EUREKABUILD PROPOSALS

1. SUSTAINABLE BUILT ENVIRONMENT

1.1: EurekaBuild (E!3790) Project Idea Form

> Title

Selection criteria of glazing in buildings in the tertiary sector

> Describe your project idea

The aim of the project is to develop a selection criteria tool for optimum energy performance of buildings of the tertiary sector, in terms of thermal, optical and acoustic characteristics of glazing. The rapid technological development of glass within the last decade raised a large variation of glass components and systems in the market industry. Architects, engineers and constructors often come in front of the decision of which type of glass to use in their case study, always considering various parameters, such as: cost, aesthetic appearance (colour), resistance (depending on dimensions of glazed surface) and ignore parameters such as the thermal, optical and acoustic characteristics and generally CE marking in such building products. Such characteristics have great impact on energy performance of buildings and comfort conditions in the indoor environment (thermal, visual, acoustic comfort), depending on the orientation, the percentage of glazed surface in the building façade, the type of construction, etc. This project will examine the integration of thermal, optical and acoustic characteristics as criteria of selection the optimum glazed components and systems of specific case study buildings, testing different scenarios of glazing in specialised thermal and visual simulation programs. The cost benefit analysis in relation to payback period of specific glazing types will be also explored. Close cooperation will be strongly encouraged with the respective market and manufacturers within this field.

An approach has already been started to certain market actors in the field of glazing as a building product. There is already an interest and support to the proposed action from specific market actors and associations which are willing to participate in the project (as main partners, or subcontracts, or letter of interest), such as: Uniglass Ltd (Pilkington Plc in the Greek market), Greek Federation of Glaziers & Artisans of Glass Panes (P.O.E.V.Y.) and Aluminium Association of Greece (E.E.A).

Experience and work on market oriented approach will be obtained from European SAVE project GREEN-IT, co-ordinator CRES / Department of Buildings, which promotes energy efficient building products (www.green-it.eu/, 2005-2008).
The main target group of this project is: architects, engineers, construction companies, building product industry.

> Please explain briefly your expertise

Centre of Renewable Energy Sources is the Greek national entity for the promotion of renewable energy sources, rational use of energy and energy conservation. CRES is dynamically active for the protection of the environment and sustainable development and for the promotion and market penetration of new energy technologies.
Division of Energy Efficiency / Department of buildings, has long experience on market consulting (in private and public sector) in the field of energy saving and rational use of energy as well as building construction products.

> Please describe what your contribution will be to this project (financial, technological,…)

The contribution of CRES to the project will be technological as an expert in the field of energy efficiency and application of RES in the built environment. CRES has long experience on energy consulting in public and private sector in the design or construction phase of a building work and confront issues regarding selection of type of glazing per case study building.

> Explain which type of contribution you are looking for (financial, technological,…)

Contribution in a consortium of experts within the technological field in order to develop proposals for financial support in National and European level.

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1.2: EurekaBuild (E!3790) Project Idea Form

> Title
Environmental strategies in retrofitting of University buildings
> Describe your project idea
The development and integration of environmental strategies in the retrofitting process of University buildings results in considerable improvement of thermal and lighting comfort for users, while reducing energy consumption and environmental pollution. Interventions proposed by the Energy Management Unit of NTUA include standard and innovative passive and hybrid solar systems and energy conservation measures incorporated to representative University buildings during reconstruction.
> Please explain briefly your expertise
Environmental design, energy conservation systems, solar integration, retrofitting of public and private buildings and open spaces.
> Please describe what your contribution will be to this project (financial, technological,…)
Design, co-ordination and construction supervision of innovative retrofitting systems.
> Explain which type of contribution you are looking for (financial, technological,…)
Financial and technological contributions of private companies in environmental systems proposed.

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1.3: EurekaBuild (E!3790) Project Idea Form

> Title
"Ecologic Education Building". Interventions planned for an existing education building, in order to become energy self-sufficient.
> Describe your project idea
The proposed idea concerns the design and construction of appropriate interventions to an existing education building, aiming to create a pilot building that is going to perform as an energy self-sufficient system. The selected building will cover its energy needs using renewable recourses and bioclimatic planning. The needs for electric supply are going to be met by the use of a hybrid system, including photovoltaic elements and a wind generator. The needs for thermal supply are going to be met by the use of solar systems. Passive systems are going to be planned, based on the principles of environmental architectural design, such as appropriate shading systems, use of materials with high thermal capacity, plantation on roofs, tromp walls, bioclimatic planning of the surrounding space. The building itself is going to become an education tool, in order to achieve the environmental awareness of the children. Additionally, it will become a pilot project for other school buildings.
> Please explain briefly your expertise
The Department of Building Constructions has the responsibility for every action concerning building activity in the borders of the Municipality of Thessaloniki. Especially the sector for "Building repair and reconstruction and Building conservation" of the above department, is specialized on the maintenance of all the education buildings of the Municipality and also on the conservation of buildings of cultural heritage.
> Please describe what your contribution will be to this project (financial, technological,…)
Our Department can support scientifically the above project, considering that its stuff has the special expertise for these issues (environmental planning, bioclimatic design, energy consumption, etc)
> Explain which type of contribution you are looking for (financial, technological,…)
The Municipality has not the financial means to realize such innovative projects. The type of contribution we are looking for is economic funding and support. We are very much interested in participating to European Projects with partners from Greece or from other countries, aiming to exchange knowledge and expertise and receive financial resources.

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1.4: EurekaBuild (E!3790) Project Idea Form

> Title

Development of Sustainable Advanced Concrete Technologies based on Ecologic and Economic assessment of the Expected Lifetime Cycle.

> Describe your project idea

Reinforced concrete structures are often conceived for a certain time span of serviceability. Due to the superposition of different kinds of loads and particularly due to the presence of aggressive substances the resistance of construction materials is insufficient in numerous cases. Hence, many structures have to be repaired before the end of their designed life span. In case of reinforced concrete structures these repair measures are not only very expensive but they also consume high amounts of energy and materials which causes strong environmental impacts.

This project is focussed on the development and evaluation of different concrete technologies and materials from diverse perspectives:

- **Durability (simulating expected life span using numerical analyses)**
- **Ecology (product life cycle and environmental impact assessments)**
- **Economy (estimating life cycle costs by investment appraisals**).

This kind of combined analysis facilitates the efficient design of structural elements and repair measures and provides the possibility to significantly increase the life span of new and repaired concrete structures, and based on this assessment, new concrete mix designs and concrete repair and protection systems will be developed.

In the domain of civil engineering structures are designed for a lifespan of 70 to 100 years. In this period the structures have to meet different requirements in order to maintain their serviceability. One of the most important requirements to be fulfilled concerns the **durability** of the involved materials. Even during the design of a structure or a structural repair it is very important to forecast the loads and the possible damage mechanisms that are presumed to become decisive during the **planned service life**. In the most cases the durability design of structures **is underestimated** and quite often the designed life span can not be reached. In case of reinforced concrete structures the resistance of the construction materials is insufficient in numerous cases due to the presence of aggressive substances. Hence, many structures have to be repaired before the end of their designed life span.. Thus, **the durability of construction materials is crucial for the ecological impact of structural elements**. **From an ecological point of view it is therefore of great interest to improve the durability of structures using advanced concrete technologies in order to prevent restorations and reach the planned life span of the structures**. **This objective can be reached using new protective design concept and concrete technology.**

The project will focus on :

1. development materials
   - durable concrete using special mix designs and super-plasticizers, corrosion inhibitors, fibres, anti-shinkage admixtures,.. in order to reach maximum durability.
   - Study of most performing prevention and protection systems against corrosion of the steel reinforcement , and other causes of defects which could affect the long term durability
   - Study of special construction methods, durability design of new constructions
   - Durable repair systems, causing minimum of ecologic and economic impact.
2. life cycle assessment based on 4 steps :

Step 1 : The target (comparison, optimization), the subject (product or process) and the system boundaries (temporal and geographical) of the assessment are defined.

Step 2 : The inventory input/output analysis is carried out of each product or system (new or repair). After a list of all relevant material and energy flows has been defined, each item of the list is quantified.

Step 3 : investigation of types of ecological problems related to the construction or repair and determination to lowest ecologic effect possible in view of **expected lifespan cycle:**

- EE 1 greenhouse effect (global warming) or CO2-equivalent
- EE 2 depletion of the ozone layer in the stratosphere or CFC-11-equivalent
- EE 3 formation of photo-oxidants (smog formation) or C2H4-equivalent
- EE 4 acidification of the soils through acid rain or SO2-equivalent
- EE 5 eutrophication (over- fertilisation of surface water) or $PO4^{3-}$-equivalent
- EE 6 energy use (embodied energy & process energy including waste heat)

This allows to quantify the Ecological effect according:

$$\mathbf{EE = \sum_{i=1\ to\ i=n}\ SEEi\ \ x\ \ mi}$$

with:

EE = ecological effect (problem) [kg / functional unit]

SEEi = sp. ecological effect of a substance i [kg of the reference substance / kg of substance i]

mi = mass of the substance i [kg of the substance i / functional unit]

Step 4 : determination of the economic parameter (cost of construction in function of the durability)

Even though the building or repair of a structure utilizing innovative and durable materials is more expensive regarding the first investment (production), a life cycle investment appraisal clearly shows that the total cost and ecologic impact can drastically be decreased. In this project more efficient materials would be formulated based on lifecycle expectation, ecologic and economic impact.

> Please explain briefly your expertise

Tecnochem is one of the European technology leaders developing new reliable, ecological and durable construction materials such as corrosion inhibiting agents, water repellent agents and ultra high ductility protective layers such as engineered cementitious composites (ECC).
Tecnochem is specialised in solving jobsite construction problems with smart products and systems. Variable modulus of elasticity, corrosion inhibitors, shrinkage free concretes, high strength rapid hardening materials, are a few examples of innovative thinking in view of the extension of durability of constructions.
Tecnochem has a team of experienced chemists and engineers, dedicated to concrete and concrete repair materials and systems, and works together with leading Universities, Institutes and Authorities in order to continue with progressive ideas and developments.
Tecnochem has over 30 years of experience in solving construction problems, which has lead to an extensive range of specialised construction chemicals. Tecnochem produces with 'clean energy' and strives to use only environmental friendly raw materials.

> Please describe what your contribution will be to this project (financial, technological,…)

The contribution of Tecnochem will mainly be technical by submitting the basic technology and the developed products and systems for the durable construction and repair of constructions. The implementation of technology on the site, the proper application of the materials and monitoring of performance belong to Tecnochem's expertise. Cooperation with structural engineers and ecologists to assess lifecycle expectation, and ecologic impact is essential. Tecnochem can co-manage the program.

> Explain which type of contribution you are looking for (financial, technological,…)

The consortium partners should be found on companies touching the field of concrete technology and construction but also commerce and insurances such as:

- Researchers (private companies, universities, federal institutes)
- Cement producers
- Raw material blenders/refiners (fibres, mineral additions, aggregates, admixtures)
- Concrete fabricators (pre-cast, ready-mix, tiles)
- Project planners
- Construction companies

- Consulters
- Property insurers
- Insurance assessors

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1.5: EurekaBuild (E!3790) Project Idea Form

> Title

Development of new methods for the Ecological Restoration of Roadsides: Ecosystems and Landscapes (ROADSCAPE)

> Describe your project idea

The aim of this proposal is to develop new methods to restore ecosystems and landscapes at the roadsides, designed not only for geotechnical stabilization but mainly to integrate the infrastructure in a local ecological context. Ecological restoration goals at the roadside would lead to biodiversity, landscape and natural heritage conservation. We will test a batch of innovative methods based on the manipulation of ecological key processes, which are limiting plant recruitment in these emergent ecosystems: organism interactions, suitability of the abiotic environment and patch connectivity.

> Please explain briefly your expertise

From 2003 to 2006, OHL and Universidad Complutense de Madrid have undertaken the HIDROTAL research project. As a result, we have documented the singularity of these emergent ecosystems (distinctly different from theoretical references such as hillsides)and assessed the annual variation in key factors at the roadsides in a Mediterranean context and evaluated the limited success of the current practices (hydroseeding):

1. Substrate/soil: mulching, nutrient and water availability, texture, penetrability.
2. Microclimate: water potential, relative humidity, temperature, direct and diffuse photosinthetic photon flux density.
3. Seeds: seed bank, seed rain, quality and quantity of hydroseeding mixture.
4. Energy capture and transfer: photosynthetic efficiency and CO2 acclimation.
5. Community: vegetation cover and composition.

We are currently implementing these results in the production procedures and technologies within the civil works activity.

The OHL Group's R+D+I policy is laid down each year in the corresponding Annual Plans. Apart from the initiatives recorded and approved in these Annual Plans, however, there may be times throughout the year when other projects crop up within OHL Group, which will then be carried out with the backing of the Development and Innovation Management as part of its remit of advising, seeking finance, monitoring and control.

OHL works in unison with the organizations of the national R+D+I system, such as the Science and Technology Ministry, through its Technical Research Fomentation Program (PROFIT in Spanish initials), the Industrial Technological Development Center (CDTI) or the COTEC Innovation Foundation, in which it participates as sponsor. Some of the R+D+I projects, currently under study or already underway, are being conducted in close collaboration with leader companies in their respective sectors, and also with universities and research centers of acknowledged prestige. More information www.ohl.es

> Please describe what your contribution will be to this project (financial, technological,…)

We can provide:

- Project managers and researchers trained in the interface between Civil Engineering and Ecology.
- A specialized research team from the Universidad Complutense de Madrid.
- Experimental scenarios and result implementation in current construction projects.

> Explain which type of contribution you are looking for (financial, technological,…)

- Teams and Companies with shared interests on Ecological Restoration, working in other biomes or analogous environments in other territories.
- Mulch and seed suppliers.
- Teams and Companies with experience in atmospheric physical-chemistry, particularly on CO_2 and pollutant dynamics to work at the road verge.
- Teams and Companies with experience in Reproductive Biology of plants and in animal-plant interactions.
- Teams and Companies with experience in root nodules and mycorrhizae.

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1.6: EurekaBuild (E!3790) Project Idea Form

> Title
Tiles for lining building facades imitating the skin functions for heating/heat dissipation in buildings.
> Describe your project idea
Prefabricated tiles of small thickness are used to line the building facades, offering the means for heat absorption/dissipation. They provide extra capabilities related to the noise repulsion and partial sun protection due to their exterior pattern.
> Please explain briefly your expertise
Assistant professor NTUA
> Please describe what your contribution will be to this project (financial, technological,…)
• Protection against and controlling of thermal loads exchanged between the building and the environment
> Explain which type of contribution you are looking for (financial, technological,…)
• Scientific co-operation among various disciplines and financial support to the initially pilot application of the project at building level.

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1.7: EurekaBuild (E!3790) Project Idea Form

> Title
Empirical Research for the innovative performance of the Greek enterprises : The Case of Construction
> Describe your project idea
Innovation is a complex process with many interacting components. Based on Oslo manual, the data to be collected from the empirical research will cover the following 12 different sections: 1. Process innovation; 2. Not yet completed or abandoned innovation activities; 3. Innovation activity and expenditure; 4. Intramural research and experimental development (R&D); 5. Effects of innovation; 6. Public funding of innovation; 7. Innovation co-operation; 8. Sources of information for innovation; 9. Hampered innovation activity; 10. Patents and other protection methods; 11. Other important strategical and organisational changes in the enterprise.
> Please explain briefly your expertise
Innovation Management, Technology Transfer, Research on innovation, Sample techniques and statistics, strategic analysis and planning.
> Please describe what your contribution will be to this project (financial, technological,…)
To provide the know – how for the implementation of research project in the field of innovative performance in the construction sector
> Explain which type of contribution you are looking for (financial, technological,…)
We are looking for financial contribution

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1.8: EurekaBuild (E!3790) Project Idea Form

> Title
Prefabricated terrace floor slabs for the creation of a "green roof" with low plants.
> Describe your project idea
Special slabs placed a posteriori on a structure make it easy to create a "green roof". Possible to install or partially/totally remove the system at will, without influencing the building.
> Please explain briefly your expertise
(Architect Engineer & Environmental Manager) – PhD. Cand. Deputy Manager of Quality, Safety & Env't in ATTIKO METRO S.A.
> Please describe what your contribution will be to this project (financial, technological,…)
• An easy and inexpensive method to develop the infrastructure for the creation of a "green roof" with all the advantages it provides to the bio-climatic design.
> Explain which type of contribution you are looking for (financial, technological,…)
• Scientific co-operation among various disciplines and financial support to the initially pilot application of the project at building level.

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1.9: EurekaBuild (E!3790) Project Idea Form

> Title
"Sustainable Architectural Design presupposes the capability of Sustainable Building Construction"
> Describe your project idea first case
The project idea concerns the implementation of an innovative method – the use of Self-Compacting Concrete (SCC) - for the construction of a new office building in the city of Xanthi. The general idea is related to the concept of a sustainable designed building, which aims to minimize the environmental impact from: a. construction activities (appropriate energy resources and raw material management aiming at the conservation of the environment), b. the environmental charges in the construction, and the increase of constructions' lifetime (sustainable materials & constructional techniques and technologies). In addition, with the use of SCC we are expecting the construction of high quality fair faced concrete surfaces inside and outside of the building will eliminate the need for any plastering or other type of cladding, except those who are prefigured, and to enhance basic parameters (i.e. creation of a substantial thermal mass, etc.) of the bioclimatic behaviour for the building which consist another fundamental design strategy. In particular, it is the first time in Greece where such an advanced type of concrete will be used for a building application. Synthesis of concrete was designed by applying a new method for the production and quality control of self compacting concrete mixtures, developed at the laboratory of Building Materials, Department of Civil Engineering, Democritus University of Thrace. The mixture will be rated at the strength class of C25/30. Trial mixes revealed that this advance concrete type will reduce the placing time by 70% and the personnel needed by 50%, as compared with ordinary concrete of the same strength class. The increased quality of the structure regarding durability and better finishing of concrete members are additional beneficial effects of using SCC. Reduction of placing time also leads to environmental and traffic benefits (consumption of lesser gas by the placing equipment, less noise production due to the absence of vibration equipment, decrease of traffic blocking time, etc.).
> Please explain briefly your expertise
The project is the result of the cooperation of four independent participants: 1. Katsaros M. M.Arch, Koltsida M. M.Sc, for "M2K architects" architectural firm, responsible for the elaboration of the general study of the building. 2. Anastasiades St. I., Development & Construction Company, responsible for the general construction and the financing of the building. 3. Skarlatos E., for TEKTON S.A. "Ready Mix Concrete & Aggregate Co", responsible for the production of Self-Compacting Concrete. 4. Prof. Sideris K. K. Civ. Eng., Ph.D, who developed the method for the production and quality control of Self-Compacting Concrete in the Laboratory of Building Materials, in Democritus University of Thrace.
> Please describe what your contribution will be to this project (financial, technological,…)
Our contribution to this project respectively to the four participants as described above concerns the implementation of this innovative method of construction to the design of the building, use of this same method for the design and construction of precast parts for the cladding of the building, the organization of such a construction process in site and in real time, the quality control of the structure during the construction, the certification of the successful application of the selected process, and finally the pragmatic financing of the venture by the developer.
> Explain which type of contribution you are looking for (financial, technological,…)
We are aiming in any kind of financial or technological cooperation or support.

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1.10: EurekaBuild (E!3790) Project Idea Form

> Title

Resources and Buildings – Energy – Materials – Environment
Integrated approach - with respect to overall sustainability agenda

> Describe your project idea

Buildings, representing the main consumer of natural resources, use in average about 40% of all energy and produce 30% of CO_2 emission and 40% of total waste. It is essential that energy needed in operation phase for heating and cooling of contemporary buildings represents the major part of all energy produced and used.

A substantial change of practice towards energy-optimized building is necessary, partially already discovered and confirmed by daily use, but the significant change was not reached yet. There exists a realistic technical potential to reach the level of zero-energy or energy-plus buildings. Use or renewable energy systems in buildings has a large potential for further development. The technologies for particular systems are available, further improvements are possible (solar systems, photovoltaics, heat exchangers etc.). Such innovative concept of building design and construction must be based on the application of the best available techniques, advanced knowledge in building physics and technical systems (HVAC).

The process of decreasing of amount of needed operation energy results in the change of proportion between embodied and operation energy. Thus the amount of embodied energy in construction materials is becoming more and more important criterion of sustainability of buildings and reduction of embodied energy and embodied CO_2 through optimization of material use is essential. The increasing use of renewable natural materials, recycled materials as well as high performance materials (like high performance concrete, new composites etc.) can thus increase the overall sustainability of the new building design concept. New generation of information technique should be used for improved building operation leading to intelligent building concept.

The development of integrated design process and complex assessment tools covering all above mentioned aspects of building performance represents a key topic leading towards energy and material efficient buildings and consequently to reduction of fossil fuel consumption and decrease of CO_2 emissions.

> Please explain briefly your expertise

Members of the Sustainable Building group within CIDEAS research center (Center for Integrated DEsign of Advanced Structures) at the Faculty of Civil Engineering, CTU in Prague (leaded by Prof. Hajek and Prof. Tywoniak) have a long term experience in the field of development and optimization of techniques for energy and material efficient buildings.

This expertise was used in the application of several innovative projects in the Czech construction practice (e.g. PV-installation at CTU campus building - in total 40 kWp, Education & Environmental centre Sluňákov - large building close to passive standard, large earth-heat exchangers, solar thermal systems with large accumulator, 13 Zero-energy houses Koberovy, 4 storey passive residential house in Čerčany - wooden structure, combined PV and thermal collectors, Senior Centre Moravany and reconstruction of Skoda factory hall – use of RC floor structures lightened with fillers from recycled waste plastic etc.).

A wide range of local as well as international co-operations in the research and development projects are focused on sustainable building issues. Major international co-operation in the field are e.g.:

- CEN
- LEnSE (FP6) – Methodology Development towards a Label for Environmental, Social and Economy Buildings
- iiSBE – International Initiative for Sustainable Built Environment
- fib – Commission C3 – Environmental Aspects of Concrete Structures, TG 3.7 Integrated Life Cycle Assessment of Concrete Structures

- SUREURO (FP5) – Sustainable Refurbishment of Europe - SmartHomes, SunTools and others
> Please describe what your contribution will be to this project (financial, technological,…)
Offered contribution to the project: - research and development (including testing and site monitoring) in the field of energy and material efficient buildings – design, construction and operation phases of the life cycle - development and implementation of tools for complex assessment of building overall quality from the wide range of sustainability issues
> Explain which type of contribution you are looking for (financial, technological,…)
Expected contribution from the project: - exchange of knowledge with other partners of the project - possibility to test and monitor innovative solutions on buildings in real construction and operational conditions - financial contribution for research, testing and monitoring

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2. LIVING CULTURAL HERITAGE

2.1: EurekaBuild (E!3790) Project Idea Form

> Title

Repair and protection of cracked masonries in seismic areas by use of the Flexible Joint Method

> Describe your project idea

New innovative concept of structural intervention

The Flexible Joint Method (FJM), proposed and developed by our research group, is dedicated to protection and repair of cracked masonry structures in seismic areas, especially to cultural heritage buildings. This innovative method introduces "softening" of damaged structures instate of stiffening (associated with the most popular methods of strengthening), and thus allows to avoid unnecessary interventions and limits variations of structure mechanical behavior as much as possible. In the FJM special deformable elastic-plastic polymer fills the cracks of the damaged buildings. The polymer is select properly to make them work together with the existing materials with better "compatibility" from the mechanical point of view. This is to reduce as much as possible high stress concentration, which could occurs while using high strength/high stiffness modern bonding materials. The main criterion in selection concerns much more deformability than strength.

A special flexible polymer filling cracks of a damaged masonry

Properties of a flexible joint

An important feature of the proposed method is maintaining of the primary state of stress in the joined structure of elements or preserving the newly established stress equilibrium and static balance being a consequence of stress redistribution after damage occurrence. Application of this sort of joining structural elements does not introduce additional stress in the damaged object, which could cause new damages in the weakened structure of the building. Cracks' filling with the specially designed polymer cements the disrupted structural bearing elements and causes that a new load bearing capacity of the structure is similar to the primary one. The polymer regains to the damaged building the tensile, compression and shear resistance in place where the bearing capacity was lost. Especially, the tensile resistance, deformability and ductility are greater, what is particularly advantageous in seismic areas. The next profit of the polymer application in cracks is the increase of damping of the whole structure and possibility of dissipation of an additional input energy. The masonry structure retrofitted in such a way better absorbs the energy deriving from vibration and does not undergo further destruction in case of dynamic excitation.

Introduced possibility of large deformation of joints results in some advantages of the flexible joint in comparison to a rigid one. The flexible joint:

- deforms during transmitting of loads (damps vibrations and equalises deformation);
- assures uniform distribution of stress along the lap joint over the total contact surface, making optimal use of joining material in the constructed connection;
- prevents a sudden unforeseen brittle failure of the joint;
- bonds structural faults in crack locations and limits development of the creating new stress concentrators;

The new method of protection and retrofit may be regarded as a passive one, and should be treated as a complementary to the existing retrofit methods, which are applied in seismic areas after earthquake.

The laboratory tests carried out till now (static, cyclic and dynamic) on polymers and tests on

different kinds of specimens bonded by polymer joints, as well as in situ researches on cracked masonry structures confirmed advantageous of the method. This innovative method is relatively chip and is not time consuming. It is registered in the Polish Patent Department with No. P-368173 and is described in details in (Kwiecień et al. 2005), (Kwiecień et al. 2006a), (Kwiecień et al. 2006b).

Tasks and purposes of future researches

It is necessary to investigate material properties of damaged masonry (by use of diagnostic methods, e.g. microdrilling or micro-cores CoDiT method) before preliminary selection of possible structural intervention methods. In case of the use of the FJM, the description of this properties is needed for proper selection of polymer. Especially, important is adhesiveness between original structure materials and polymer. This task should be investigated in co-operation with chemical engineers having experience with different kinds of heritage masonries and environmental influences on their material properties.

In the proposed project, it is required elaboration of a special primer with proper adhesiveness to various kinds of applied polymers and original heritage masonry materials. Created innovative technologies and materials should be tested in laboratories and on real case studies of heritage masonries.

Introduction of the innovative methodology of the monuments protection and repair can give the new low cost tools of minimum intervention assuring extension of the residual life of heritage constructions and reduction of risk to acceptable levels. It can open new possibilities in conservative interventions allowing to maintenance architectural character of heritage construction.

> Please explain briefly your expertise

Expertise :

- Three years of work as a head of the grant No. PB 1529/T07/2004/27 : *Method of elasto-viscoplastic protection and repair of building structures subjected to static, dynamic and thermal loads*;
- Many laboratory and field applications of flexible joints in masonry and concrete speciments and structures, tested with static, thermal and dynamic loads;
- Measurements (including monitoring) of vibrations and deformations of buildings;
- Static and dynamic diagnosis of monument structures (structure mechanics, soil mechanics, analysis of damage influence on structure behavior, analysis of effectiveness of different existing and innovative repair methods);

Selected References:

1. Kwiecień A., Zając B., Ciurej H., Pęcherski R.: Application of flexible joints in dynamically excited structure of damaged buildings. In 6th International Conference of EASD EURODYN'2005, Paris 2005.
2. Kwiecień A., Kubica J., Stecz P., Zając B.: Flexible Joint Method (FJM) - a new approach to protection and repair of cracked masonry. First European Conference on Earthquake Engineering and Seismology. Paper Number: 282. Geneva 2006
3. Kwiecień A., Zając B., Kubica J.: Repair of cracked historical masonry structures by use of the Flexible Joint Method (FJM) – laboratory tests. In 5th International Conference Structural Analysis of Historical Constructions, New Delhi 2006.

> Please describe what your contribution will be to this project (financial, technological,…)

- Know how of the Flexible Joint Method,
- Competitive team,
- Proper polymers for application,
- Laboratory and measurement equipments,
- Company with experience on field applications of polymers (with conservative authorisation)

> Explain which type of contribution you are looking for (financial, technological,…)

- Co-operation with chemical engineers with knowledge and experience in frame of properties and behaviour of heritage masonries materials and they modification under environmental influences as well as skills to form of the speciall primer with proper adhesiveness to various kinds of applied polymers and masonry materials,
- Possibilities of testing the FJM on shaking tables,
- Possibilities of testing the FJM on structures in seismic areas
- Financial support of research
- Co-operation with small and medium enterprises in frame of repair and protection of damaged existing buildings

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2.2: EurekaBuild (E!3790) Project Idea Form

> Title
Sustainable reconstruction of educational and cultural spaces in peripheral communities
> Describe your project idea
The aim of the project is the **improvement of the quality of life** of the inhabitants of peri-urban centers and the creation of a new relation between **city and countryside** through the integration of **environmental management and conservation systems** in actions of amelioration of existing as well as development of new **communal spaces of education and culture.** The project will contributes to the creates of employment opportunities and the active involvement of sensitive segments of the population. The project will include actions of : 1. Restoration and restructuring of traditional buildings and their conversion to spaces of education and culture 2. Amelioration and reconversion of communal spaces with the incorporation of environmental features 3. Development of ecological management systems of **natural sources** (solar energy, wind, water and green spaces) and **waste treatment** and incorporation of environmental elements in design and training 4. Actions of environmental reconstruction of archaeological spaces 5. Shaping of a new environmental conscience through the involvement of large parts of the population and especially young people, in environmental issues through their active participation in the articulation of new strategies for sustainable development.
> Please explain briefly your expertise
The project will be designed and managed by a consortium of public and private bodies, including Universities, local municipalities and private companies of construction and development. They will be coordinated by Evonymos Library, a non-profit organisation with expertise in ecological design and research.
> Please describe what your contribution will be to this project (financial, technological,…)
Evonymos will design and co-ordinate the project through a team of experts in sustainable design and its close co-operation with representatives of local communities.
> Explain which type of contribution you are looking for (financial, technological,…)
We would like the contribution of private companies interested in the development, construction and financing of innovative environmental projects in collaboration with local communities.

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2.3: EurekaBuild (E!3790) Project Idea Form

> Title

New systems to monitor the long term behavior of historic buildings

> Describe your project idea

The project idea refers to the development of new systems to monitor the long term behaviour of historic buildings, as well as associated environmental parameters. This monitoring will be permanent and intelligent, so that the control will be performed before, during and after the restoration works.

The main objective of the project is the development of a "intelligent" system for a permanent monitoring of cultural heritage. The system will consists on:

- Sensors to monitor structural failure, being permanent and compatible with aesthetic requirements
- Embedded sensors to control materials decay, being installed during the restoration works
- New sensors to measure environmental parameters, associated to structural/materials behaviour
- Intelligent systems, provided by alarm devices, to alert the end user in the case of anomalies and dangerous damages
- New systems to ensure appropriate data transmission
- A software to process for an easy and reliable interpretation of data

Besides, a phase concerning training of architects, stakeholders and restorers on the installation, use and interpretation of the monitoring system and data will be also developed.

Impacts:

- Facilitate preventive maintenance of cultural heritage
- Guarantee safety of workers during restoration
- Validate the reliability of certain interventions (specially those referring to geotechnical problems)
- Improvement of buildings durability
- New business opportunities: restoration companies, manufacturers of sensoring and monitoring systems, …

Actors involved:

- Enterprises focused on restoration works
- Entreprises focused on sensoring/monitoring systems manufacturing
- Software developers
- Architects
- Stakeholders and owners of cultural heritage
- Research Centres and Universities.

Administration bodies in charge of cultural heritage management.

> Please explain briefly your expertise

Fundación Labein (Labein) is a research and innovation centre located in the Basque Country Region, in Spain. The mission of Labein is to support enterprises and administration bodies in their research and innovation needs by means of research, development and innovation projects as well as in technology transfer, technological services, consulting, trainning and dissemination activities.

Labein has a total staff of around 280 people with different background (mainly technical, but also economical and social), 70% of them with high-qualified degree and 28 doctors.

Labein is member of different associations of research and innovation at regional, national and international level. Among them, the most relevant are Saretek (Basque Country network for research and innovation), FEDIT (Spanish Federation for research and innovation organisations) and EARTO (European Association of Research and Technology Organisations).

Labein has a wide experience in collaborative projects in the European Framework. Actually has been involved or still involved in 40 projects from the 6th FP, leading 10 of them. Among these projects 27 are in relation to building and/or energy issues. Labein is leading 7 of them.

The Construction and Environment Unit provides services to the whole range of construction sectors: construction product manufacturers, engineering and architectures firms, constructors, developers,

users of buildings and structures and administration bodies. Our construction R&D activities are focused in the following areas: Strategic management of building cultural heritage, Sustainable city and urban regeneration, Environmental strategic management, Process innovation, Sustainable Building and Nanotechnology. Labein is participating on the European Construction Technology Platform and on the Spanish Construction Technology platform leading some of the working groups. Some relevant European projects in the field of the cultural heritage in which Labein is participating or leading are: ▪ GRAFFITAGE: Development of a new antigraffiti system, based on traditional concepts, preventing damage of architectural heritage materials ▪ OPERHA: Open and fully compatible next generation of strengthening system for the Rehabilitation of Mediterranean cultural heritage ▪ MEDACH: Marine environment damage to Atlantic coast structures and buildings: methods of assessment and repair CHRAF: Priorities and strategies to support Cultural Heritage Research Activities within ECTP and future FP7 activities
> Please describe what your contribution will be to this project (financial, technological,…)
Labein –Tecnalia´s contribution to the project will be technological
> Explain which type of contribution you are looking for (financial, technological,…)
At this stage we are seeking expressions of interests for potential European partners as well as financing contributions.

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2.4: EurekaBuild (E!3790) Project Idea Form

> Title
Using innovative GPR techniques for environmental and archaeological studies
> Describe your project idea
The use of ground penetrating radar as a tool for environmental and archaeological studies
> Please explain briefly your expertise
Great experience on GPR techniques, data post processing and the most updated equipment
> Please describe what your contribution will be to this project (financial, technological,…)
Our contribution will be technological and know-how transfer
> Explain which type of contribution you are looking for (financial, technological,…)
We are looking for financial contribution

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2.5: EurekaBuild (E!3790) Project Idea Form

> Title
Redevelopment of an entire urban area in Thessaloniki Historical center by creating a city Hotel
> Describe your project idea
It's about resolution and restoration of five neoclassical buildings in to a city hotel. The whole idea lies into the effort to bring back to life a whole historical area which has declined is completely empty for years now and under "protection" from the Ministry of Culture! The unique city scape, the centrality of the place, the wonderful building fabrics that exist in site are the strong issues that support the implementation of this idea.
> Please explain briefly your expertise
Architect in charge of historical restoration and revival of urban tissue, Environmental Historian SMArtus MIT USA Enviromental Design of City Architecture expert.
> Please describe what your contribution will be to this project (financial, technological,…)
Undertake the design of the project and the organization of the development of the idea
> Explain which type of contribution you are looking for (financial, technological,…)
Financial Cover

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2.6: EurekaBuild (E!3790) Project Idea Form

> Title
Sustainability and Cultural Heritage.
> Describe your project idea
The proposed idea concerns interventions planned for an existing building with high cultural value, in order to achieve its performance as an energy self-sufficient system. The building is dated on the beginning of the 20th century and it is under conservation works at the time being. It is situated on the west entrance of the city of Thessaloniki, near the harbor. The above building will cover its energy needs using renewable recourses and bioclimatic planning. The needs for electric supply are going to be met by the use of a hybrid system, including photovoltaic elements and a wind generator. The needs for thermal supply are going to be met by the use of solar systems. Shading systems, appropriate plantation and environmental planning of the surrounding space are going to be used as passive systems for control of the micro-environment.
> Please explain briefly your expertise
The Department of Building Constructions has the responsibility for every action concerning building activity in the borders of the Municipality of Thessaloniki. Especially the sector for "Building repair and reconstruction and Building conservation" of the above department, is specialized on the maintenance of all the education buildings of the Municipality and also on the conservation of buildings of cultural heritage.
> Please describe what your contribution will be to this project (financial, technological,…)
Our Department can support scientifically the above project, considering that its stuff has the special expertise for these issues (conservation of cultural heritage, environmental planning, bioclimatic design, energy consumption, etc)
> Explain which type of contribution you are looking for (financial, technological,…)
The Municipality has not the financial means to realize such innovative projects. The type of contribution we are looking for is economic funding and support. We are very much interested in participating to European Projects with partners from Greece or from other countries, aiming to exchange knowledge and expertise and receive financial resources.

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2.7: EurekaBuild (E!3790) Project Idea Form

> Title

Assessment of appropriate monitoring methods for the mitigation of hydrogeological hazards' impact on tourist cultural sites
ACRONYM: MOHITOCS

> Describe your project idea

The project refers to a two-step process of monitoring framework: a) assessment of the monitoring possibilities (technical know-how, available techniques, existing level of infrastructures) for the analysis and evaluation of environmental impact on complex cultural systems (i.e. open-air monuments, 'frozen landscapes' memory institutions, modern protective constructions over ancient tourist sites) that are touristically active, and b) development of new systems to monitor the long term behaviour of cultural landscapes. This monitoring will be continuous and intelligent, so that the control will be performed before, during and after hydrogeological hazards (i.e. seismic events, volcanic eruptions, soil liquefaction, landslides, tsunami, flooding).
The main objective of the project is the elaboration of a dynamic methodological framework, appropriate for a further development of a flexible and user-friendly system that will interrelate the two main entities, namely the temporal and geographical distribution of hazards (expressed as perturbations, damage, disfiguration, destruction) with their imprint on the cultural heritage, via continuous monitoring.
Consequently, the whole concept is based on the integration of methods and targets within a system that will consists of:
i. a scheme of overall hazard assessment for each cultural site that will describe the danger, the results and their persistence within this cultural site (d-base with existing data)
ii. sensors to measure environmental parameters associated with the behaviour of cultural targets (i.e. remote sensing techniques for the detection and estimation of ground's movements and landslides)
iii. sensors to monitor structural failure, mechanical and biochemical disfiguration / destruction (i.e. control of materials' decay), being permanent and compatible with aesthetic requirements
iv. intelligent systems, provided by alarm devices, to alert the end user in the case of severe natural phenomena, as well as other anomalies (i.e. long-term erosion or pollution) and dangerous damages
v. system/s to ensure appropriate data transmission
vi. processing software for an easy and reliable interpretation of data
Impacts:
i. enhancement of an interdisciplinary approach for the hazard assessment of cultural heritage
ii. broad training of environmental scientists, managers of the patrimony, stakeholders, restorers and public agents
iii. rise of scientific and social awareness for the preventive maintenance of cultural heritage instead of mitigation
iv. assessment of existing tourist infrastructures and guaranty for the safety of workers, archaeologists, cultural agents and visitors
v. validation of the reliability of certain interventions, especially when referring to geotechnical assessments
vi Improvement of heritage's durability
vii creation of new business opportunities concerning restoration companies, manufacturers of sensing and monitoring systems, GIS developers and cultural managers
Actors involved:
i. Research Centres and Universities
ii. Administration bodies in charge of cultural heritage management
iii. Stakeholders and owners of cultural heritage
iv. Software developers
v. Enterprises focused on sensing / monitoring systems manufacturing
vi. Enterprises focused on restoration works

> Please explain briefly your expertise
The newly established Center for the Assessment of Natural Hazards and Proactive Planning (CANHA) is a research and innovation centre located in the School of Rural and Surveying Engineering of National Technical University of Athens, in Greece. Its mission is to support scientific community, enterprises and administration bodies with respect to their research and innovation needs by means of research, development and innovation projects as well as with technology transfer, technological services, consulting, and training and dissemination activities. Moreover, all scientific activities of the Centre coordinate in the best possible way, in order to insure its contribution to public awareness and sensitivity towards the multi-dimensional consequences of disasters (human and material loss, economic and environmental after-effects, and cultural loss). More than forty academic personnel with different background (mainly technical, but also economical, social and cultural) belonging to various laboratories, participate in the research activities of the Centre. There is a long-standing experience on issues related to natural hazards and management of natural systems. There are about forty-five successfully completed projects –many of them with global significance and with many international partners. CANHA is participating or leading the following European projects relevant with the field of cultural heritage: **SI.PRO.CI:** *(Completed)* Its main Objectives were: The mapping, evaluation and of possible natural and man-induced hazards in the study area of the Prefecture of East Attiki. The mapping of the elements under threat (e,g. Life lines and infrastructure). The integration of the above in a GIS platform. The design of an appropriate geobase and the development of GIS 'risk zoning' applications. **DISMA: DISaster MAnagement GIS with emphasis on cultural sites** The nucleus of this sub-project is the risk management of the cultural heritage within the specific region of Eastern Attica Prefecture using new GIS technologies. Main goals are: a) the creation of risk maps which include cultural targets and b) the promotion of the co-operation between scientific community and local social and administrative structures. **LITTORISK**: **Patrimoine et Prévention de Risques naturels- Habitats Diffuses Littoraux**. It aims to contribute to the development of risks maps including the indication of sites with cultural heritage value located in the coastal areas of the different partner regions, while defining a prevention and mitigation strategy of the damages caused by natural hazards affecting the cultural and natural heritage.
> Please describe what your contribution will be to this project (financial, technological,…)
CAHNA contribution to the project will provide scientific knowledge and technological support.
> Explain which type of contribution you are looking for (financial, technological,…)
At this stage we are seeking expressions of interests for potential European partners as well as financing contributions **Possible partners** National Observatory - Athens, Greece Geological Department - Patras University OMAS (Cyprus) Ltd CNRS - France Department of Earth Sciences, University of Oxford

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Remarks			

2.8: EurekaBuild (E!3790) Project Idea Form

> Title

Development of restoration materials and interventions for the earthquake protection of historic buildings.

> Describe your project idea

The objective of this project is the development of restoration materials (mortars, grout injection, deep repointing, innovative materials) that would be used for the reinforcement of historic masonries, in order to provide them earthquake protection. The studied historic masonries would be either stone masonries or brickwork ones. In a past research work, pilot brickwork masonries have been constructed by using mortar of historic type (hydrated lime, pozzolanic additions, and ceramic fragments). The pilot masonries were evaluated in static response tests (shear strength) and dynamic response tests (earthquake simulator) (in cooperation with the School of Civil Engineering, Prof. P. Carydis). Furthermore, finite element models were developed (School of Civil Engineering, Prof. K. Syrmakezis) with the intention of studying the structure behaviour under seismic loads. This work could be used as the basis for this project.

> Please explain briefly your expertise

- Characterisation of structural materials used for historic/traditional structures
- Design of restoration mortars and concretes that assure the compatibility with the historic ones regarding their physicochemical and mechanical characteristics
- Evaluation of materials' physicochemical characteristics (chemical analysis, mineralogical composition, microstructure's characteristics, e.t.c.)
- Evaluation of materials' mechanical characteristics (flexural strength, compressive strength, static and dynamic modulus of elasticity, e.t.c.)

> Please describe what your contribution will be to this project (financial, technological,…)

- Know-how of materials' design
- Know-how of materials physicochemical and mechanical characteristics evaluation
- Laboratory equipment

> Explain which type of contribution you are looking for (financial, technological,…)

- Cooperation of materials' industries that are interested to produce innovative materials regarding the reinforcement of historic masonries
- Cooperation with Civil Engineers in order to evaluate the pilot masonries static and dynamic behaviour (by using shaking table and finite element analysis)
- Cooperation with relevant authorities in order to proceed to pilot applications in historic masonries
- Financial support of research

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2.9: EurekaBuild (E!3790) Project Idea Form

> Title
PROTECTION OF MASONRIES AGAINST RISING DAMP BY INNOVATIVE PLASTERS – DESIGN AND APPLICATION OF INNOVATIVE SYSTEMS FOR THE CONSERVATION OF THE TRADITIONAL MASONRIES
> Describe your project idea
Masonries are subjected to evident decay processes due to the presence of rising damp. The application of traditional plasters and consolidants available in the market generally doesn't involve a clear improvement of the masonries conditions. The research has the aim to define and to measure the chemical – physical parameters really meaningful for the evaluation of the products performances in order to develop new innovative products. Also on the basis of previous experiences plasters with precise micro-structural characteristics will be experimented and consolidant systems based on nano-dispersions or aqueous emulsions products made by inorganic and inorganic – organic mixed products will be tested. These products will tested at pilot scale applications.
> Please explain briefly your expertise
• Characterisation of plasters of historic/traditional structures • Evaluation of materials' physicochemical characteristics (chemical analysis, mineralogical composition, microstructure's characteristics, e.t.c.) • Moisture transport phenomena mathematical modelling and simulating
> Please describe what your contribution will be to this project (financial, technological,…)
• Know-how of materials physicochemical and mechanical characteristics evaluation • Laboratory equipment • Moisture transport simulator
> Explain which type of contribution you are looking for (financial, technological,…)
• Co-operation of materials' industries that are interested to produce innovative plasters • Co-operation with relevant authorities in order to proceed to pilot applications in historic masonries • Research financial support

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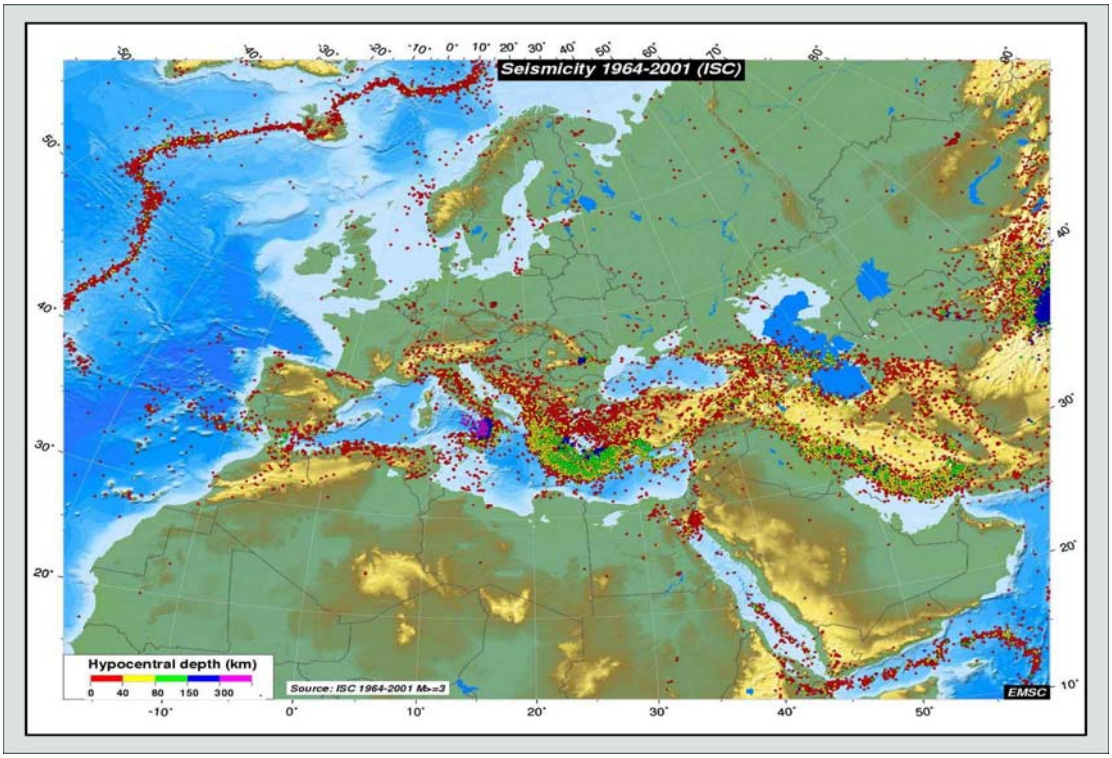
2.10: EurekaBuild (E!3790) Project Idea Form

> Title

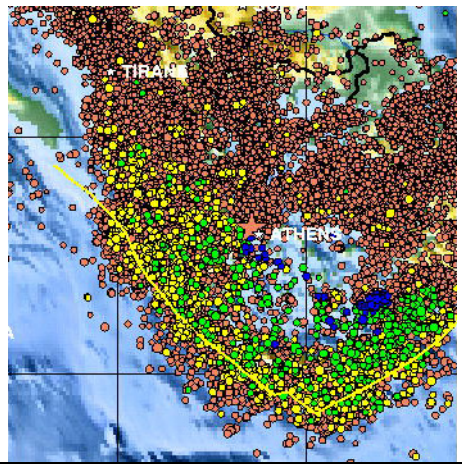
Design and engineering of highly ductile concretes and mortars for new construction and preservation of cultural heritage in case of earthquakes, flooding, terrorist attack,…

> Describe your project idea

During the last 30 years more than 300.000 people were killed by consequence of earthquakes, a multiple became homeless, the economical damage is hardly to assess.
Earthquake safety for buildings with conventional materials is very expensive. New, high performance materials need to be developed, which help to make earthquake design concepts more effective, reducing the overall material volume at the same time.
Often the protection of cultural and social heritage as well as economical aspects argue against the build-up of completely new construction. High performance materials need to be established, that are capable to reinforce existing structures without wrecking.

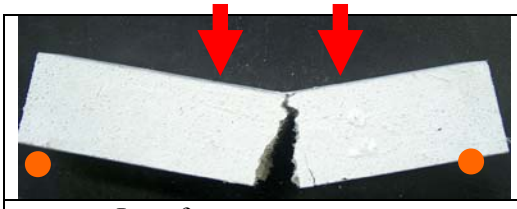
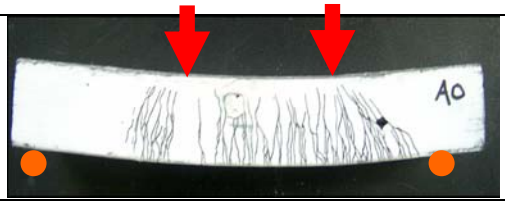


(seismic activity in Europe from 1964-2001)



since 1960 , 20000 earthquakes occurred in Greece (source USGS map)

The major limiting properties of "ordinary" concrete or mortar are poor ductility and tensile strength. New technological developments permit to create concrete or mortar properties that were unimaginable some years before.

	
Low fracture energy upon stress	High fracture energy upon stress

The project aims to the development of special stress absorbing concretes and mortars (up to 200.000 N/m of fracture energy) for the application in components that are important for the dynamic stability of a construction.
Basing on the same technology, reinforcement materials shall be developed that can be applied supplemental to existing structures in very thin layers, but despite of the thinness being capable to reinforce a whole existing structure, securing the safety in case of earthquakes.
Apart from the increase of safety for life and assets in existing buildings, additional beneficial effects will be achieved by the application of these mortars. This will be in detail:

- Saving Resources and reducing CO_2-exhaust by lower overall material requirement
- Saving Resources by using waste materials as addition and cement replacement
- Minimized costs by strengthening existing constructions instead of pulling down and reconstruct
- Conservation of the original appearance of historical cities and existing constructions by only applying small and specific layers.

Additional beneficial effects to environment and health are assessable and need to be investigated within a scientific research project, such as:

- Durability enhancement of existing structures
- Protection from negative environmental impacts (radiation, gas, liquid…)
- Improvement of service-life time compared to the original concept
- Applicability of early-warning systems.

Finally it is highly supposable that reinforcement with special regard to earthquake will also improve the resistance against other impacts such as natural disasters (thunderstorm, storm tide, avalanche, and volcanic eruption), human caused crisis (terror, war) or accidents (impact, explosion).

> Please explain briefly your expertise

Tecnochem has acquired the know-how of formulating ductile materials, high fracture energy. This pioneering lead to many opportunities in developing exceptional materials at the service of community, contributing to safety of humans.
Tecnochem is specialised in solving jobsite construction problems with smart products and systems. Variable modulus of elasticity, corrosion inhibitors, shrinkage free concretes, high strength rapid hardening materials, are a few examples of innovative thinking.
Tecnochem has a team of experienced chemists and engineers, dedicated to concrete and concrete repair materials and systems, and works together with leading Universities, Institutes and Authorities in order to continue with progressive ideas and developments.
Tecnochem has over 30 years of experience in solving construction problems, which has lead to an extensive range of specialised construction chemicals.
Tecnochem in the year 2006 managed the project and application, first in Europe, of High Fracture Energy (High Ductility) concretes for the construction of Ductile Slabs on a sequence of 15 viaducts in Italian Highways with elimination of joints.

> Please describe what your contribution will be to this project (financial, technological,…)

The contribution of Tecnochem will mainly by technical by submitting the basic technology of ductile/high fracture energy concretes and mortars to the consortium, and will manage together with other leading partners, the development of new materials which can extend the resistance to stresses (earthquakes, flooding,..) in new construction (concretes) as well as for the cultural heritage (protection and renovation).
> Explain which type of contribution you are looking for (financial, technological,…)
The consortium partners should be found on companies touching the field of concrete technology and construction but also commerce and insurances such as: • Researchers (private companies, universities, federal institutes) • Cement producers • Raw material producers (fibres, mineral additions, aggregates, admixtures) • Raw material blenders/refiners (fibres, mineral additions, aggregates, admixtures) • Concrete fabricators (pre-cast, ready-mix, tiles) • Project planners • Construction companies • Consulters • Property insurers • Insurance assessors

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2.11: EurekaBuild (E!3790) Project Idea Form

> Title
INTANGIBLE CULTURAL HERITAGE: INDIGENOUS KNOWLEDGE AND PRACTICE CONCERNING THE NATURAL ENVIRONMENT
> Describe your project idea
The main aim of the project is the preservation, documentation, analysis and dissemination of the existing traditional knowledge related to the interaction of people with their surrounding natural environment and the valuation of the cultural, ritual and social value of wild plant diversity. Wild plants have always been significant in all cultures being used for food, medicines, dyes, shelter, fuel, tools, handicrafts and many other purposes important in everyday life. The rapid change of the environment, the depopulation of remote rural areas and the globalisation and homogenisation of communities lead to loss of valuable traditional knowledge that was transmitted from generation to generation and preserved within the complex structures of rural communities which are now disintegrating.
> Please explain briefly your expertise
Biology; Ecology; Botany; Plant taxonomy; Phytochemistry; Biodiversity; Wild food, aromatic, medicinal and dye plants; Ethnobotany; Ethnobotanical research methodology
> Please describe what your contribution will be to this project (financial, technological,…)
Ethnobotanical research; Documentation; Analysis
> Explain which type of contribution you are looking for (financial, technological,…)
Contribution on: Ethnobiology; Ethnobotany; Social anthropology; Environmental economics; Information technology for data management

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2.12: EurekaBuild (E!3790) Project Idea Form

> Title
Understanding and recognizing cultural heritage significance in bridges (Heritage Bridges)
> Describe your project idea
This project aims to develop strategy and methodology for understanding and recognition of cultural heritage significance in bridges to protect and preserve outstanding engineering works for the generations to come. Bridges are an integral and important part of cultural heritage. They are perhaps the most powerful expression of a social community – its identity and values, but also of human advancements in technology. However only 7 bridges are specifically listed as UNESCO World Heritage sites up to today – Pont du Gard and Pont St-Bénézet (Avignon) in France, Aqueduct in Segovia and Aqueduct of Vanvitelli, Coalbrookdale's Ironbridge in UK, Vizcaya Bridge in Spain and Mostar Bridge in Bosnia & Herzegovina. There are more bridges within UNESCO protected historic city centres (Florence, Prague, St. Petersburg...). There are some bridges on UNSECO Tentative List, but generally these are part of a larger complex (road, railway, city, fortress), with only a dozen nominated as individual outstanding structures (Brooklyn Bridge, Firth of Forth...). Far larger number of bridge structures deserve appreciation and recognition of their heritage significance, and should consequently be protected and managed as such. Consistent with EU policy of preserving Europe's cultural heritage that emphasizes how preserving cultural richness of the past contributes to secure Europe's future, this project is aimed at developing strategy and methodology for promotion, protection, rehabilitation and dissemination of heritage bridges. Many bridges are far over and above their functional purpose of providing crossings for quick, easy and comfortable transportation of people and goods. They became true symbols of the city and region and its people. It is important to recognize that major developments in bridge engineering and technology – whether it is by evolution of construction techniques, applied advancements in structural theory or methods of evaluating material behaviour, are of equal heritage significance as historical bridges, regardless of the fact that they might be much more recently constructed. Adequate protection and preservation policy and techniques are necessary to prevent losing any more works of engineering masters.
> Please explain briefly your expertise
Faculty of Civil Engineering of Zagreb University, Croatia and Civil Engineering Institute of Croatia are interested in pursuing the project. The partners have huge experience in design, construction, maintenance, assessment, repair, rehabilitation and management of major bridges. Other partners expressed interested in the project: Laboratorio Fotogrametria Arquitectonica, Universidad de Valladolid, Spain; Faculty of Architecture, University Basque Country, Spain; EURA Conservation Ltd., United Kingdom ; University of Ljubljana, Slovenia ; University of Venice, Italy and Politecnico di Milano, Italy.
> Please describe what your contribution will be to this project (financial, technological,…)
Project partners listed above can provide excellent facilities and have access to resources necessary to perform the research.
> Explain which type of contribution you are looking for (financial, technological,…)
We are looking for European researchers interested in forming partnership on this project as well as financing contribution.

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Remarks			

2.13: EurekaBuild (E!3790) Project Idea Form

> Title

Development of innovative technologies and methodologies for monitoring, conservation and decision making regarding cultural heritage preventive conservation and protection

> Describe your project idea

The project will be accomplished in the following steps:

I. Use + integrate existing

- techniques
- knowledge

and explore innovative ones

II. Delivering

- Methodologies
- Protocols
- Directives and standards
  - NDTs
  - Practises and methodologies

III. Investigating, developing and strategic planning on the level of

- Cities
- Buildings

per type of construction and per type of material.

> Please explain briefly your expertise

- Evaluation of structures conservation state by using NDT
- Characterisation of materials conservation state by using instrumental techniques
- Know-how in development of strategic planning tools for the integrated design of conservation interventions in the level of historic cities and sites

> Please describe what your contribution will be to this project (financial, technological,…)

- Know-how of NDT and instrumental techniques for the structures and materials conservation state
- Existing methodologies and protocols for NDTs and practises for structures' evaluation
- Strategic planning tools for historic cities and sites (based on GIS)

> Explain which type of contribution you are looking for (financial, technological,…)

- Companies activated in knowledge based decision making systems development
- NDTs Companies
- Organisations experts in NDTs application or structures conservation state evaluation

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Remarks	European Construction Technology Platform – Focus Area Cultural Heritage – Working Group 2 "Materials" Coordinators		

2.14: EurekaBuild (E!3790) Project Idea Form

> Title

Conservation and Revealing of Cultural Heritage and Sustainability and Protection of Environment along European Motorways: The case of Egnatia Motorway in Northern Greece.

> Describe your project idea

The proposed idea concerns to develop strategies and interventions planned for European Motorways under design and construction as well as for existing ones in order to protect and assure sustainability and protection for the Environment on the one hand, and on the other hand to support conservation and revealing of the Cultural Heritage along European Motorways.

The case of Egnatia Motorway in Northern Greece.

Next the case of Egnatia Motorway in Northern Greece is presented as an example of the significance of the project idea.

The Egnatia Motorway and its vertical axes are the backbone of Northern Greece transport system. **670 km** long, it is the first high standard road axis that runs "horizontally" through Greece from Igoumenitsa to Kipoi-Evros. It shortens distances and brings areas like Epirus, Western Macedonia and Thrace out of their isolation. It multiplies investment in transport, industry and tourism and links the industrial centres of the West and the East.

The Egnatia Motorway is the most important modern infrastructure project concerning the development and communication of our country with Europe, the Balkans and Asia Minor. It is part of the Trans-European Transportation Network and one of the 14 priority projects in the European Union. The Egnatia Motorway is also a collector route for the Balkan and South-eastern European transport system. Pan-European Corridors IV (Berlin - Sofia - Thessaloniki), IX (Helsinki - Alexandroupolis) and X (Vienna - Belgrade - Thessaloniki) all end at the Egnatia Motorway.

The Egnatia Motorway is connected with 4 ports, 6 airports and 9 vertical axes that ensure access to the countries of South-Eastern Europe. So, the total length (main axis and 9 vertical axes) is about **1.000 km** and the **total budget** amounts to **€ 6.770 M,** (VAT included).

The Environment & Cultural Heritage along the Egnatia Motorway

Along its route, one can meet areas of exquisite natural beauty (e.g. the mountainous areas of Northern Pindos, the wetlands of Aliakmonas, Strimonas, Nestos and Evros Rivers, and Koroneia and Volvi Lakes) and of unique historic importance (e.g. the archaeological site of Dodoni, the remains of ancient Egnatia etc).

The successive natural and manmade environments along the project are exceptionally diverse. The Egnatia Motorway runs through Greek landscapes of exquisite beauty and ecological importance. Its alignment follows the Ancient Roman Via Egnatia. Along this ancient route, within an approx. 1000 meters zone, 270 sites of historical interest have been identified, while, in its vicinity, significant archaeological sites and natural resources of critical importance are located. The Egnatia Motorway runs through Pindos and other Greek mountains and reveals a variety of exceptionally interesting geological formations, valleys and ravines.

EGNATIA ODOS A.E. proceeded to actions aiming at the protection and preservation of the cultural heritage of Greece, as well as at its enhancement, when this is feasible.

Along its route, 270 sites of historical interest have been identified. EGNATIA ODOS A.E. has already financed more than 45 archaeological excavations along the axis at a cost amounting to € 11.5 million. The finds unearthed are significant and date back to various historical eras. In several cases, the motorway alignment was either changed or improved with costs amounting to € 80 million.

Thus, EGNATIA ODOS A.E. has already financed **more than 7%** of the total budget for the **Environment & Cultural Heritage** frameworks. We note that the total budget is about 7.000 Million Euros.

So, the realization of the project idea for European Motorways has multiple significance. E.g., the development of restoration compatible materials and proper interventions for the earthquake protection of historic monuments , e.g. old stone bridges, is very important as concerns Cultural Heritage along European Motorways under construction or existing ones.

> Please explain briefly your expertise
The project is the result of the cooperation of the following participants, having significant expertise in corresponding fields: 1. Prof. Ast. Liolios, Democritus University of Thrace, Dep. Civil Engineering, Inst. Structural Mechanics and Earthquake Engineering, Xanthi, Greece. 2. Prof. Vas. Tsihrintzis, Democritus University of Thrace, Dep. Environmental Engineering, Inst. Ecological Engineering and Technology, Xanthi, Greece. 3. Prof. A. Moropoulou, National Technical University of Athens - Sch. of Chemical Engineering - Sect. of Materials Science & Engineering, Athens, Greece. 4. Prof. C. Syrmakezis**,** National Technical University of Athens, Sch. of Civil Engineering - Structural Engineering Div., Greece. 5. Skarlatos V., TEKTON S.A. "Ready Mix Concrete &Aggregate Co", (production of Self-Compacting Concrete), Xanthi, Greece.. 6. Prof. A. Liolios, Member of the Board of Directors, EGNATIA ODOS S.A., 6th km Thessaloniki-Thermi, Greece.
> Please describe what your contribution will be to this project (financial, technological,…)
Know-how of the above methods' and materials' design for Environmental Protection and Sustainability and Conservation and Revealing of Cultural Heritage along European Motorways.
> Explain which type of contribution you are looking for (financial, technological,…)
1. Cooperation of industries and relevant authorities involved into actions described by the project title. 2. Financial support of research.

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2.15: EurekaBuild (E!3790) Project Idea Form

> Title
NEW PROCEDURES TO EVALUATE THE STRUCTURAL INTEGRITY & BEHAVIOUR IN CULTURAL HERITAGE
> Describe your project idea
The Project aim is the reasonable integration of the static and dynamic monitoring of the physical and structural parameter to improve the diagnostic of the building structural integrity with a high historical, artistic and cultural value. The specific objectives are the following: - Diagnostic procedure definition respectful with technical and artistic, historic and cultural building aspect criteria. - Prognosis model development for the crack evolution of the affected elements. - Combined interpretation of the dynamic and static experiments results.
> Please explain briefly your expertise
AIDICO has conducted some intervention and restoration technical works and R&D projects in the static monitoring and dynamic analysis in many historic building of the Valencian Community area. The Safety & Materials Technical Units maintain specific targets research combining the better evaluation of the some part of the cultural heritage building. The previous experience of AIDICO has motivated that the establishment of some new procedure to integrate the profitable results for a better global integrity evaluation. The specific roles are: inspection sonic and ultrasonic techniques, static remote monitoring, and numerical simulation of structural mechanical and thermal analysis.
> Please describe what your contribution will be to this project (financial, technological,…)
AIDICO could manage a project to integrate the different methodologies and others to increase the building assessment from the static and dynamic analysis point of view.
> Explain which type of contribution you are looking for (financial, technological)
The stakeholders for the Project are: construction restoration companies, cultural heritage management organisation/foundations, image and signal digital processing, simulation process or thermal analysis, artistic or aesthetic evaluation/intervention and some other complex intervention techniques.

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2.16: EurekaBuild (E!3790) Project Idea Form

> Title
Non-smooth Computational Mechanics for Heritage Structures
> Describe your project idea
Development and testing of extensive computational models for the mechanical analysis, including dynamics and earthquake, of masonry and similar heritage structures. Focus will be the introduction of unilateral models like contact-separation or frictional stick-slip, which leads to higher damping properties and, therefore, act beneficial during an earthquake. The proposed project will verify this finding and use it for the design of reinforcement strategies.
> Please explain briefly your expertise
Development of specialized structural analysis and optimization codes, participation in studies and research related to masonry and heritage structures. Results documented in scientific publications, including the recent titles: B. Leftheris, A. Sapounaki, M.E. Stavroulaki, G.E. Stavroulakis, Computational Mechanics for Heritage Structures. Wit - Computational Mechanics Publications, Series: High Performance Structures and Materials Vol. 9, Southampton, Boston 2006. J. Haslinger, G.E. Stavroulakis (Eds.): Nonsmooth mechanics of solids. CISM Lecture Notes Vol. 485, Springer, Wien, New York, 2006. G.A. Drosopoulos, G.E. Stavroulakis, C.V. Massalas: Limit analysis of a single span masonry bridge with unilateral frictional contact interfaces. Engineering Structures, 28, 1864-1873, 2006. G.A. Drosopoulos, G.E. Stavroulakis, C.V. Massalas: FRP reinforcement of stone arch bridges: unilateral contact models and limit analysis. Composites Part B, 38(2), 144-151, 2006.
> Please describe what your contribution will be to this project (financial, technological,…)
Technological contribution. In particular, development of algorithms, extensive computational modelling and structural analysis design and verification.
> Explain which type of contribution you are looking for (financial, technological,…)
Financial contribution, from interested private or public sector companies related to the topic (software development, restoration of monuments, aseismic design). Technological contribution related to the production of devices and experimental testing.

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Remarks			

2.17: EurekaBuild (E!3790) Project Idea Form

> Title

Assessment of historical masonry buildings using rapid visual screening procedures

> Describe your project idea

Most historical buildings constructed from stone or brick masonry have deteriorated due to age and damage from environmental actions and past seismic events. Seismic damage from past earthquakes is common in many historical buildings in southern European countries. A number of questions arise:

- Which historical buildings are in real danger?
- Which historical buildings need an urgent intervention?
- What should the strategy be so that the weakest historical buildings can survive?

The idea is that these questions can be answered through a rapid visual screening procedure. Specific forms should be created to collect structural characteristics or other parameters that significantly affect the structural integrity of the buildings. The FEMA procedures for seismic assessment could be used as a background guide. Moreover, specific rapid assessment procedures for masonry buildings adopted in Italy, New Zealand and Japan should be used as a background material. Once the information is collected, the data can be used to assess the buildings and rank the buildings in the order of most vulnerable so that the most susceptible buildings can be strengthened.

> Please explain briefly your expertise

- Seismic assessment of existing reinforced concrete and masonry buildings,
- Assessment of existing buildings via rapid visual screening procedure and
- Decision making for possible interventions on a building stock.

> Please describe what your contribution will be to this project (financial, technological,…)

- Mostly technological and scientific contribution.
- Specific financial contribution on laboratory equipments, instrumentation, computer facilities, computer software and consumables.

> Explain which type of contribution you are looking for (financial, technological,…)

- Cooperation with municipalities and with state sectors responsible for monuments and historical buildings.
- Cooperation with senior engineers or recognised expert specialist engineers.
- Financial support.

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