
- International student enrolment Scholarships
- Enhance opportunities for collaborative and interdisciplinary initiatives between the faculties and with other Universities and institutions.
- Attract Post-Doctoral Fellows
- Improved bibliometric statistics (number of articles published in peer-reviewed journals)
- Address economic and social factors (number of graduated and employed)



Trends



Priority 2

Priority 2:

Pocket of Excellence in Research

Trends

Short Term Objectives

- Increased number of research and development partnerships with major global companies
- Increase the flow of Ph.D. students
- Influence international agenda
- Invite experts for guidance

Long Term Objectives

- Create an International Consortium of Excellence in Research for improved knowledge transfer
- Support, recognize, reward, and celebrate faculty and professional staff achievements in all areas to identify and develop
- Higher number of contracts with industry
- Exploit existing research infrastructure to its full potential
- Become self-sustainable



Trends



Priority 3

Priority 3:

Pocket of Excellence in Innovation

Trends

Short Term Objectives

- Establish the publicly funded (€1 million) GRID computing system in collaboration with CERN.
- Increased number of research and development partnerships with major global companies
- Establish an entrepreneurial mentality (staff and students)
- Improve career development prospects
- Closer collaborations between the science & technology and financial personnel

Long Term Objectives

- Spin Off Company
- Foster and enhance research output to marketable products
- Development of a technological incubation system



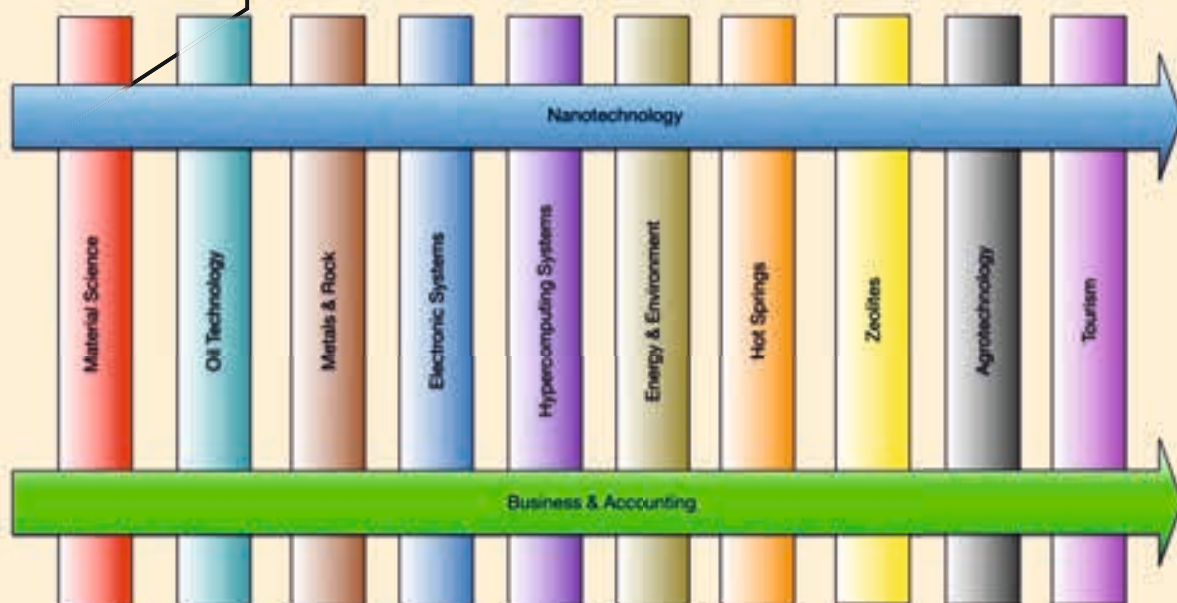
Trends



Priority 4

Intelligent Expertise

The region of Eastern Macedonia & Thrace has worked closely with the institute to develop smart specialization themes in various areas of interest to the region. There are 10 main themes, presented below vertically, with two important crosscutting themes, those of Nanotechnology and Business & Administration that can be applied to all vertical themes.

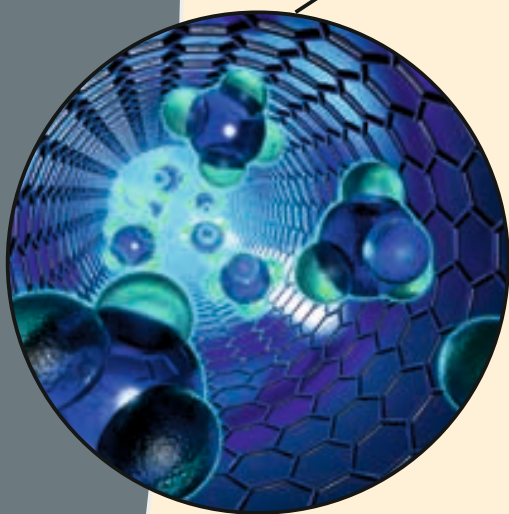


Priority 4

Intelligent Expertise

1. NANOTECHNOLOGY

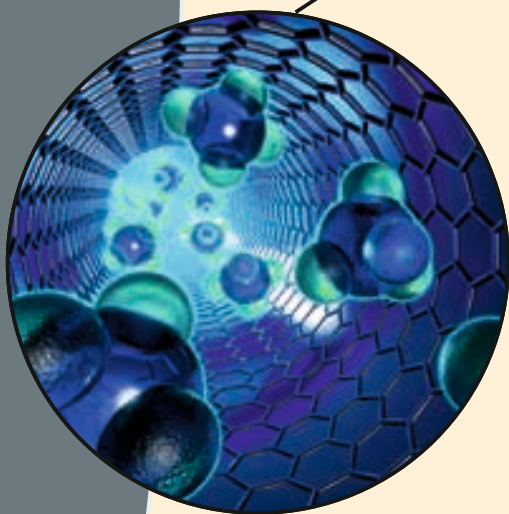
Nanotechnology is the understanding and control of matter at dimensions between 1 and 100 nanometers. Unusual physical, chemical, and biological properties can emerge in materials at the nanoscale. These properties may differ in important ways from the properties of bulk materials and single atoms or molecules. For example, a block of Gold is shiny and 'gold' in color, but a suspension of gold in solution can vary from pink to purple as the nanoscale gold particles get larger; this is due to quantum confinement inside the particles. Surface area, or the area of an object that is an exposed surface is also another important property, as greater surface area can allow chemical reactions to go faster. Encompassing nanoscale science, engineering, and technology, nanotechnology involves imaging, measuring, modeling, and manipulating matter on this length scale.



Priority 4

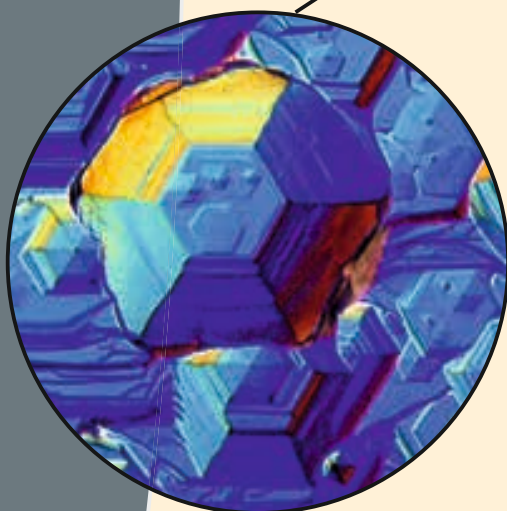
Intelligent Expertise

The research priorities also place a strong emphasis on the development of applications-driven research and the transfer of technology from the laboratory to the work place or into society. Interaction with industry is therefore a key component of our strategy and one that can be exploited by further interaction of the institute with regional, national and international industries. The Business & Accounting department will play a key role in this activity, to determine and support the needs of industry, and also support the entrepreneurs in the institute. Because of its nature, Nanotechnology is widely acknowledged to be a multi-disciplinary area of research involving physics, chemistry and biology, to name just a few.



2. MATERIAL SCIENCE

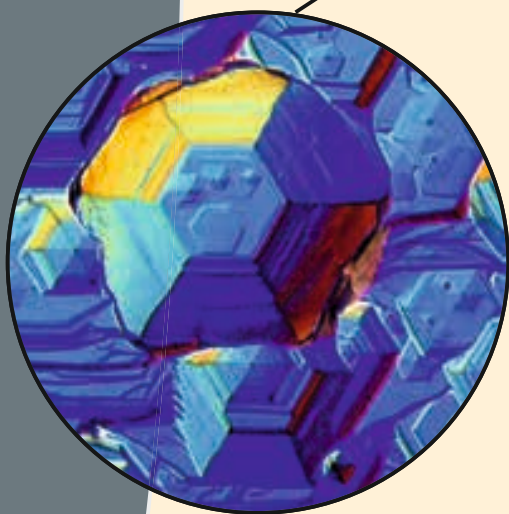
During the different stages of the roadmap implementation, the development of nanoporous materials with tuned properties, continuous characterization and product evaluation efforts are essential. As previously mentioned, Nanotechnology is considered a crosscutting activity, which will be applied, where appropriate, to each vertical pillar, through development of materials, and utilization of ex-situ and in-situ characterization techniques to gain the necessary information about the synthesized materials and their properties. The ex-situ characterization techniques are important to obtain information about the chemical composition, structure, porosity, morphology, diffusion aspects, localization and nature of active sites, sorption selectivity/affinity, stability, catalytic activity etc. Techniques such as BET, SEM, TEM, XRD, SAXS, ICP-AES, HRTEM, TGA/DSC, TPD, NMR, UV/VIS, FTIR, FT-Raman, ESR etc., will be used. The targeted nanomaterials are:



Priority 4

Intelligent Expertise

- Microporous zeolite materials (MFI, LTA, FAU, etc.)
- Mesoporous siliceous and non-siliceous materials (MCM, SBA, MSU, metal oxides, etc.)
- Combined micro/mesoporous siliceous and non-siliceous materials.
- Layered and pillared layered materials.
- Activated carbons, carbon molecular sieves and carbon nanotubes.
- Metal-Organic Frameworks (MOF, ZIF, PMO)
- Silicagel, alumina and titania.



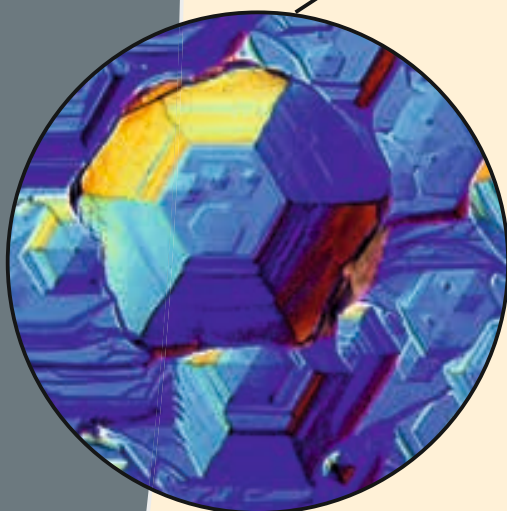
Intelligent Expertise

Proposed Innovative applications using nanoporous materials.

1. Adsorption applications

- a) Development of high-capacity CO₂ and CO selective adsorbents.
- b) Removal of VOC's, using adsorbents to concentrate the organics and then using a catalytic process to destroy them.
- c) New adsorbents for the storage of important gases such as natural gas and hydrogen with the aim of reducing the air pollution by combustion engines.
- d) New adsorbents for energy storage, ranging from batteries to super capacitors.
- e) Selective adsorbents designed for fast removal of some specific compounds.
- f) Removal of gaseous pollution compounds

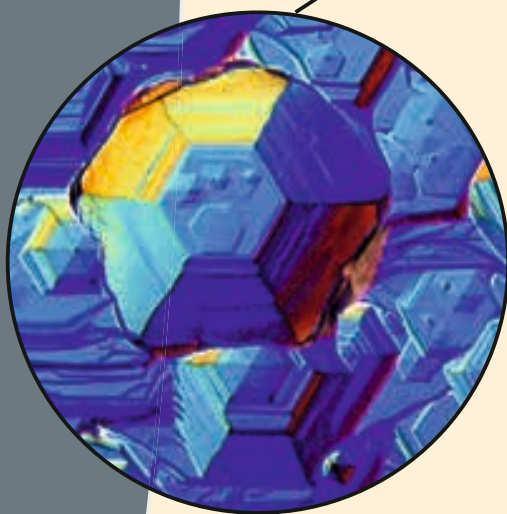
Study of the domain theory on nanoporous materials.



2. Membrane applications

Intelligent membrane engineering can help to realize the process intensification strategy. Integrated membrane separations and new membrane operations, such as catalytic membrane reactors and membrane contactors, will play a crucial role in future technologies. However, so far no inorganic membrane is used in large-scale industrial gas separation. Membrane reactor technology has huge promise to deliver intensified processes that are more compact, less capital-intensive, giving higher conversions and selectivities in equilibrium- and kinetically controlled reactions, respectively. Membrane reactors are expected to save energy and costs of feed/product separation. Innovative research areas for membranes:

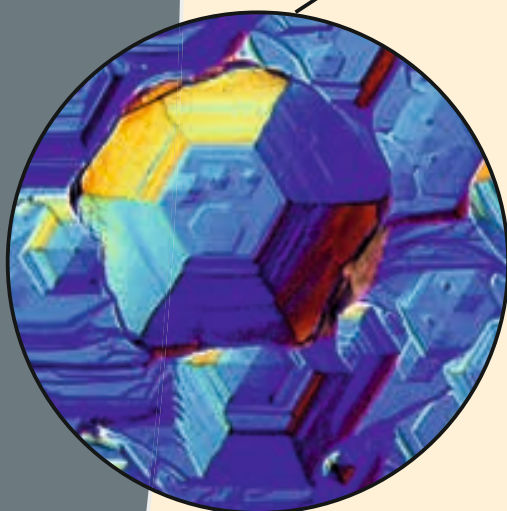
- Carbon dioxide separation
- Hydrogen separation
- Dewatering of (bio)ethanol
- (Bio)ethanol removal from fermentation batches
- Catalytic membrane reactors
- Novel porous membranes (hybrid membranes)



3. Catalytic applications

Catalysis is an indispensable tool, when chemical substances are to be converted into valuable or environmentally more benign products. Catalysis enables one to make chemical processes more selective for the desired products, more energy-efficient and/or environmentally friendlier. Innovative research items are:

- Stabilization of small metal clusters as guests inside nanoporous solids as hosts (gold nanoclusters for oxidation of carbon monoxide, production of propylene oxide by direct epoxidation of propene with in-situ generated hydrogen peroxide)
- Oxyfunctionalisation of alkanes with oxygen or air
- Catalytic combustion of VOC's in air
- Isomerization of heptane isomers
- Dehydrogenation of light alkanes
- Direct alkylation of aromatics with alkanes
- Process intensification
- Photocatalytic reaction



3. OIL INDUSTRY

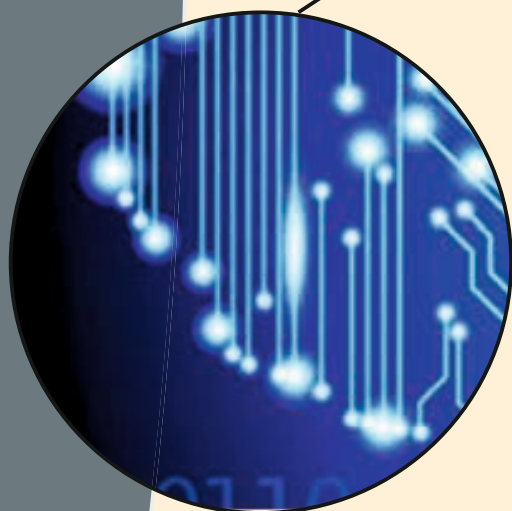
The oil exploration carried out in the Gulf of Kavala is a complex process and requires the contribution of many specialisations. The Kavala Oil company will benefit from the continuous supported of R&D in the field of interest and on specialized extended service. EmaTTech has the equipment required for routine and special core analysis (standard/special core analysis) and for geophysical data processing and data analysis via supercomputers. To this end, we propose the extension of the existing Memorandum of Understanding between Kavala Oil and EmaTTech to facilitate this support. Note also that this support will strengthen the position of the company not only locally but also on a national and international level. In the same context, EmaTTech supports the company by educating new personnel through the Graduate Program in Technology of Petroleum and Natural Gas, which includes the participation of international advisors, and distinguished professors provide added value to the course and the institute's research strengths.



4. ELECTRONIC SYSTEMS

A significant number of high-tech and innovation businesses operate in the region. EmaTTech maintains a long-standing cooperation with PRISMA SA and similar SMEs with possibilities to extend these partnerships.

The Dept. of Electrical Engineering laboratories incorporate advanced in time sensors and monitoring technologies and can contribute through R&D services to industry. In the same context, the institute is liable to extend the biomechanical services it provides in collaboration with the Medical School of the University of Thrace. Furthermore, the continuous monitoring of surface and groundwater for heavy metals namely cadmium in river Nestos and chromium -6 in rivers Strymona, Evros and Axios is part of the proposed action. Control of water for irrigation and industrial purposes as well as monitoring of the marine area around the oil platform in the Gulf of Kavala, in collaboration with Fisheries Research Institute (INALE) is also proposed.



5. HYPERCOMPUTING SYSTEMS

EmaTTech is developing supercomputing technology (CERN-tier2), which will make the institute's GRID the largest computing centre in Greece. The utilization level in RTD and extended services of this system is important for the development of the region in the area of Geoinformatics and monitoring systems. Tourism can also benefit from virtual tours. The GRID system is expected to be exploiting the computational hyper-system through a spin-off company.



6. ENERGY & ENVIRONMENT

EMaTTech is fully equipped (including a weather station) for the study of environmentally friendly energy. In REMT there is a number of small and medium entrepreneurs of higher education (mainly engineers) that are engaged in the installation of photovoltaic systems and wind turbines and who are interested to have access to R&D activities and to incorporate smart specialization in their applications.



7. HOT SPRINGS

The area of REMT has some of the most popular spas in the country (e.g. the baths of Eleftheres, Lydia mud baths) and natural water sources (Drama).

In Europe companies utilize cosmetic spas and their possibly of obtaining quality natural products for the in the manufacture of innovative products. However, the secondary use of Nama and remedies requires RTD.

For example, the slurry of mud loses its natural healing properties when dislodged.

The reason is that the diffusion of therapeutic substances to the body of the field is continuous rather than discrete. In other words, a quantity of sludge from the field is proportional to a dairy product. The use of these resources of the REMT as a major priority of a proposed spin-off.



8. ZEOLITES

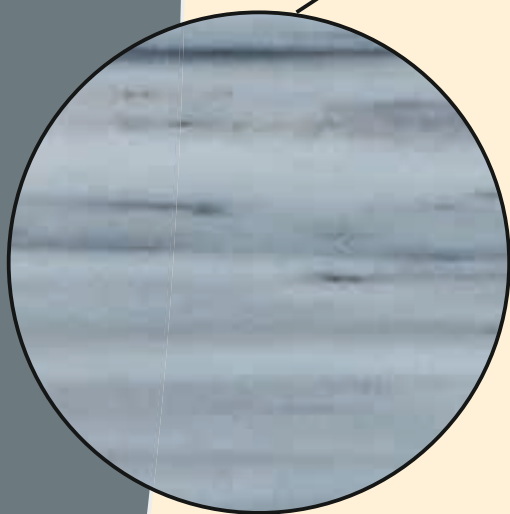
In nearby Metaxades there are significant reserves of clinoptilolite, which is a natural zeolite. Zeolite has widespread application in the treatment of liquid and gaseous waste to clean up rivers and various industrial separation applications.

EmaTTech has technology for further processing clinoptilolite, optimize performance, and for creating beds and films for industrial uses. In cooperation with the NCSR Demokritos, the largest research centre in Greece, new technologies can be developed and extended services offered in this area.



9. METALS AND ROCK QUARRY

The REMT has an abundance of mineral wealth in metals (e.g. manganese, Germanium, Antimony, Cobalt, Gallium, etc.) but also aggregates ornamental stones such as marbles and granites. The marble industry is highly developed in Kavala and Drama and it has the capacity to expand if supported by an R&D department through provision of regular and special services in various fields of interest.



10. AGROTECHNOLOGY

The REMT does have primary activity, but of low tech. The area of nanotechnology has proven to offer many new capabilities in this area. Additionally, new equipment and tools such as DNA analysis of seeds, proteomic analysis and organic chemistry laboratories, handled by the Department of Oenology can contribute to agro-technology services primarily in the fields of food and beverage. Indeed food security and safety is one of the EU commission most significant crosscutting activities in Horizons 2020. Progress in this area could result in many benefits for society and also the financial stability of the institute.



11. TOURISM

Tourism is a very important business in Greece. Moreover, it is a first class application field of advanced information technologies and telecommunications. A number of key electronic services related to booking tickets, hotels, travel is already provided via the internet. These services (some of which are quite successful) are limited to seeking information and making reservations via one mainly tourism services company. In its most sophisticated form, provided electronic services are portals for tourism services. In some cases, search services are provided and the appropriate company provides the services (e.g. accommodation, car rental, etc.) through a number of search criteria. The potential of electronic services may be multiplied by fully utilizing the potential of smart devices, and using the institute's soon to be developed GRID infrastructure, given that the GRID provides increased data integration capabilities and services through:



Priority 4

Intelligent Expertise

- Integration Capabilities and search in heterogeneous databases, regardless of manufacturer, and data format (e.g. XML, RDBMS, OODBMS, files). These capabilities allow this fairly complex search processes in a broader data set, thus greatly facilitating the integration of data from different sources / providers.
- Utilization of available services (e.g., search, booking) following the standards of model Web Services. Such integration allows for multiple complex queries and bookings from a tourist application. Using these possibilities a Grid infrastructure can support innovative applications that provide highly personalized services. As a typical example we can consider applications that allow the automated synthesis of a tourist package consisting of a plurality of services (e.g. accommodation, travel, value added services, etc.) on the basis of a set of Grid/Web Services provided by different companies and completed within a grid infrastructure. The grid infrastructure can provide the cooperation of different organizations, companies, and service providers to cooperate in order to increase sales and profits. In such a case, the end user is facing a multitude of heterogeneous hand, no additional services, virtualized as a single provider of tourism services.





12. BUSINESS & ACCOUNTING

Creating and economic research and business consulting center that will be engaged in support of exploiting research outcomes and the provision of consultancy services to business and agencies covering the following objectives:

- Technology transfer and cooperation with enterprises, especially SMEs.
- Advanced support services for enterprises; organization and administration (management), marketing, and design of new products, etc.
- Development of SME activities, support entrepreneurship and new business development (including support innovative new business spin offs and spin outs).
- Developing and promoting commercial services to tourism
- Promote product orientated research in the institute
- Development of a Technological Incubation system to support entrepreneurs; infrastructure support, entrepreneurial training and IPR facilitation





Trends Success and Reward

Priority 5

Priority 5:

Success and Reward

Trends

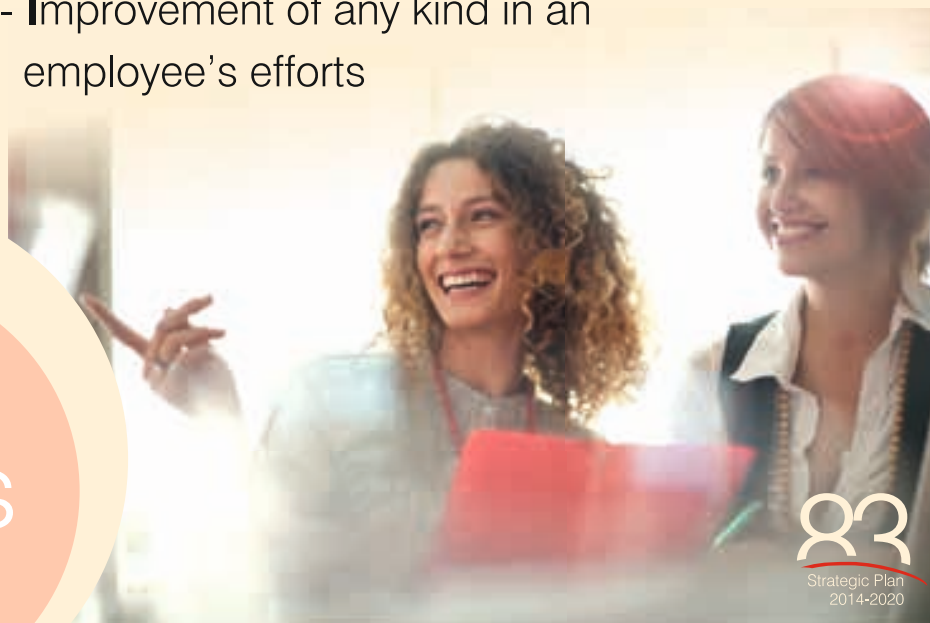
Collective efforts of all staff members contribute to the overall mission of the institute and encourage opportunities for those efforts to be acknowledged. In order to attract and retain the best employees, we must aim to create an environment where employees feel their collaborations are appreciated.

Reward for:

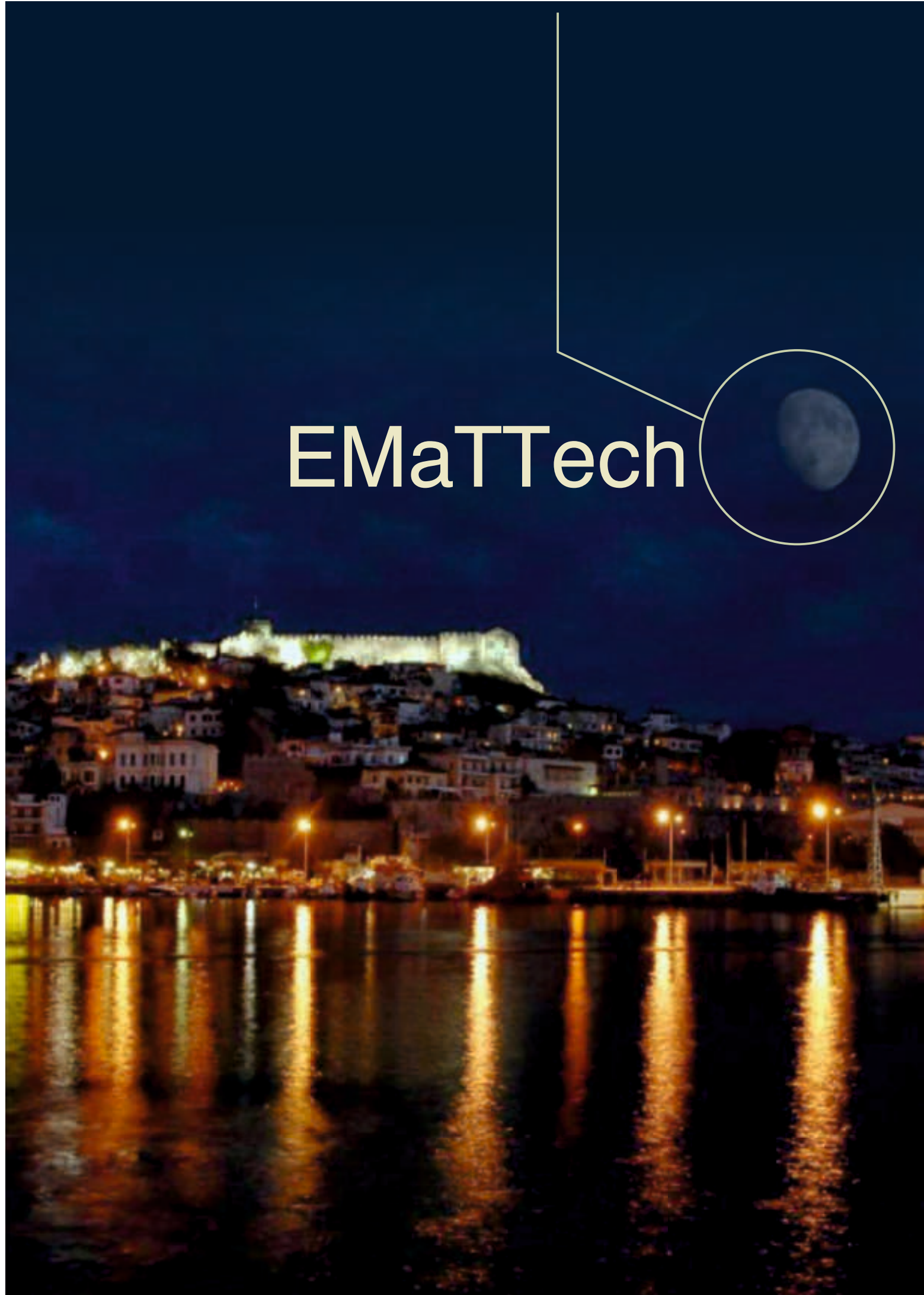
- **T**ime
- **W**ork
- **M**oney-saving ideas
- **S**olutions to challenges
- **O**utstanding one-time achievements
- **G**eneral contributions that you'd just like to acknowledge
- **I**mprovement of any kind in an employee's efforts



Trends



EMaTTech



Implementation of the Strategic Plan and Progress Monitoring

This strategic plan should be considered as a living document, subject to regular review and updating by the Priorities Committee.

Its implementation will be led by the President of the institute and will be the responsibility of both academic and administrative personnel. Information on progress in the implementation of the strategic plan will be reported by the President with the assistance of the Priorities Committee, to the Senate, the Board of Regents and the institute's community.

Monitoring will be undertaken according to the Kaplan & Norton methodology; score cards are based on the following criteria: Strategic Relevance/Benefit (weighted 50%), Resource Demands (30%) and Risks (20%).

The developed scorecards will be evaluated and a report subsequently presented. Monitoring will be done by human resources monitoring teams that will also test the engagement of personnel with the institute's strategy.





**Making
the
difference...**

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