

RESEARCH AND DEVELOPMENT



A Periodical of the University of Thessaly

Research Committee of the University of Thessaly
Office for Technology Transfer and Research Support

Issue 06/ 2017

**PRECIOUS: PREvention of Complications to Improve
OUtcome in elderly patients with acute Stroke.
A randomized phase III clinical trial.**

**Migrate: Research and training network on
Miniaturized Gas flow foR Applications with enhanced
Thermal Effects**

**Alliance: Enhancing excellence and innovation
capacity in sustainable transport interchanges**

**NOVELOG: New cooperative business models and
guidance for sustainable city logistics**

**PATHWAYS PROJECT: Participation To Healthy
Workplace And inclusive Strategies in the Work Sector**

**dReDBox: Disaggregated Recursive
Datacentre-in-a-Box**

CONTENTS



- 3 PRECIOUS: PREvention of Complications to Improve Outcome in elderly patients with acute Stroke. A randomized phase III clinical trial.**



- 4 Migrate: Research and training network on Miniaturized Gas flow for Applications with enhanced Thermal Effects**



- 6 Alliance: Enhancing excellence and innovation capacity in sustainable transport interchanges**



- 8 NOVELOG: New cooperative business models and guidance for sustainable city logistics**



- 10 PATHWAYS PROJECT: Participation To Healthy Workplace And inclusive Strategies in the Work Sector**



- 12 dReDBox: Disaggregated Recursive Datacentre-in-a-Box**

**Research Committee
University of Thessaly**

Issue 05/ 2016



Steering Committee

Mamuris Zissis, *Professor,
Chairman of the Research Committee of
the University of Thessaly and Vice-Rector
of the University of Thessaly*

**Charoula Stathopoulou
Vasilonikolou**, *Assistant Professor,
Vice-chairwoman of the Research Com-
mittee of the University of Thessaly*

Ioanna Lalioutou,
*Associate Professor, head of public
relations at the University of Thessaly*

Dimitrios Mesalouris,
*Head of Special Fund for Research
Grants (ELKE)*

**Research Committee of the
University of Thessaly**

**Office for Technology Transfer
and Research Support**

Lachana & Giannitson,
38334 Volos, Greece
Phone: +30 2s4210 06429,
+30 24210 06470,
+30 24210 06433
e-mail: ee@uth.gr,
resup@uth.gr
Website: ee.uth.gr

PRECIOUS: PREvention of Co mplications to Improve OU tcome in elderly patients with acute S troke.

A randomized phase III clinical trial

Strokes are the world's second leading cause of death and the second cause of long-term disability. Elderly patients have a high risk of complications, such as infections or fever, after strokes. These complications are strongly associated with a higher risk of death or dependency. Under its Horizon 2020 programme, the European Commission has funded a new research project on strokes. The PRECIOUS project will assess whether a pharmacological strategy to prevent the most common complications in elderly patients with acute stroke reduces the risk of death or long-term disability.

The study

A total of €6 million has been awarded to the consortium to run the trial over five years. The project includes Greece and 10 other European countries. PRECIOUS will include 3,800 patients in 80 hospitals in the study. Patients aged 66 years or older will be randomised to a strategy to prevent complications in the first four days of their hospitalization, or to standard care. The PRECIOUS research team is headed by Prof Bart van der Worp (University of Utrecht, Netherlands), while the study in Greece will be led by Dr George Ntaios, an Assistant Professor in the Department of Internal Medicine of the University of Thessaly.

“We hope that through preventive treatment with cheap and safe drugs, the chances for good recovery of the patients without significant post-stroke will increase. This simple and affordable therapeutic strategy could potentially lead to an annual reduction by approximately 25,000 of the number of elderly Europeans who die or become disabled as a result of stroke,” say the two researchers.



Assistant Professor George Ntaios Department of Medicine - “PRECIOUS”

Department of Medicine, University of Thessaly

The Department of Medicine and the Research Laboratory of Internal Medicine of the University of Thessaly School of Medicine were established in the University Hospital of Larissa in 1999. Under the leadership of Prof George N. Dalekos, it provides outstanding healthcare mainly to patients from the Central Greece region but also from all over Greece.

The Department of Medicine and the Research Laboratory of Internal Medicine offer a variety of educational opportunities for medical students, residents and fellows. The department is proud of its strong educational mission, training the next generation of physicians through rigorous residency and fellowship programmes. The department has participated in numerous research studies both as a research centre as well as the national coordinating centre.

About 2020

The EU's biggest research and innovation programme to date, Horizon 2020 will make nearly €80 billion in funding available from 2014 to 2020. It promises more breakthroughs, discoveries and world-firsts by taking great ideas from the lab to the market.

Further information

For further information on the PRECIOUS-trial, please contact Dr George Ntaios (gntaios@med.uth.gr) or visit the PRECIOUS website (www.precious-trial.eu/).



MIGRATE: Research and training network on Miniaturized Gas flow foR Applications with enhanced Thermal Effects

Continuous human technological development and the simultaneous reduction of available natural resources have influenced the goals of applied research in recent years. In recent decades, increasing the productivity of industrial processes has been the primary target. However, this has now changed and the focus is now mainly on attempting to reserve resources and on developing of cleaner technologies in the near future. This is why the community directive “European Roadmap of Process Intensification”, which the European Federation of Chemical Engineering (EFCE) proposes, envisages, among others, the development of microscale processes and the improvement in heat transfer processes and heat recovery.

The phenomena of microscale heat and mass transfer and their very high transmission rates are typical examples of the benefits that result from the diminution of components. Such microscale processes can be applied in a vast range of areas, from industry to everyday applications, with heat transfer and regeneration the most promising field. By employing innovative, highly effective heat-transfer processes, up to 80% of emitted heat can be recovered.

However, the knowledge of microscale transfer phenomena is limited. High accuracy measurement systems would help in understanding and studying these phenomena, but these are not readily available, and their computational study is especially demanding. For this reason, the study and design of these devices are usually based on trial and error, and comprise the rule for heat transfer in gases. There are no services yet that provide technical solutions as far as improving equipment using gases on the microscale are concerned, that would take into account pressure decrease, materials, microstructure, modelling and simulation, as well as measurements and process

control of such devices, although a lot of applications include them.

The MIGRATE programme aims to deal with some of the difficulties faced by European industry with mass and heat in microscale gas processes. Within the framework of the programme, a European network of scientists, consisting of academic institutes (universities and research centres), large, small and medium-sized enterprises, will be formed and will include computational, experimental, theoretical and applied research. For this purpose, 15 early stage researchers (ESRs) will be trained in various fields of heat transfer in gases in low dimensions and/or pressures. In particular, these researchers will be trained in modelling processes and heat transfer equipment, in developing and calibrating sensors and data collecting systems used in heat transfer as well as in gas mixture thermal separators and microheat regenerators, with industrial applications in fields like transportation, telecommunication and energy production. This combination of academic research, small and medium-sized enterprises and large industries is expected to enrich our understanding of heat transfer in microscale gas flows, to allow us to transfer this knowledge to industry so it can be applied in high efficiency devices, to staff enterprises with highly trained personnel and to promote collaboration among European scientists.

The programme aims to:

- Improve the foundation of research in Europe in the field of heat transfer in microscale gases and its applications as well as the development of innovation in this field
- Solve important scientific issues and transfer the acquired knowledge to industrial technological applications
- Find scientific and technological solutions for

issues related to conserving resources

- Train early stage researchers (ESRs) according to a European standard and in collaboration with industries, so they can acquire high-quality specialisation in matters concerning microscale gas heat transfer as well as other skills (such as copyright, marketing, financial management)
- Be a programme related to various scientific fields and different areas of specialisation through collaboration among various countries.

The Transport Processes and Process Equipment Laboratory of the Department of Mechanical Engineering of the University of Thessaly will support and collaborate with a number of the 15 early stage researchers who will conduct the corresponding projects of the MIGRATE programme. The laboratory will also be responsible for completing educational and research duties and obligations, two of which are the ESR6 and the ESR10.

The research topic of the ESR6 project includes the computational and experimental study of a micro-pump, without any moving parts, whose function is based on temperature differences (Knudsen pump). Firstly, the various designs will be assessed computationally so as to choose the best design possible, based on which further experimental study will be conducted, the modelling, and, in the end, the construction of a prototype. The computational modelling will be conducted with the support of the University of Thessaly, while the experimental study and the development of a prototype will be conducted by the University of Toulouse in France (www.insa-toulouse.fr/en). This programme is also supported by the world-famous Inficon company in Liechtenstein (www.inficon.com), which specialises in vacuum processes. Researchers will spend the largest part of the year in the University of Thessaly and in the University of Toulouse, and by the end of the programme a joint PhD can be awarded.

The ESR10 research topic includes the improvement of a microgas divider to capture volatile hydrocarbons through processes on the surface of a solid wall. The aim is to develop a methodology capable of absorbing benzene and

its derivatives, and to rapidly discharge them when heated, as well as to be applied in a portable microdevice for the in situ measurement of hydrocarbons of 1-2 ppb content. The development of the device, as well as a large part of the experimental project, will be conducted in the In'Air Solutions company in Strasbourg, France, while the development of the appropriate computational tools will be conducted at the University of Thessaly. The various stages of this programme will be supported by the CNRS/ICPESS in Strasbourg as well as by the Aix-Marseille University in Marseille, France. Towards the end of the programme, a PhD could be awarded by the University of Thessaly, with the co-supervision of scientific coordinators from both the University of Thessaly and the University of Strasbourg.

More information on the MIGRATE programme, which has received funding from the EU's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie actions grant agreement No. 643095, is available on the project webpage: www.migrate2015.eu.

Professor Dimitris Valougeorgis
Scientific Coordinator for the MIGRATE programme
Transport Processes and Process Equipment Laboratory
Department of Mechanical Engineering
University of Thessaly
www.mie.uth.gr/Valougeorgis_en.html



Professor Valougeorgis Dimitris Department of Mechanical Engineering - "MIGRATE"

An aerial photograph of Europe, showing the continent's outline and surrounding seas, serving as a background for the title.

ALLIANCE

Enhancing excellence and innovation capacity in sustainable transport interchanges

The University of Thessaly, through its Traffic, Transportation and Logistics Laboratory (TTLog) of the Department of Civil Engineering, is a participant in the ALLIANCE (Enhancing excellence and innovation capacity in sustainable transport interchanges) twinning project.

The scope of the project is the enabling, stimulating and strengthening the scientific and technological capacity of Latvia and the raising of the profile of the country's research staff and institutions in the field of smart interconnecting sustainable transport networks. This knowledge transfer will build the grounds for a common understanding of the main components affecting sustainable intermodality and support the selection and management of the most optimal and applicable solutions for transport interchanges. It will also facilitate stakeholder collaboration and the development of strong linkage among education, research and industry.

ALLIANCE aims at developing advanced research and higher education institution in the field of transport in Latvia by linking the Transport and Telecommunication Institute (TTI) with two internationally recognised research entities – University of Thessaly (UTH) and the Fraunhofer Institute for Factory Operation and Automation (IFF). The close collaboration of the three institutions will help to achieve the goals through the following activities:

- Organisation of young researchers' seminars
- Organisation of workshops
- Organisation of summer schools for trainers and young researchers
- Development of educational programme for graduate and postgraduate students
- Development of training programme for trainers and practitioners
- Provision of grants for participation as authors in peer-reviewed conferences
- Facilitation of short-term staff exchanges with the aim of international collaboration, mainly publications
- Establishment of a guidance strategy for preparing scientific publications
- Creation of an educational forum as online tool for distance learning and knowledge sharing

The overall methodology is built around the analysis of the needs of Latvia and the surrounding Baltic region (Lithuania, Estonia, Poland) on knowledge gain about intermodal transportation terminals and the development of the tools to attain this knowledge, providing at the same time excellence and innovation capability. The analysis, which will be conducted during the first stages of the project, addresses the overarching relations among policymakers (for example, government, city authorities), industry (transport operators, service providers, etc.) and education/research. Structured around three main pillars of organisational/governance, operational/services and service quality/customer satisfaction, ALLIANCE will deliver a coherent educational/training programme addressed to enhancing the knowledge of current and future researchers and professionals offering their services in Latvia and the wider region.

In the field of interest "smart solutions and intermodal terminals", the vision is that the knowledge transfer through twinning activities will benefit the creation of a doctoral programme in Transport Economics and Management at TTI. The educational/training programme is structured in three thematic areas: governance and policy development, smart solutions and decision-making frameworks. Each thematic area will be elaborated and organised as an intensive summer course, lasting a week each. Specific

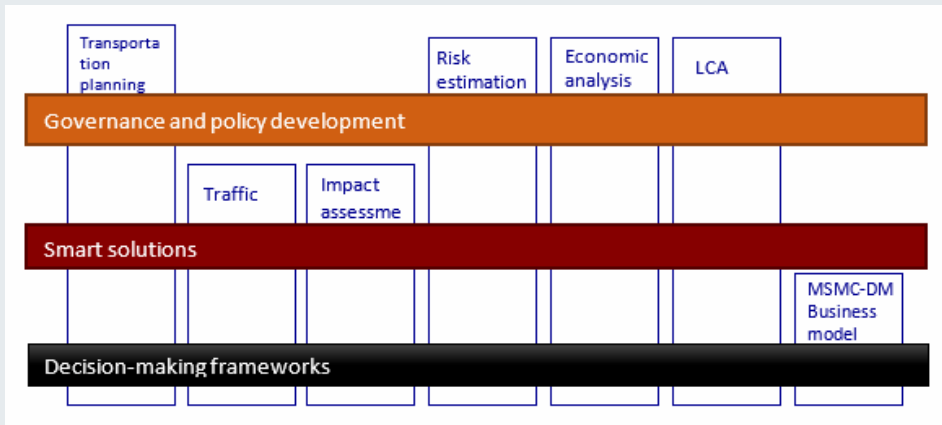


Figure 1: Grid of elements to educational/training programme and thematic areas

material will be also developed for the train-the-trainers session, which will transfer knowledge to TTI staff on the topics and involve them in the teaching activities at the summer schools. A grid of the elements of the thematic areas is depicted in Fig.1:

The expected impacts on the overall research and innovation potential of the TTI and Latvian research community will be of high importance. The TTI will benefit from ALLIANCE by:

- Improving its knowledge in methodologies for preparing, writing and publishing scientific papers
- Strengthening its research capacity
- Establishing international research teams in specific areas of interest
- Generating new innovative ideas for future research work through the project's activities
- Setting up the fundamentals for the next generation of researchers
- Being integrated in a number of existing international transportation research networks
- Being incorporated in the European research system of transport and logistics

The ALLIANCE project and the cooperation of TTI with the two research institutions UTH and IFF will induce benefits into several domains of everyday life, both at regional and national level as well as internationally. First of all, new bases will be established concerning procedures, education and interdepartmental collaboration among research institutes. The innovative organisational framework, which will be structured for this reason through the project, is expected to constitute a best practice application with tangible and well-estimated progress results, which will be disseminated and communicated through social events to the research community and to the respective business sector as well.

In addition, the application of innovative, smart and state-of-the-art solutions either well-tried or based on best practice results will provide the necessary guarantee increase in the effectiveness of new projects in the transport domain. Lastly, the most important benefit will be the configuration of an integrated framework pertaining to the knowledge-transfer techniques and the generic upgrading of the educational system through networking, staff exchange, webinars and other knowledge-transfer methods and techniques based on a well-structured and well-tried schedule.

For more information about ALLIANCE, please contact:

Eftihia Nathanail

Assistant Professor, Department of Civil Engineering
 Head of Traffic, Transportation and Logistics Laboratory (TTLog)
 Tel.: +30 24210 74164,
 +30 24210 74158
 Email: enath@uth.gr
<http://ttlog.civ.uth.gr>



Eftihia Nathanail Assistant Professor, Department of Civil Engineering - "ALLIANCE"

NOVELOG: New cooperative business models and guidance for sustainable city logistics

The University of Thessaly is one of the 28 partners in the NOVELOG (New cooperative business models and guidance for sustainable city logistics) research project. Funded by the European Commission under its Horizon 2020 programme, the three-year project began in June 2015..

The project's vision is to strengthen the capacity of local authorities and stakeholders for sustainable policy making in Sustainable Urban Mobility Planning, by providing tools for managing the "implementation chain" (problem capture – decision – planning – testing – assessment – adjustment – implementation). The project encourages the development and implementation of a sustainable freight policy and respective measures (innovative smart logistics solutions and corrective actions), resulting in an improved understanding of cost effective strategies, measures and business models to reduce the carbon footprint of logistics operations in cities. The project also promotes the replication of best practice methods and methodologies as well as the adoption of success stories in similar city cases.

The scope of the project is to enable knowledge and understanding of urban freight distribution and service trips so that cities can implement effective and sustainable policies and measures and facilitate stakeholder collaboration for sustainable city logistics. This guidance will support the selection of the most optimal and applicable solutions for urban freight and service transport, and will facilitate stakeholder collaboration and the development, field testing and transfer of best governance and business models.

To this end, the project objectives are as follows:

- To understand, assess and capture current needs and trends in urban freight transport, revealing the reasons for the failures in the implementation of city logistics schemes and to identify the key influencing

factors and develop future sustainable urban logistics scenarios.

- To determine optimum policies and measures based on city typologies and objectives and to link them to tailored business models and test and validate them.
- To develop a modular integrated evaluation framework for city logistics that will portray the complexity of the life cycle of urban freight transport (UFT) systems and implement it to assess the effectiveness of the policies and measures.
- To incorporate the best-fitting policies and measures in integrated urban planning and sustainable urban mobility plans (SUMP), at local level, to facilitate and guide multi-stakeholder cooperation for improved policymaking.
- To field test, implement and validate all the above, in selected EU cities, and demonstrate the applicability and sustainability of the tools and ensure the continuity of the impacts by creating and establishing take-up strategies and road-maps for the best city logistics solutions.

The key concept of the project is to initiate and enable city logistics policy formulation and decision-making as part of a city's sustainable urban mobility planning, and to support the implementation and take up of appropriate policies and



Eftihia Nathanail Assistant Professor, Department of Civil Engineering - "NOVELOG"

measures. This will be achieved through guidance provision to policymakers, based on sustainable business and logistics models, and the facilitation of cooperative schemes and consensus among stakeholders. The policies and measures applied in urban environment are grouped into two mega concepts:

1. administrative and regulatory schemes and incentives (Admin)
2. cooperative logistics (CoLog).

Consensus among the involved stakeholders constitutes the main ambition of NOVELOG, which is pursued in each and every work package, through the building a communications and knowledge interchange platform, at various levels, concerning urban logistics. The ultimate goal is to involve all stakeholders (including public) in the decision-making process, in order to raise their awareness towards the upgrading of urban freight transport activities and services, keeping their interest alive and focusing on the enhancement of sustainability, liveability and effectiveness of the implemented policies and measures as selected, approved and adopted by them according to their pursuits, goals and emerging needs. NOVELOG will innovate by progressing beyond the state of art in urban freight and city logistics within a triple helix of (1) evaluation framework development, data collection, and empirical analyses, (2) specific demonstrators and case studies and (3) guidelines for Europe-wide take-up of the best policies and solutions. In this direction, NOVELOG will develop a set of four different tools:

1. Understanding cities
2. Toolkit
3. Evaluation
4. Guidance

The establishment of a communication platform among cities and stakeholders will be pursued from the beginning of the project. This platform will enable collection of influencing factors of urban freight transport and the identification and collection of key performance indicators and methods used for assessing the effectiveness of policies and measures for each stakeholder group. It will reveal stakeholder objectives, priorities and perceptions and future plans for urban freight transport development; it will initiate an open discussion arena, to be evolved further to a common decision-making process.

The performance of selected or tested policies and measures will be assessed through the integrated evaluation framework, based on stakeholder objectives, priorities and perceptions. The most appropriate, feasible assessment method will be employed by each city, depending on the city's own characteristics, and multi-stakeholder, multi-criteria decision-making techniques will be elaborated and implemented, to estimate a logistics sustainability index of the city's urban freight transport profile, based on life cycle impacts and societal costs. Practical guidance for including urban freight transport policies and measures in the cities' sustainable urban mobility plan will be drafted and specified, for the participating city cases and for selected NOVELOG network cities.

The NOVELOG pilot cities and their respective demonstration concepts are listed below:

1. Athens, Greece: Business cooperation between road and rail transport providers for last mile deliveries and ITS application
2. Turin, Italy: Flexible use of public infrastructures by ITS and recognition scheme incorporated into the regulatory framework
3. Graz, Austria: Home delivery system for small shops
4. Rome, Italy: Decision support system for city logistics measures, detailed definition by authorities and recognition scheme incorporated into the regulatory framework
5. Barcelona, Spain: Macro-blocks planning in a city logistics perspective
6. Mechelen, Belgium: Shops and bike couriers cooperation for urban freight deliveries.
- 7.

The NOVELOG case studies and their respective demonstration concepts are as follows:

1. Emilia-Romagna region, Italy: Harmonisation of city logistics rules among cities; home deliveries and business model for a Urban Consolidation Centre (UCC)
2. Gothenburg, Sweden: Care of addresses and use of the existing logistics platforms for consolidation.
3. Venice, Italy: Using public transport for last mile freight deliveries
4. Copenhagen, Denmark: Formalised freight network for defining incentives to improve demand management
5. Pisa, Italy: Urban distribution centre business and operational model
6. London Borough of Barking and Dagenham, UK: Freight travel plan and behavioural change policies

For more information about NOVELOG, please contact:

Eftihia Nathanail

Assistant Professor, Department of Civil Engineering
Head of Traffic, Transportation and Logistics Laboratory (TTLog)

Tel.: +30 24210 74164, +30 24210 74158

Email: enath@uth.gr

<http://ttlog.civ.uth.gr>

and the other media channels:

- Official website: www.novelog.eu/
- LinkedIn: www.linkedin.com/groups/NOVELOG-Project-8384147/about
- Twitter: twitter.com/NOVELOG_project
- Facebook: www.facebook.com/NOVELOG-Project-412651338922161/

PATHWAYS PROJECT

Participation To Healthy Workplaces And inclusive Strategies in the Work Sector

Participation To Healthy Workplaces and inclusive Strategies in the Work Sector

People suffering from chronic illnesses and mental-health problems often experience serious work-related problems, such as unemployment, low productivity, absenteeism and stigmatisation in the work environment, all of which have repercussions on a personal, national and European level. The constantly increasing number of people suffering from chronic diseases and mental-health problems, in combination with the existing economic crisis, intensify these issues and call for measures and strategies under certain innovative conditions, which should improve the job opportunities for them. Unfortunately, such actions are limited, as the lack of knowledge on the available strategies in European countries, their efficacy, and the lack of clarification concerning the professional needs of these people has led to a chasm between what is offered and what is actually needed.

PATHWAYS is a three-year European research programme aiming to contribute to the development of innovative approaches to facilitate the vocational integration of people suffering from chronic diseases and improve their employment status. Specifically, PATHWAYS aims to

- a) detect integration strategies available in Europe and beyond
- b) define their effectiveness
- c) assess the specific professional needs of people with chronic illnesses and mental health problems, and
- d) develop guidelines that support the implementation of strategies for the integration into employment.

The following institutions are participating in PATHWAYS:

- Universidad Autónoma de Madrid (Spain)
- Parc Sanitari Sant Joan de Déu (Spain)
- University of Thessaly (Greece)
- University Rehabilitation Institute (Slovenia)
- Hogskolen I Oslo Og Akershus (Norway)
- Gailtal Klinik – Neurologische Rehabilitation (Austria)
- Uniwersytet Jagiellonski (Poland)
- Ludwig-Maximilians-Universitaet Muenchen (Germany)
- Vseobecná fakultní nemocnice v Praze (Czech Republic)
- Carinthia University of Applied Sciences (Austria)
- European Association of Service providers for Persons with Disabilities – EASPD (Belgium)

Coordinator: Fondazione IRCCS Istituto Neurologico Carlo Besta (Italy)

Taking part in the programme as consultants-partners are the following bodies:

1. World Health Organisation, Alarcos Cieza, Somnath Chatterji, Geneva (Switzerland)
2. The University of Sidney, Luis Salvador-Carulla, Sydney (Australia)
3. Swiss Paraplegic Research, Jerome Bickenbach, Nottwil (Switzerland)
4. GAMIAN-Europe (Global Alliance of Mental Illness Advocacy Networks-Europe)

Pedro Montellano, Brussels (Belgium)

Twelve partners from ten different countries specialised in the field of chronic health issues, mental health, and employment are also participating in PATHWAYS. In this way, strategies among the various European areas are compared, taking into consideration cultural, social, and political differences. Consulting partners, including advocacy organisations, employers, institutions, international organisations and European Union representatives will provide useful information for the development and implementation of various political proposals aiming to improve the integration into employment. In this way, PATHWAYS will promote access to the labour market, in which people with chronic diseases and mental health problems will be active and essential members.

The programme includes the fulfilment of seven work packages. The Department of Special Education of the University of Thessaly, under its director, Associate Professor Anastasia Vlachou, is taking part in all work packages, taking charge of the seventh package, which aims to:

1. Look into and determine, along with relevant partners (representatives of advocacy groups, employers and experts), the best way to implement the available strategies, putting emphasis on any obstacles that may arise and limit successful implementation.
2. Develop proposals at a European level concerning the implementation of strategies for integration into employment.
3. Assess the expected effects of the defined strategies on people with chronic diseases, employers and government funds.

For more information, visit www.path-ways.eu



Associate Professor Vlachou Anastasia, Department of Special Education - "PATHWAYS"

dReDBox

Disaggregated Recursive Datacentre-in-a-Box

Innovating how we build datacentres

The dReDbox programme aims to develop a new architecture for data centre infrastructures. It is widely known that all high-scale applications (internet banking, search engines, stock transaction systems, smartphone applications, etc) are supported by a large number of servers. The main structure unit of these infrastructures is the server. Depending on the application profile, their number, the resources offered by each (for example, the number of processors, the memory size, the number and size of disks, etc), their networking as well as which part of the application they take on, are determined. Contemporary servers are actually high-scale computers able to incorporate a number of processors and disks as well as large memory. Their proportions are bigger than those of a personal computer since they have high power requirements. Because of the heat load produced, a specialised cooling system is needed. That is why the servers in a computing centre are placed in specially adapted rooms with air-conditioning and power supply voltage. The programme began in January 2016 and will last three years. The programme's coordinator is IBM Research in Ireland. Two universities, a research centre, and five companies from Ireland, Spain, Greece, France, Netherlands and the UK take part. The University of Thessaly is represented by a team of five researchers.

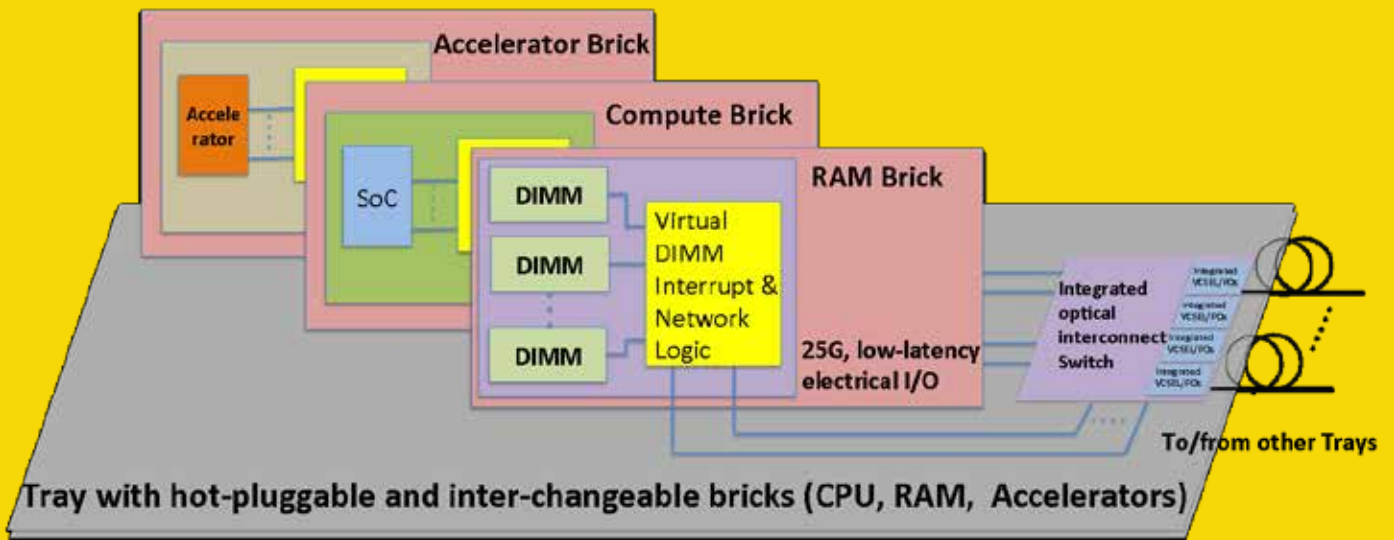
Despite the fact that the server provides the possibility to incorporate a large number of resources, there are many limitations:

First, every platform supports a specific ratio of resources. For example, it can allow 10 to 20 processors, 10 to 150 GB of memory and up to four disks. So, if an application requires 10 processors and 300 GB of memory, the resources of two processors would have to be combined to meet the memory requirements. As a result, there has to be a supply of ten processors that would remain untapped.

Secondly, the servers incorporate specific resource models, so if a resource requires an upgrade that is not supported, replacing the processor that leads to the upgrade of all resources is necessary. In the dReDBox programme, the structure unit of computing centres will be the resources themselves and not the server that is now combining them. For this purpose, a powerful electro-optical network will interconnect all the resources

of the computing centre with speeds resembling those that can be achieved locally in the server's motherboard. The resources will be incorporated into small platforms the size of a credit card and the network will provide motherboards with a large number of ports for their incorporation. In contrast to all contem-





porary servers, any type of card can be inserted to each port. The following is an example of the dReDBox architecture: Within the project's framework, a final solution will be given and all challenges resulting from infrastructure architecture on operating systems will be met as well as challenges resulting from resource management software of computing centres. A prototype platform will be constructed, from all component parts, by the project's industrial collaborators that develop motherboards for contemporary servers. A copy of this platform with all operating subsystems will remain at the University of Thessaly after the end of the project.

The programme was chosen for funding within the EU's Horizon 2020 programme, upon a call in 2015 for next-generation datacentre technologies for the internet market. The programme was one of the five chosen from among 58 proposals.

The programme deals with a considerably new subject, which is unique among the five chosen for funding. Similar attempts are in progress in the US.

The programme is EU-funded and is aimed at manufacturers and computing infrastructure providers. End users will benefit from a cleaner planet as the programme aims to produce the same work with a much lower energy cost and fewer devices.

It is an ambitious programme that deals with cutting-edge technology in the particular field. The students involved in the programme have the opportunity to complete PhD dissertations and enrich their CV, ensuring access to high-ranking positions in high-tech firms.

For more information on the project, visit www.dredbox.eu



Athanasios Korakis, Assistant Professor, Department of Electrical and Computer Engineering - "dReDBox"



University of Thessaly
Research Committee of the University of Thessaly
Office for Technology Transfer and Research Support

<http://www.uth.gr/>

<http://ee.uth.gr/>