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Knowledge Partnerships
for an Innovative Future



British Council

UK-Turkey Higher Education and Industry Partnership Programme

Knowledge Partnerships for an Innovative Future

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INDEX

- 13** Why Food May Prove To Be The Best Food Packaging
16 From Ash and Steel Slag to Energy... Building a Better Environment
19 Sustainability: Getting The Right People, In The Right Place, Sharing The Right Ideas
23 Rapidly Growing Energy Sector Faces Rapidly Growing Cyber-Threat
26 The Tool That Keeps You Updated In A World of Dynamic Science
28 A Virtual Vault For Your Data
31 Course That Designs First Steps On The Career Ladder
34 The New Education Systems: Mobile Learning
37 The Emotional Life of Mobile Phones
41 In the World of Nanomaterials, The Big Idea is - Small
43 How To Reach A Target of 30 Percent Renewable Energy – by 2023
45 World Energy Demand To Double? Try The Water Solution
49 The Chicken and the Egg, and the much-needed Graduates
52 The Water Agenda: Recycling, Reusing and Taking Control
55 The Plastic Film That Makes Greener Greenhouses
58 Small Farmers Innovate to Grow
63 Database-Mining in Cancer Research
66 Changing the Tools for Cancer Diagnostics and Malarial Therapy
69 Eliminating 'Side-Effects' – Making Cancer Treatments Smarter
72 The Changing World of the 100
77 Gluten-Free Products for Better Health

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British Council 2014

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Over
20
Projects

8 Project teams have developed joint curriculum

€ **22** million Applications for national and international funds

€ **1.9** million Received grant amount from organizations

23 Turkish University Partners

20 UK University Partners

21 Industry Partners

12 Governmental Institution / NGO Partners

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A COMMERCIAL SUCCESS STORY

“This publication provides insight into the exciting research and teaching collaboration between the partners, revealing the impact that the projects are having on universities, students, industry and perhaps most importantly, on society itself. “

It is with enormous pleasure that I present this collection of articles highlighting a series of uniquely innovative collaborations between UK and Turkish universities, with partners from business and industry. This publication tells the stories of a series of projects set in motion by the British Council UK-Turkey Higher Education and Industry Partnership Programme. This programme, launched in March 2012, created more than 20 new partnerships between UK and Turkish universities and industry partners.

The programme itself is a commercial success story, helping to generate over €1.9m in additional research and development funding, with a further €22m anticipated, and has resulted in the establishment of 8 joint curriculum programmes. It is a research, cultural and educational success story, as the programme is supporting technology transfer, helping build industry relevant curricula, encouraging innovation and further internationalising education.

This publication provides insight into the exciting research and teaching collaboration between the partners, revealing the impact that the projects

are having on universities, students, industry and perhaps most importantly, on society itself. From new environmentally friendly packaging that also increases the shelf life of cut fruit and vegetables, groundbreaking work on drug properties that could have significant implications for the treatment of diseases such as cancer, to new innovations in cyber protection and the latest mobile phone technologies. These stories reveal the remarkable and often inspirational outcomes from the collaboration between scientists, business people and interested citizens of the UK and Turkey.

In the drive to build strong knowledge economies, countries all over the world are striving to develop better links between industry and higher education. I am delighted that our two countries are cooperating in this area under the auspices of the UK-Turkey Knowledge Partnership Agreement. The British Council believes that by building such co-operation between the two countries, academics, researchers and industrial partners gain much more than by working in isolation. We know for example, that papers produced by international teams receive more citations than those produced by researchers from one country alone.

Although it is a small country, the UK has the second highest citation rate in the world. In Turkey, there is a drive to internationalise higher education and rapidly strengthen research and development with phenomenal pace. Bringing these two countries together to co-operate on teaching and research with industry involvement therefore was inevitably going to lead to great things. As Prof Yusuf Çengel, Senior Advisor to President of TÜBİTAK once said “with the experience of the UK and the dynamism of Turkey, we can together do great things.”

In July of this year, it was my privilege to address the conference: Generating Knowledge, Innovation and Growth, that the British Council organised in partnership with the Council of Higher Education in Turkey, the President of which, Professor Gökhan Çetinsaya has also provided a foreword to this collection. At the conference I highlighted why this area of work is important to the British Council. We

are not a government department, nor a research council, nor a higher education institution. However, for almost 80 years we have been leading education and scientific co-operation between the people of the UK and the rest of the world. In that time, we have helped create thousands of university partnerships such as those featured in this publication, and used our unique expertise and experience of managing co-operation between different cultures to ensure success. As these stories testify, success means prosperity for the UK and Turkey through the additional funding that the partnerships have leveraged, and long lasting trust and friendship between people and institutions in the UK and Turkey. This is at the very core of the British Council’s Mission and I am very proud to witness this success in these projects. I hope you are as inspired by them as I am.

Margaret Jack
Director Turkey, British Council

¹ In 2010, 80 per cent of the variation in citations per document across countries is explained by international research collaboration rates, which indicates the strong correlation between international research collaboration rates and citations per document “The shape of things to come: Higher education global trends and emerging opportunities to 2020”, British Council, Going Global 2012.

² “Citation Country Rankings”, The SCImago Journal & Country Rank, <http://www.scimagojr.com/countryrank.php>

³ Prof Çengel, Yusuf, “Employment, Entrepreneurship and Growth: A Prosperous Future for Turkey and the UK”, Vice President of TÜBİTAK, Istanbul, 4 October 2013.

TURKEY-UK KNOWLEDGE PARTNERSHIP: A TWO WAY HIGHWAY

“The European Higher Education Area (Bologna Process) and the European Research Area (Lisbon Process) which involve Turkey as well as the United Kingdom, are among the best examples of the global cooperation.”

In the 21st Century the biggest challenge posed by globalization to nations, industry and peoples, is how they deal with change – from demographic change, to growing issues of food security, to sustainability, to the increasing demand for energy, to a just desire for better living conditions. The impact of change is felt more intensely in a world where we are all increasingly connected through the internet and social media. The changing world is no longer over there, it is right here in my city, in my neighbourhood, in my instant connection with people across the world. Innovation is the power we have to shape this fast-changing world for the better. At the heart of innovation is the relationship between University and Industry, a partnership that connects fundamental research with the ability to make it happen.

This University-Industry collaboration is a rich and sophisticated eco-system of talented, highly motivated people and enabling institutions – faculty members, researchers, students, universities, university research and development centres, entrepreneurs, incubators and science parks, technology transfer offices, intellectual property policy makers, sectoral associations, industrialists, industrial research and development centres, consumers, funding agencies,

science and technology policy makers. Over the last 60 years we have witnessed tremendous change in this ecosystem, forcing us to re-evaluate the roles played by universities and industry. In the 1960s improved competency in industrial enterprises generated advantages in production. In the 1980s and 1990s industry generated improvements in cost and speed. However by the turn of the century there were two very different drivers of change. Since the 2000s, industry has prioritised ‘knowledge’ and since the 2010s, knowledge is founded on co-operation.

Similarly while in the past the main mission of universities was limited to education and research for its own sake, that too is changing. Today, the social contribution (by which I mean both the economic and social value) of the knowledge produced and the social value created through educating people are now much more important factors. This is why industry-university collaborations, in Research, Technology Development and Innovation (RTDI) Processes for example, are not just a duty but a necessity for Higher Education institutions. Each collaboration creates its own method and model, there will be different co-operation models at national, regional and local levels. In this regard, the

European Higher Education Area (Bologna Process) and the European Research Area (Lisbon Process) which involve Turkey as well as the United Kingdom, are among the best examples of the global cooperation.

Several strategic commitments have emerged from an ongoing relationship of friendship and mutual trust between Turkey and the UK. These include some significant recent commitments embracing higher education, technology and innovation at intergovernmental level: the “Turkey-UK Strategic Partnership Agreement” signed at the prime ministerial level on 27 July, 2010; the “Turkey-UK Knowledge Partnership Agreement” signed on 26 September, 2011 between the Turkish Ministry of Economy and the Department for Business, Innovation and Science of the UK; the memorandum of understanding signed between the Turkish Council of Higher Education and Universities of UK with the co-signature of the UK Minister of State for Universities and Science on 13 December, 2012. I am particularly delighted that spurred on by these strategic agreements, the British Council’s UK-Turkey Higher Education and Industry Programme has already achieved tangible results. Establishing joint programmes, technology transfer, the development

of industry-informed curriculum and commercialised research just scratch the surface of what has been initiated by the 21 partnerships between UK and Turkish universities together with their industrial partners.

Some of the remarkable stories showcased here were shared among participants at the first output of the UK-Turkey task force – “Generating Knowledge, Innovation and Growth, A UK-Turkey Knowledge Partnership Conference” held in July 2013 at the Istanbul Technical University. The success of this event encouraged both the UK and Turkey to deepen collaborative possibilities through the formation and development of partnerships between science parks and technology transfer offices. I believe the value and number of these partnerships will become even more evident, leading to further collaborations in education, technology transfer, research and innovation. The industrial, educational and social achievements of these projects will lead to deeper and even more fruitful partnerships between the UK and Turkey.

Prof. Dr. Gökhan Çetinsaya
President
Council of Higher Education Turkey

Environment



Why Food May Prove to be the Best Food Packaging

Scientists bring fresh thinking to fresh-food packaging creating an environmentally friendly food-wrap

Modern consumers are caught between the advice from governments and doctors that they should eat more fresh fruit and vegetables and the environmentally harmful packaging required to stop the food going off. There is a real need for more sustainable packaging in this market, which in the UK alone is worth over £2 billion per annum.

A project between the İzmir Institute of Technology, The University of Reading and industry partner, Agrotalya, is designed to make an innovative contribution to resolving this problem

The source of a solution to providing environmentally friendly packaging may come from Turkey, where agriculture is one of the major industries. After crops are harvested and processed, there remains a significant amount of plant waste. Although some of these materials are currently used in feedstock or fuel, most are unused or underutilized.

Project Partners

İzmir Institute of Technology
The University of Reading
Agrotalya

However, Turkey's artichoke industry is now working to provide a solution for both and packaging and waste material problems. Producing 35,000 metric tonnes per year, Turkey is the 12th largest artichoke producer globally. While artichokes are a rich source of cellulose, acids and minerals, much of the plant is inedible.

The Artichoke Alternative

Why artichokes instead of other produce? It's partly because the artichoke waste offers an alternative to current method of preventing browning based on what are known as 'dip-treatments'. This involves the cut product being dipped in a solution consisting of reducing, acidifying, chelating and antimicrobial agents in such a way, that the residue left after the product

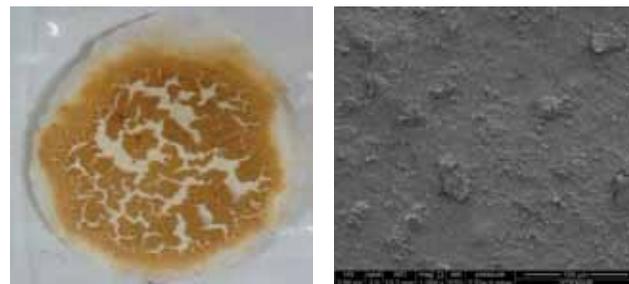


is withdrawn from the solution, contains the agents in such low concentrations that they are well below the thresholds which require declaring on the label

Artichoke wastes have the potential of being used as a source of carbohydrate polymers. By incorporating hemicellulose into the packing material matrix, it will improve the oxygen barrier properties. Consequently, browning will be retarded and the shelf life of vegetables will be extended. Composed of mainly bio-based materials and containing no petroleum compounds, the environmental impact of these new films would be very low.

Research activities are undertaken in United Kingdom and Turkey laboratories – with research training for the Turkey team in UK and vice versa. Unprocessed or minimally heat-treated (blanched) artichoke hearts were packaged in the films developed. Shelf life of the packaged artichokes are evaluated via microbiological, chemical, physical and sensory analyses.

Agrotalya, a new agriculture company located in Antalya, Turkey, provides fresh artichokes as well as blanching and packaging equipment. The company can rapidly use the research findings at pilot or industrial scale, so fresh cut artichoke can be added to company's product range and can meet consumers' needs in the market.



● Outputs

Industry: The project promotes the fresh-cut fruit and vegetable industry in Turkey, which requires reliable and safe handling processing, packaging and storage methods. Thanks to the extended shelf life of the artichokes or other fresh cut vegetables and fruits, the industry can deliver the products to distant markets.

Consumers: UK consumers (and **others**) will benefit from the availability of foods such as artichokes, not easily cultivated in the UK. The work can help nutritious and safe food reach more people, which are not only a food security, but also a health issue.

Workshops and Conferences: Following meetings and visits between members of the team, a workshop was held October 31, 2012 that was attended by 10 faculty members, 20 research assistants and 10 postgraduate students. Student exchanges and internships between the two universities are in the planning stages. A 2-day conference entitled "Recent Advances in Enhanced Functional Packaging for Foods from Sustainable Sources" took place in Izmir

New Programme: A joint Food and Nutrition Engineering programme is under development between Izmir Institute of Technology and University of Reading. Izmir Institute of Technology will prepare administrative paperwork and submit it to the Higher Education Council (YOK).

Commercial: The intention is to develop a new range of packaging films based on the work done on this project that would act as "smart" packaging material. The project team intend seeking support from Turkish, UK and EU research funding agencies as well as key industrial partners in both countries, to take the academic and commercial outcomes of this project to a new level.

Impacts:

- Promotion of fresh-cut fruit and vegetable industry in Turkey
- Export of products to distant markets, including UK
- Introduction of new products
- Utilization of waste agricultural materials

From Ash and Steel Slag to Energy... Building a Better Environment

Producing construction materials and particularly concrete is an energy intensive process. The current project aims to make better quality and less environmentally harmful construction materials

The fact that second to water, concrete is the most consumed material in the world, is astonishing but unsurprising. While the World Business Council for Sustainable development (who reported this data) acknowledge that concrete can be used to make long-lasting energy-efficient buildings, in Europe, the US, and Japan, an estimated 900 million tonnes of construction and demolition waste is produced each year.

The consumption of sand, rock and soil in the production of concrete and the associated generation of waste which ends up in landfills or in the sea cannot be sustained into the future. This environmental degradation has prompted teams of researchers at Sakarya University, Gazi University and University of Wolverhampton to develop a project for the utilization of waste materials and industrial by-products in construction applications.

The project aims to produce low-cost construction materials, using fly ash and slag. Fly ash is produced during the combustion of coal and is a very fine, powdery material, like talcum powder. Steel slag is an inevitable



1 ton of steel production creates 400 kg steelmaking slag

by-product from the steelmaking process, generated at a quantity equal to 10-15 per cent of the steel produced.¹

Using Synthetic Materials

The fly ash will be used as either cement replacement or as fine aggregates in the production of construction materials. The slag is crushed and used as lightweight aggregate to produce cement-based materials such as building, and paving blocks. The research will lead to a greater reduction in the use of virgin materials that require extensive energy to extract, crush and transport. Additionally, carbon dioxide (CO2) emissions can be greatly reduced by using fly ash to replace cement and using steel slag to replace aggregate.

Industry partner Ereğli Demir Çelik – Turkey's leading

In Turkey, 15 million tons of fly ash is produced every year. All these waste materials are discharged into the environment...

steel manufacturing company – is providing waste materials for use in the research. Participation in the project provides the company with an immediate solution to the volumes of waste produced in the construction industry that are currently being disposed of in environmentally harmful ways.

In both Turkey and the UK, a large amount of fly ash is generated annually – the majority of it is deposited in landfills. Additionally, the steel industry in Turkey generates a great quantity of steel slag, where often it is deposited in landfills near beaches and tourist resorts as well as directly into the sea, which, in turn, affects the flora and fauna of the region and the local and national economy.

“For each ton of cement produced, there is approximately 1 tonne of CO2 emission, which would make this research viable as it would reduce the amount of cement used”. Prof Jamal Khatib

The Building Boom

This project will help reduce waste and energy usage at a time when there has been a surge in the number of major infrastructure projects across Turkey, including motorways and high-speed railways. The researchers used varying amounts and proportions of slag and

“Steelmaking Slag is not currently used and unfortunately the waste is poured into the sea sometimes...The project will help to prevent this environmental threat.” Prof Seyhan FIRAT

fly ash, exploring their effect on the bearing ratio of the road sub-base A number of laboratory tests are conducted, including ‘specific gravity’, ‘hydrometer test’, and ‘compaction’, to determine the optimal amount of these waste materials that can be used to produce the best bearing capacity for use in road construction.

In addition to addressing a major environmental concern, the the construction industry will benefit by reducing costs and improve the quality of materials. As a consequence of the manufacturing, commercial and environmental value of this project, the academic staff at the UK and Turkish institutions will directly benefit by increasing their research profiles. Their research, new insights and expertise will be disseminated through publications, workshops and conferences. Team members at Gazi and Sakarya Universities have expertise in construction materials in geotechnical applications while Wolverhampton University has team members with expertise in cement-based materials. The outcome of sharing their knowledge is not only the development new environmentally-friendly products, but fresh areas for further collaborative research.

One outcome of the project relevant for road-building will be to help prevent land subsidence and reduce the maintenance and repair costs of roads.

Construction waste threatens human health... This new product will help to develop economic, recycled and environmentally friendly construction materials that will reduce this threat while also providing business benefits to construction companies.

Project Partners

Sakarya University
Gazi University
University of Wolverhampton
Ereğli Demir Çelik
UK Quality Ash Association (UKQAA)

Outputs

Building stronger collaboration between **Sakarya University**, **University of Wolverhampton** and **Gazi University** in that all will benefit from the collaborative research for future partnership with industry. The original project team was expanded to include Gazi University in Turkey.

Opening the door for the UK industrial partner, **Quality Ash Association (QAA)** to enter into the Turkish market. QAA is keen to explore existing technology in the UK that is applicable for use in Turkey as well as other countries and this research is vital in finding future potential partners.

Currently, Europe in general is witnessing a slow down in the economy, however this research is an area of great potential for the future. In spite of the recession in the UK at the moment, it is encouraging that academia and industry are able to provide collaborative research that will positively impact on the environment and the economy.

Opportunity to provide waste steel slag from the industry partner of the project, **Ereğli Demir Çelik Company**. Through the establishment of a strong university-industry network, Ereğli Demir Çelik intends to develop sound and heat insulated blocks.

Joint plan with the industry partner on finding new usage and applications for the waste materials in order to reuse waste materials in a more ecological manner.

Scientific reports and joint research publications in the form of conference papers and journal articles.

An international conference at Gazi University on “Application of Efficient and Renewable Energy Technologies in Low Cost Building Design and Construction” which will be published as a book.

Grant applications for further funding to **TÜBİTAK**, **IRSES** and **Horizon 2020** with the value of **300,000 TL** with the involvement of five universities with expertise in construction research: Bulent Ecevit University, Kocaeli University, Anadolu University, Osmangazi University and Gazi University.

Organisation of one postdoctoral researcher exchange between the UK and Turkey on concrete components.

Possible outcome of a commercial product (fly ash or steel slag) which will be marketed as a **green product**.

Sustainability: Getting The Right People, in the Right Place, Sharing the Right Ideas

In the first of an ambitious project aiming to provide practical solutions to seemingly intractable problems, Boğaziçi University and the University of Manchester create a robust platform for idea exchange

In 2008 the OECD noted that Turkey faced a number of environmental challenges due to unsustainable production and consumption patterns. These include high material and pollution intensity of its economy, and disregard for environmental concerns in efforts to speed economic and social development. The true cost of modernization has often been deferred onto future generations in terms of environmental degradation, and even the current generation's quality of life.

The summer school series set up by Boğaziçi University and the University of Manchester, “Conflict over Commons”, is a serious attempt to address this by engaging contributions and dialogue between, industry, government, academia and all concerned stakeholders around a different sustainability topic each year. The first year's area of inquiry was the fisheries sector, aiming to develop environmental protection and a sustainable development policy dialogue in the fisheries sector.

In the language of an increasingly popular line of academic thinking, fisheries are ‘common pool resources’

Project Partners

Boğaziçi University

The University of Manchester

that many people and organizations have a stake in, from enterprises of various sizes in the canned fish industry, to fishers using trawl nets with large and small boats. It's an area of conflicting interests with growing demands on natural resources, stretching the limits of environmental protection. The industry also displays a lack of effective co-ordination, shown by the decreasing number of fish and sustainable use problems.



Different Interests, Differing Takes

In Turkey, as well as other countries, small-scale fishers are among those who suffer the most from the degradation of fisheries and fishing areas and they have been actively engaged in campaigns to limit fishing size of the large-scale fishers. There are regulation differences, not only between the UK and Turkey, but internationally

there are different perspectives around different types of fisheries. However, there have been recent improvements in Turkish regulations, especially with regards to limits introduced on young fish catchment and fishing depth.

What are common-pool resources?

Common-pool resources, such as forests and seas, are often managed by a combination of governments and markets. This is often done by only allowing a certain amount of the resource to be used or harvested over a set period of time. This allows for the core section of the resource to remain intact.

What was exciting and innovative about the “Conflict over Commons” series was that all parties with a vested interest in the issues were included in the process. Members of civil society, industry representatives, academics, small-scale fishers and students attended, exchanged knowledge and discussed solutions around issues such as sustainable fishing management; the relationship between poverty and fisheries; and policy-making challenges. The team also came together with Greenpeace at the Summer School for their campaign against destructive fishing, the project becoming an invaluable tool for bringing together fishermen and the campaign group to voice and listen to the other’s concerns.



Members and representatives from fishery cooperatives in Istanbul provided valuable industry input around: the problems they face in the everyday management of the fishery commons; how different management and policy arrangements affect them; and their local knowledge for sustainable management of fisheries.

Ideas In Action

Sustainability is always about ‘context’, giving issues their wider ecological, social, philosophical context, focussing on the local and the global, or in terms of academic ideas, the necessity of getting insight from an interdisciplinary perspective. International participation enabled the school to function as an international platform for policy dialogue on fisheries. This was the first time that the issue of conflicts regarding common-pool environmental resources was addressed academically in a systematic manner in Turkey with the participation of international scholars, attracting a large international and interdisciplinary audience. The summer school put into practice the necessary bridge-building between academia, business and civil societies.

In terms of capacity building in higher education, the project’s benefits were two-fold. Firstly, it has developed teaching and research skills due to the



international partnership character of the project, since academics and students were exposed to state-of-the-art research on common pool resources. They had hands on experience with the newest techniques such as simulation exercises and role-playing games, had the opportunity to engage with interdisciplinary research combining formal methods, case studies, statistics, and even a limited version of conducting a field study. Secondly, as the project brought together industry and civil society actors with academics, it served to expand the research capacity in academia by the inclusion of everyday user perspectives, policy-orientation and feasibility in academic research.

On the industry side, the project helped professional capacity building since industry partners got first-hand access to international knowledge on fishery management and could get a sense of best practice examples globally. The school contributed to the industry partners’ professional skills for sustainable management of fisheries by bringing in expert knowledge on ecological limits and sustainable use.

The project helped and changed the lives of all participants. Academics had the chance to see first-hand the real-world problems they work on, the implications of the knowledge they produce and the



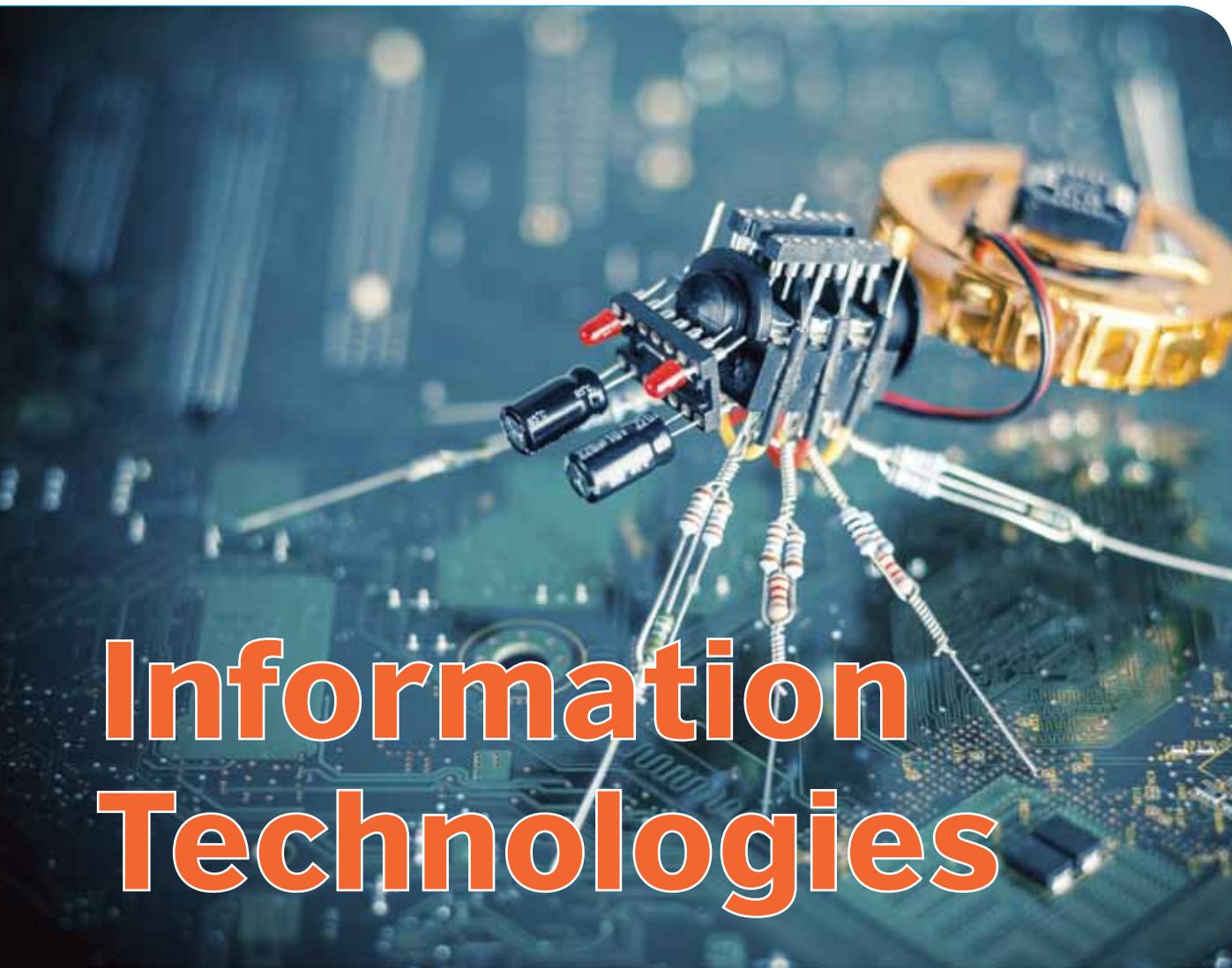
feasibility of the solutions they propose. The industry partners, on the other hand, had the chance to get input from academic disciplines on how to manage fisheries (and their livelihoods) more sustainably. The project can potentially change the lives of everyone in Istanbul if this collaboration bears fruit in terms of policy-making in the management of fisheries.

Outputs

Links Deepened: The already-existing links with Greenpeace Mediterranean and Slow Food Turkey were strengthened on the specific theme of fishery management. In addition, a working relationship was established with Güzelce Fishery Products Cooperative and the Central Association of Turkey Fishery Products Cooperatives.

Expansion: The project team extended the scope of the project into a “Summer School Series” with the involvement of University of Manchester. Each summer school focuses on a different subject and the following one will be on “Conflict over Commons 2: Water Resources, Underground Resources, and Coastal Resources.”

Funding: The project will continue for at least three more years. Alternative sources of funding that will be explored for the coming years include various funds distributed by The Scientific and Technological Research Council of Turkey (TUBITAK), as well as the Regional Environmental Centre.



Information Technologies

Rapidly Growing Energy Sector Faces Rapidly Growing Cyber-Threat

Scary headline, but updating the growing energy sector in Turkey also requires new thinking around Cyber security. A project between University of Abertay Dundee and Istanbul Bilgi University has it covered

The demand for energy in Turkey has been estimated to grow at an annual rate of 6 percent between 2009-2023, and accordingly, the amount of investment needed to fulfil demand is estimated at USD130 Million. It's not just the figures which explain why the Turkish energy sector is widely seen as the most dynamic and fastest expanding sector in the Turkish economy. The dynamics of the sector are changing; the energy market is experiencing a transition into a competitive market structure and attracting substantial private sector investments. This liberalization process with the recent privatizations, licensing tenders and strategic partnerships has led to rapid growth. It's no surprise that for the first time in the history of the Turkish energy industry, a firm from this sector has ranked first among the biggest companies of the country.

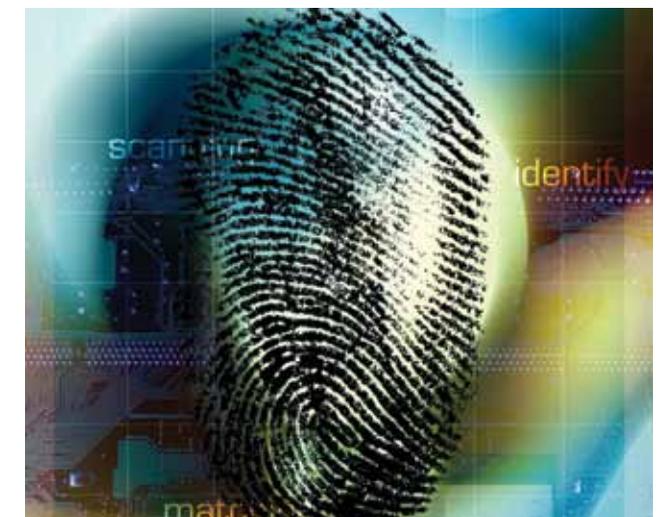
As the industry grows, the energy sector and governmental offices face a myriad of threats in cyberspace. The types of these threats vary from the theft of intellectual property through cyber intrusions, to intrusions against critical infrastructure companies, including those in the energy sector. We have observed

a trend over the last year in malicious actors increasing their focus against critical infrastructures. Last year, as many as 100 incidents of attacks were reported by the Turkish media. After the crippling effects of cyber attacks all over the world, the energy sector has recognized the unprecedented challenge in protecting energy delivery systems against cyber threats.

Cyber Attack on Energy Delivery Systems

It's the right moment for a collaborative project between University of Abertay Dundee and Istanbul Bilgi University and TUPRAS (from the Turkish energy sector). This project was designed in response to the call for proposals from

Project Partners
University of Abertay Dundee
Istanbul Bilgi University
TUPRAS-Turkish Petroleum Refineries Co



UK and Turkish Higher Education Institutions (HEIs) to develop projects in collaboration with industry. Designed to address this issue of cyber-security, the collaboration will also contribute more widely to the innovative capacity of the emerging energy sector in Turkey. The most important contribution to security is education that raises awareness and alertness, and the best defence method in cyber-security is through extensive training, education, and communication. As the energy industry has evolved so rapidly, security systems have struggled to stay ahead.

In this sector, one disconcerting threat would be a cyber attack on energy delivery systems. Energy delivery systems include control systems, the brains that operate and monitor our energy infrastructure such as the Supervisory Control and Data Acquisition (SCADA) Systems. Early SCADA system designs did not anticipate the security threats posed by hackers. The result is that most of them are literally defenceless against cyber threats. Securing energy delivery systems is essential for protecting energy infrastructure. A big cyber attack upon SCADA system could cause blackouts and other disruptions stemming from the country's dependence on energy resources.

This collaborative project utilises the unique research capabilities of all the partners in developing a solution. The University of Abertay Dundee is recognised for its strengths in innovative curricula informed by the needs of industry as well as industry-led applied research, while Istanbul Bilgi University and TUPRAS are looking to build on existing good practice by deepening and broadening industry co-operation with Higher Education and research through bilateral collaboration. Through this project, the university partners conducted an audit of training needs and have developed curricula to train TUPRAS employees in cyber security, raising critical awareness of important risks and how to mitigate them. Further work

by the universities is planned to test industry security systems and offer remedial support to strengthen them. The partners submitted a joint proposal with two areas of common interest identified as having the potential of affording a long-term relationship:

- 1) Application of Ethical Hacking in the Information Security of the Energy Sector
- 2) Application of 3-Dimensional Computer Graphics in the Resurrection of Lost Edifices of Historical Heritage.

What is Ethical Hacking?

An ethical hacker is a computer and network expert who attack a security system on behalf of its owners, seeking vulnerabilities that a malicious hacker could exploit but report problems instead of taking advantage of them. Ethical hacking is also known as penetration testing, intrusion testing and red teaming.



This project has helped the collaborating parties build on their past experience and create effective framework to develop a model of collaboration that can be extended to other fields by other interested universities and will represent a real breakthrough.

Outputs

Workshops: A highlight was the “Cyber-security in the Energy Sector” workshop held in the Santral Campus of Bilgi İstanbul University. On 15 November, it was again held in the TUPRAS facilities. The speakers were C.S. Özveren, A. Sapeluk, C. McLean, E.R. Diaz. What made this workshop more interesting was its timing, which coincided with some crippling attacks on governmental IT sites. The audience had already read the newspaper headlines about cyber attacks and discussed the issue during the lectures.

Industry Commitment: TUPRAS, the industry partner, is committed to growth and reputation enhancement through internationalisation and its executives were in agreement that the successful completion of this project will help them meet both of these objectives.

Dual Degree Postgraduate Programme: Discussions about sustaining co-operation between Bilgi (Istanbul Bilgi University) and UAD (University of Abertay Dundee) began in 2012, following contacts established by this project. As a result of this, a Letter of Intent was signed and a Memorandum of Agreement was drafted. An Articulation Protocol will be signed in July, at the next visit of the Abertay Dundee team to Istanbul. Subsequently, this document will be submitted to the approval of YÖK, and UAD's Quality Assurance Committee. The project team is looking forward to a YOK-approved Dual Degree Postgraduate programme between a Turkish and UK University.

Book: The aim of the activities of this project were aimed at raising alertness, awareness and education in an area which has been severely neglected by critical sectors such as the energy sector in Turkey. There are plans underway for the publishing of a book on the topic of cyber-security in the energy sector.

The Visualisation Project: The partnership of two universities expanded in a different area - the visualisation of historical artefacts. Turkey is a country which is rich in lost historical edifices like temples, shrines and other monuments. The most famous of these are the two of the 7 Wonders of the World: Temple of Artemis, and Mausoleum of Halicarnassus. Today's visitor to the sites of these edifices in Ephesus and Bodrum experiences frustration since nothing is left of them which would help today's visitor conjure what they originally looked like. The fact that all the important fragments of these monuments are now in British Museum paves a natural way of partnership between a Turkish University (Bilgi) and a British University (Abertay Dundee). With the support of Greek and Roman Antiquities Department of British Museum, the team prepared a Research Proposal for TUBITAK for this joint project.



The Tool That Keeps You Updated in A World of Dynamic Science

Keeping track of scientific innovation can be difficult. So Bilgi University and London School of Economics have developed tools to monitor the impact of scientific development

Scientists continuously break new ground, making discoveries that directly impact on our lives so even with the latest technology, keeping track of change is difficult. And it is not just policy and decision makers who are interested in the latest developments. New research findings and their necessary policy implications can have a real social impact, making access to scientific research results an important tool.

Hence the collaboration of Bilgi University and London School of Economics on a new programme designed to keep people abreast of our dynamically changing world of science. Along with industry partners, the British Science Association and IBM Turkey, the project goal is to help build the necessary capacity for developing media monitoring and analysis tools. This is accomplished through the development of a 'Barometer for Science in the Media Monitoring' (BSMM), a data-mining software for analysing and producing social indicators. The project team has the completed work on the media monitoring system and the demo

Project Partners

Istanbul Bilgi University
London School of Economics
IBM Turkey
British Science Association

was launched in April 2013 in Turkey. Now its users can monitor science related news items in Turkish.

Vital feedback

Feedback from the public is important for politicians as well as NGOs, social movements and consumer and patient associations. In the past, public opinion was obtained through polls. Online media monitoring can do away with polls by focussing on online indicators. As new discoveries and innovations are implemented, members of the public need an accessible method of monitoring reports, studies and other news so that they can have a voice in areas directly affecting them.

What is data mining?

Data mining (sometimes called data or knowledge discovery) is the process of analysing data from different perspectives and summarising it into concise, useful information. This information can be used to increase revenue, cut costs, or both. Data mining software is one of a number of analytical tools for analysing data. It allows users to analyse data from many different dimensions or angles, categorise it, and summarise it.

Data-mining can help companies, policy makers, scientists and the public keep up to date with the latest trends, changes in technology and developments in other areas of interest.

As the public understanding of science is conventionally measured through opinion polls and surveys, which are expensive and time consuming, this software promises a cost-effective method to collate and process indicators from all online information aimed at the public sector. It's part of a larger project to monitor science information globally for different markets.

Istanbul Bilgi University and IBM Turkey are applying for the 'IBM Shared University Research Award Nomination' to provide an infrastructure for joint research projects. If the IBU-IBM application is successful, a substantial amount of funds will be gained to build a platform of software, hardware and cloud systems and to build a research centre for developing joint ICT solutions for projects like SMM (science media monitoring). This will be an important contribution to the University-Industry partnership in the field of ICT in Turkey.

Bilgi University and IBM have also extended their partnership in a different area through applying and receiving the grant for the "Urban Europe Project", to develop an online employment solutions platform for the qualified but disadvantaged parts of the society, under the leadership of Austrian partners. Through the cooperation of ZARA (NGO) and INSET Research (Australian company) the project team will implement a platform solution for the project with the total grant amount of 427,000 Euro.

Outputs

Academic partnerships: Linking with Bristol University and University of East Anglia, with the potential for greater involvement and partnerships as the project team organized a "text-mining and media monitoring" Conference in Istanbul Bilgi University in January 2013. This event brought British, International and Turkish scholars on the subject together.

Developing Media Monitoring Software: The tool developed by this project is now active http://webcmpe.bilgi.edu.tr/lib/index_final.php?tag=kar and will collect and analyse all the news on Turkish media on scientific topics. Work is underway for extending it to monitor science news in English.

Social responsibility: The data-mining product will be used by major global brands in their social responsibility projects. Microsoft intends to buy the data mining product for producing audio news for visually impaired citizens.

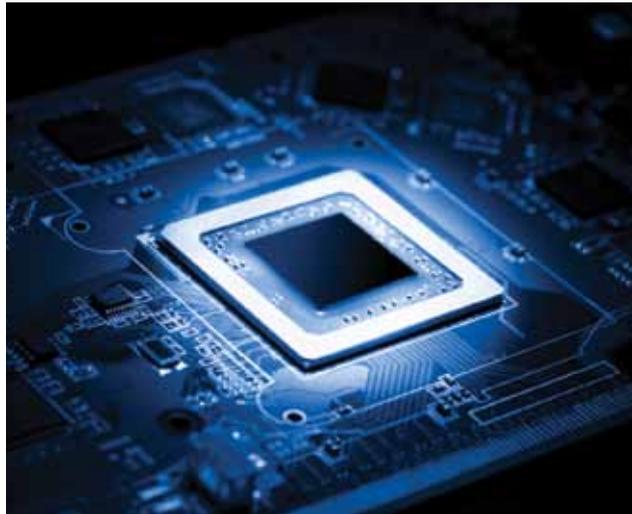


A Virtual Vault for Your Data

In a world when we have downloaded our lives to our computers and smartphones, a timely project from Swansea University and Middle East Technical University

“Criminals have now realized corporate and personal data is going unguarded,” wrote Adam Ely in a recent issue of Wired magazine. “Criminals are following the same attack patterns in mobile as they did in areas of other technologies from desktops to web applications. They are concentrating on the weakest link to steal data and enter the enterprise – mobile.” We depend on computer data and internet transmissions for almost all of our everyday activities, including emails, web browsing, online shopping, banking, social media and GPS activities. In today’s world of smart phones and tablets, the Cybercriminal and the ‘malware’ (malicious software) they create, is an increasingly lucrative form of criminality that trades on stolen information and data. The results are huge financial losses, potential threats to business and government security systems, and for individuals, there is the emotionally unsettling sense of feeling vulnerable, unsafe, exposed.

It’s why a collaboration between Swansea University and Middle East Technical University (METU) and their

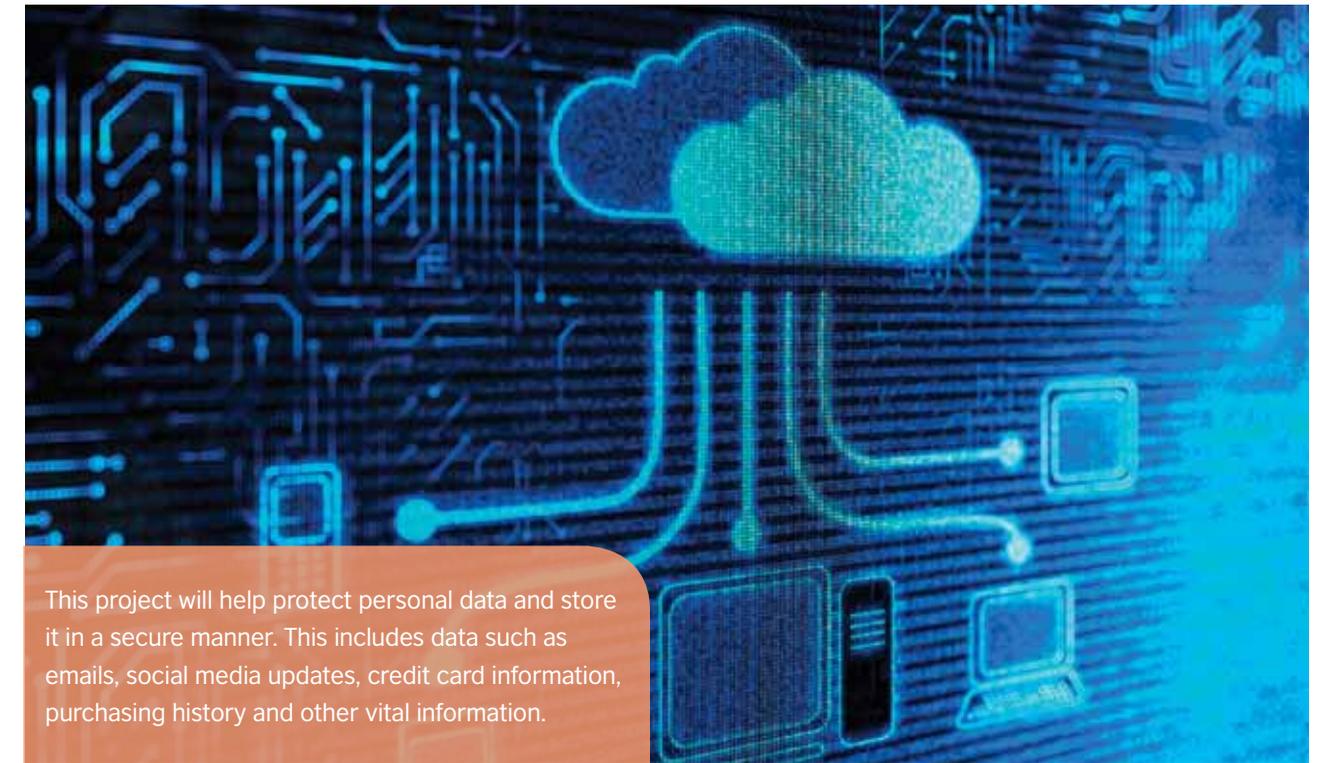


industrial partners, McAfee/Intel (UK) and Invicta IT (Turkey), focussing on network security is a timely project. Their researchers have been working to devise complex encryption methods that will protect data from unauthorized access. They are addressing many different technological and social dynamics. More computing power creates opportunities for more sophisticated malware, the growth of potential targets with billions of mobile devices in the hands of consumers, and increasingly, mobile devices hold valuable personal data.

Project Partners
Swansea University
Middle East Technical University
McAfee/Intel
Invicta IT

Yet, at the same time, mobile devices have limited resources (computing power, energy) to use exclusively for traditional defences such as anti-virus scanning and detection of unauthorized access. Typically, mobile devices have limited security mechanisms such as access controls, but attackers are continually inventing new ways to get around those defences. Additionally, the popular operating system, Android, has a security approach that leaves much of the responsibility for security in the hands of the user. So this collaborative research is looking for a solution in the virtual place, which synchronizes the material on our smartphones, laptops and desktop computers – the ‘cloud’. The cloud enables people to their data from any location at any time.

Cloud Defences
In a traditional network environment where desktop PCs do not have the stringent limitations on power or computing, it is feasible to run anti-virus programs, have personal firewalls and host intrusion detection software on the PCs. Desktop PCs can afford to run multiple layers of defence to protect them from attacks. However, this is not feasible for mobile devices that are much more resource-constrained than PCs. It makes more sense for mobile devices to use network-based defences in the cloud. In principle, cloud defences have benefits over traditional “endpoint defence” – information about past intrusions can be shared quickly in the cloud; information can be correlated and new



intrusions can be blocked in the network before they are able to reach the mobile device.

This research project brings together top experts from Swansea University, Middle East Technical University (METU) / Invicta IT and McAfee/Intel. The industry partners are very interested in the potential outcomes of this project with a goal of developing a low-cost reliable system. Aside from the immediate research, the collaborative process that has been set up may be extended in the future to cover areas of mutual interest and potential commercial use.

What is Cloud Storage?

Cloud storage is a model of networked storage where data is stored not only in the user's computer, but also in virtual storage pools that are generally hosted by third parties. Users buy or lease storage space from the hosting companies. Customers can use the space to store files or other data.

Outputs

Industry Links: The interaction with the Turkish industrial partner has already been progressing, and the partnership with the UK industrial partner will develop further when the project progresses to the conceptual design stage.

Cultural and Creative Dynamic: The academic staff and students from UK and Turkey benefitted from exploring the different academic imperatives', social influences and working arrangements. Events held in Turkey and the UK brought project insights to a wider audience beyond the teams immediately working on the project, including participants from other institutions and companies in Turkey and the UK.

Commercially Viable, Academically Leading: This programme aims to develop applied research that is of interest to the partner companies. If a suitable IP is developed, partner companies will be able to market it commercially, thus bringing income to the institutions that could be applied for further collaborative research. The expertise developed and the experiences from the technical programme will reach classrooms, resulting in lectures and courses that are more industrially focussed, up to date and relevant to students in both countries.

Sustainability of the Partnership: The project has significant emphasis on achieving sustainability in the medium term. Ideally, this would be achieved by creating IP that has sufficient market value to be able to produce a financial return for either or both universities to continue funding the activity. While this may take longer than the 24 months of the project, both Swansea University and METU are experienced in gaining international funding for research projects.

Course That Designs First Steps on the Career Ladder

The next generation of IT Professionals are highly talented, highly motivated and highly adaptable. But when employers also want graduates with work experience, academics at Reading University and Yaşar University designed a future-proof new graduate programme

Technically, Information Communications Technology (ICT) can be defined as covering any device that stores, retrieves, manipulates, transmits or receives information electronically in a digital format as well as the different uses and interactions of these devices. Existentially, ICT is the set of tools whereby we direct our lives, communicate and engage with the world, whether that's TV, smartphones computers, laptops. Students in the field are faced with a fast-changing environment, with ongoing change in industry, device usage and academic thinking. Because the field covers such a vast range of topics, finding ways to ensure that students have the most up to date information and education is a challenge for any single university. It's one of the reasons why the School of Systems Engineering (SSE) at the University of Reading in the UK and the School of Engineering at Yaşar University in Turkey have joined forces to create a double MSc programme in Computer Science.

required by employers to have some kind of experience within the industry. More than half of recruiters warn graduates that they need to have previous work experience in order to be hired. In the UK, the leading graduate employers offer paid work experience programmes for students. Two-thirds of all employers provide industrial placements for students, typically for six to twelve months, and more than half offer paid vacation internships of three weeks or longer.

The second reason, equally important, why this initiative has been created is that new graduates are increasingly

Yaşar, dünya devleriyle yeni işbirlikleri yapıyor



Yaşar Üniversitesi, enümmüdeki yıl, araştırma alanında dünyanın en iyi üniversiteleri arasında gösterilen Reading ve ABD'deki George Washington ile ortak yüksek lisans, doktora programları başlatıyor

YABAN ÜNİVERSİTESİ, dünya çapında en iyi üniversiteler arasında gösterilen Reading ve ABD'deki George Washington ile ortak yüksek lisans, doktora programları başlatıyor. Üniversite, bu ortak programla, öğrencilerin uluslararası deneyim kazanmalarını ve akademik başarılarını artırmayı hedefliyor. Programlar, teknoloji ve mühendislik alanlarında uygulanacak ve öğrencilerin iş hayatına hazırlanmalarını amaçlıyor.

Prof. Dr. Mustafa Berkay, "Bu ortak programlar, Yaşar Üniversitesi'nin uluslararası düzeyde akademik ve araştırma faaliyetlerini güçlendirecektir. Öğrencilerimiz, bu programlar aracılığıyla, dünya çapında en iyi üniversitelerden eğitim alacaklardır. Bu, onların kariyer gelişimlerinde büyük bir avantaj olacaktır."

Reading Üniversitesi'nden Prof. Dr. John Smith, "Yaşar Üniversitesi ile ortak programlar, Reading Üniversitesi için büyük bir fırsattır. Bu ortak programlar, öğrencilerin uluslararası deneyim kazanmalarını ve akademik başarılarını artırmayı hedefliyor. Programlar, teknoloji ve mühendislik alanlarında uygulanacak ve öğrencilerin iş hayatına hazırlanmalarını amaçlıyor."

George Washington Üniversitesi'nden Prof. Dr. Sarah Johnson, "Yaşar Üniversitesi ile ortak programlar, George Washington Üniversitesi için büyük bir fırsattır. Bu ortak programlar, öğrencilerin uluslararası deneyim kazanmalarını ve akademik başarılarını artırmayı hedefliyor. Programlar, teknoloji ve mühendislik alanlarında uygulanacak ve öğrencilerin iş hayatına hazırlanmalarını amaçlıyor."

Egeli Sabah, 31.01.2013

Project Partners
University of Reading
Yaşar University

In Turkey the concept of student internships is less well established. As determined by students in various polls, 'future employability' is seen as one of the key factors in selecting a university programme in Turkey. Through Yaşar University and Reading University's close ties with local employers and growing internship programme, new opportunities are being created to equip students with the right skills and competencies for future employment.



Ege Telgraf, 11.12.2012

Hands-On Projects, Worldwide Placements

Students taking part in this new double MSc programme in Computer Science will have a unique learning experience, making them more competitive in the global job market. This pioneering new programme offers students the opportunity of international experience, a curriculum based on current and changing industry needs and hands-on projects, as well as worldwide placement upon graduation. The importance of this programme is clearly seen in the raising of the overall academic quality of MSc students. Top students in the programme have the opportunity to move forward as Ph.D students at either institution.

This double MSc programme is just the first step in building a solid long-term relationship between the two



universities. It will raise the profile of both institutions and create international synergy that has the potential to expand to the Middle East market. Both universities will gain an edge over competitors in the UK and Turkey. The project aims to develop a sustainable, collaborative partnership model in the area of ICT, including curriculum developed in consultation with industry, research collaborations and sharing of good practices in higher education, industry and knowledge transfer partnerships.

Having industry directly involved in the MSc programme by means of student industrial projects and placements will lead to greater graduate success. With the most up to date curriculum, universities will have a larger pool of prospective students with this MSc programme. Additionally, there is media coverage; advertisements and showcasing of successful graduates that will help promote the universities and their programmes.



What are the advantages of a double MSc?

The double MSc provides students with a combination of advanced topics that are not covered in typical programmes. This curriculum is tailored for students who will take a leading role in driving the digital revolution in many areas of science, technology and society. It will give students an easier choice for the next step in their career: either continuing onto a PhD programme or joining the IT industry upon graduation.

Outputs

The double MSc programme will be promoted to prospective students and industry partners, through presentations, marketing materials such as brochures and an advertising campaign on social media.

Potential industry partners (BT, Oracle, Pervasive/KNIME) have expressed interest in student projects and placements. The programme will further engage industry partners to promote the programme and become involved in the design of the curriculum. Partners will help co-supervise student projects and offer bursaries and work placements.

- MSc in Computer Engineering at Yaşar University is two years.
- MSc in Advanced Computer Science at University of Reading is one year.
- The double MSc programme students attend the first year at Yaşar University and the second year at the University of Reading.
- At the end of the second year both MSc degrees are awarded.

The New Education Systems: Mobile Learning

New technology is rapidly transforming the possibilities of remote and mobile learning. Okan University, Anadolu University and the University of Wolverhampton explore mobile learning courses on your mobile phone.

As technology advances, the concepts of distance learning and e-learning are gradually converging, making both easier for students away from campus, as well as trainees in the workplace.

Okan University, Anadolu University and the University of Wolverhampton joined forces with Turkish industry partner Enocta to create a new foundation in learning and continuing education. As a first step, a marketing course was chosen for this project since technology and marketing are so closely linked, as are technology and marketing education.

New technologies such as mobile devices with touch screens have changed the face of higher education. No longer confined to a physical campus, new approaches to learning and models in distance education are needed in order to keep up with the changing habits of students. With new applications, learners of all ages will be able to access information anytime, anywhere.

Educational systems need flexibility, unlimited by space and time, to enhance creativity and imagination. They

Project Partners
Okan University
Anadolu University
The University of Wolverhampton
Enocta

also need to be able to support a variety of differences in learning styles. Mobile technology is ideally suited to distance and e-learning education with the ability to store data, access resources and manage information quickly and easily.

Matching Learning with Habits, Attitudes, Expectations

This project brought together researchers and educators interested in the development of new applications and capabilities of mobile devices for learning and training. Specifically, the team developed an application for the undergraduate marketing curriculum, matching it to undergraduate habits, attitudes and expectations. Their aim was to create an infrastructure for mobile learning and this particular mobile course would contain the new marketing strategies (including social media and latest technologies in ICT) and be an invaluable industry training system accessible via the students' mobile devices.

Project Goals:

- Design and develop a multi-platform m-learning system to meet the needs of universities in the UK and Turkey
- Provide marketing education via m-learning systems for universities
- Use the mobile learning system for work-related training

In Turkey, mobile marketing is a very important field, with more than 10 different sectors employing mobile marketing in campaigns by the end of 2008. Over 17 million users were reached through these campaigns. With mobile marketing, businesses can determine the most appropriate applications based on the demographic markets they are targeting. New marketing strategies could be created by understanding the latest information and communications technologies. Accordingly, this course featured new marketing strategies, including social media and the latest in Information and Communications Technology.

The course tools were developed with Enocta, maximising the m-learning system. Expert videos, animations, audio materials and presentations were integrated. The system was developed in Turkish with the intention of translating it into English. During the pilot scheme testing process, Enocta provided support for using the app, enabling the companies where the training was being implemented to monitor how the students were using their learning to solve problems. Feedback from everyone involved in the process was used to improve the application. The improved system will be available online.



“The new perspective viewing education as a key to remaining competitive in national and international enterprises lead to an inquiry for new, effective and efficient methods in education.”
(Demiray & Sever, 2009)

Outputs

Productive collaboration: Improvements in the effectiveness and efficiency of educational application development. This led to the development of skills in interface design, survey techniques, data analysis, subject expertise as well as a broader understanding of different academic practices. Working with industry partner Enocta, a commercial online trainer, increased understanding of different academic cultures.

Research publications: The first paper was presented at Futurelearning 2011 in Istanbul "A Multiplatform M-Learning System For More Qualified Courses". The team's next one was presented at the global research conference, mLearn, held in Qatar in October, 2013.

Broader student reach: More than 20,000 open and distance education students have been reached to date, as well as over 150 students from the Business Faculty and almost 200 academics. This marketing training platform and the mobile applications is embedded in the curriculum by September 2013.

Additional funding: Anadolu University has further supported this e-learning platform to be used in mobile learning for undergraduate and graduate marketing programmes through BAP (Scientific Research Projects) Funding worth 120.000 TL. The project is on-going and additional funding sources are being sought. Follow-up will take place with Marie Curie Fellowships and TURBO.



The Emotional Life of Mobile Phones

The growing field of Affective Computing may radically transform how we relate to computers and smartphones – and how they relate to us

In Stanley Kubrick's '2001 A Space Odyssey', HAL the computer is so advanced that 'he' can register, process and respond to the emotions of the crew. In fact HAL's 'emotional life' enables him to function better, to respond to the context of the instructions and questions of the astronauts, until he experiences an irresolvable internal emotional conflict – a feature of human emotional life!

What may have seemed like an interesting but far-fetched flight of fantasy is now a significant field of study. Affective Computing, Human-Computer Interaction (HCI) and Mobile Computing are pioneering interdisciplinary fields combining computer sciences, psychology and cognitive sciences. Researchers in the field aim to create systems and devices that can recognize, interpret process and simulate human feelings and emotions.

Anthropomorphising computers have long been a feature of the technology industry. In the 1980s, the designer Susan Kare famously created the screen icon



of the miniature Mac with the smiling face which greeted the user when the Macintosh booted up. But Affective Computing is not about simulating emotions. This relatively recent discipline aims to develop devices that can respond to emotions, moods and even intentions in much the same way that humans rely on their senses to interpret and react to people and situations. These devices will have the ability to adapt responses according to information received and processed. As smartphones are increasingly 'mobile computers', this technology has widespread applications. This programme which has developed out of a partnership between Istanbul Technical University (ITU) and Queen Mary, University of London and industry collaborator

Project Partners

Istanbul Technical University
Queen Mary University of London
AVEA

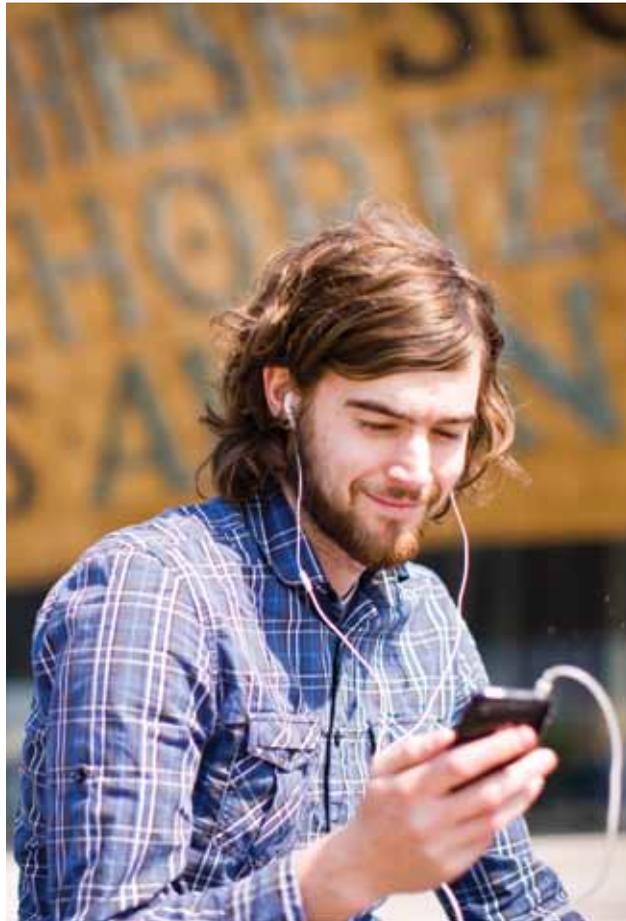
AVEA, a mobile operator of Turkey with a customer base of 13.7 million, aims to develop an effective, industry relevant Interaction Design/HCI curriculum. This up-to-the minute curriculum explores and expands on the very latest developments in Affective Computing. It brings together experts, researchers and industry leaders to discuss the issues and challenges in this field.

AveaLabs, the research and innovation division of AVEA, has not just provided input regarding the development of the curriculum but also, as a very immediate and practical output, has given a grant to ITU for further collaboration on a user-friendly game based on affective computing. This funding covers expenses to hire students and purchase additional equipment. For Istanbul Technical University and Queen Mary University London, it was a milestone in establishing

Potential Uses for HCI:

- Mobile accessibility
- Mobile art
- 3D graphics on mobiles
- Group interaction and mobility
- Mobile entertainment
- Safety and privacy

collaborative links as two institutions with extensive research and education capacity. Academics and students benefitted greatly from the 2-day international workshop held in Istanbul and the opportunity to meet the international experts and have face-to-face discussions, while the industry partner AveaLabs benefitted from the acquired expertise.



Outputs

Curriculum Development: The project team established a curriculum for a “Smart Interaction Design” designed for Istanbul Technical University. AveaLabs is supporting the delivery of the course through equipment and guest lecturers from across the mobile industry. The exchange and cross-fertilization of the academy and industry is essential to the development of this field.

Post-Graduate Module: “Affective computing” is now an accepted new MSc module in the School of EECS at Queen Mary University of London.

International Workshop: 2-day workshop in Istanbul with over 80 national and international participants from academia and industry bringing together leading experts and academics in the field of affective and behavioural computing and HCI. The collaborative atmosphere of the forum enabled participants to present, debate and share their experience of state-of-the-art developments in research, academia and industry. Combining high-level speakers from organizations such as MIT, Motorola, AveaLabs with poster presentations from graduate students working in relevant fields the spirit of this event was deeply inclusive.

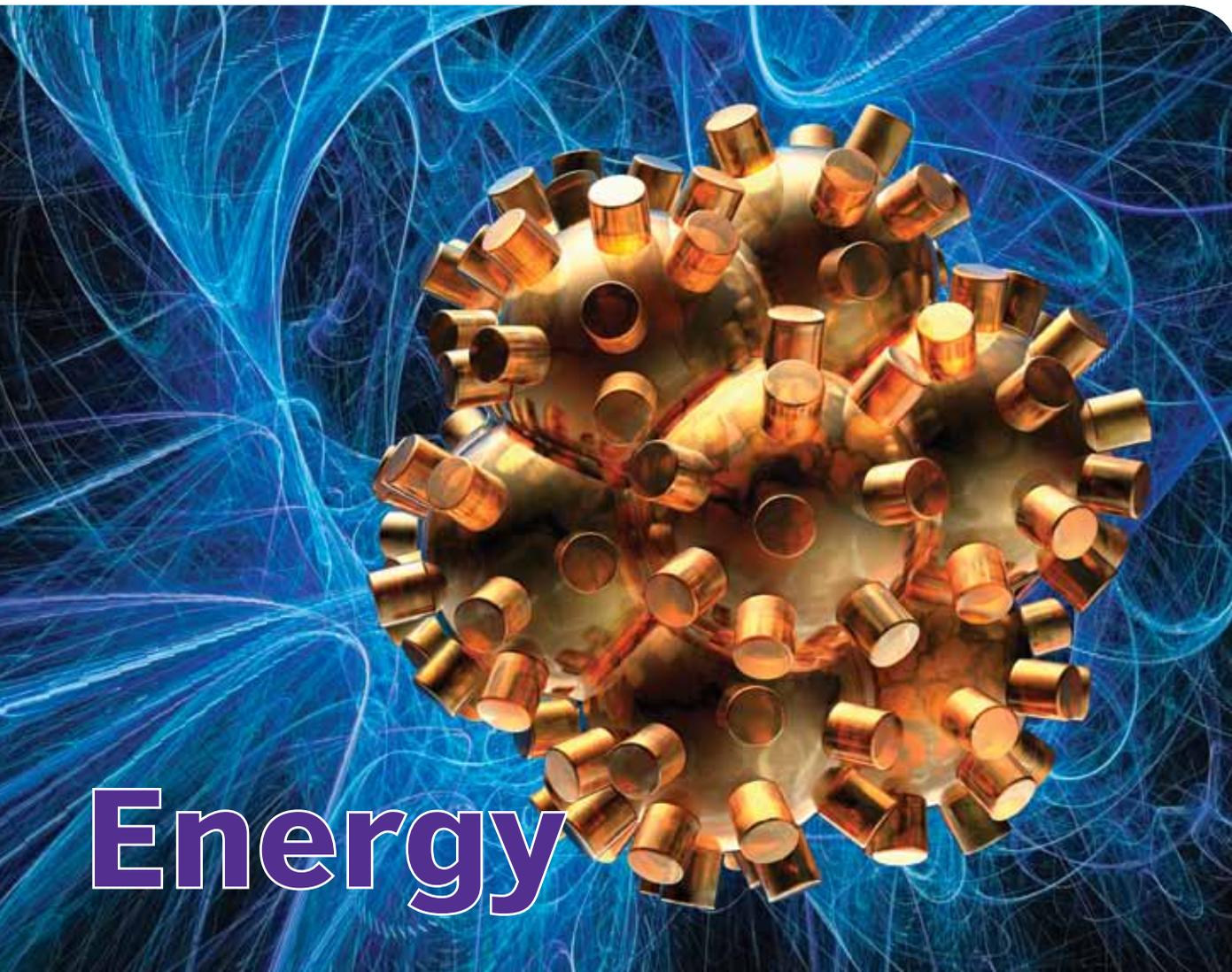
Research Papers: Two papers were accepted at the IEEE 21st Signal Processing and Communications Applications Conference 2013. The studies for these papers were partially funded by this project.

Mobile Game: Based on the successful co-operation in developing the curriculum, AveaLabs has now commissioned the ITU project team to develop a new interactive game. With funding of 66,000TL the project team will be working closely with AveaLabs to create a game for use on mobile phones using face recognition technology. This is a new technology for mobile use and the production of the game will enable AveaLabs to increase the share of its business and put it in a leading position in the new mobile technologies market.

Workshop Feedback

“We greatly benefited from it. We are following up a connection on mobile user experience.” **Salih Ergüt, Director of Avea Labs, Turkey**

“The main take-home message for me was that one should take into account what the user really wants and that new ideas should be quickly prototyped, evaluated and put aside if the evaluation does not give positive results, so that time is not lost on things which are not promising enough.” **Tobias Gehrig, PhD student, Karlsruhe Institute of Technology, Germany**



Energy

In the World of Nanomaterials, The Big Idea is - Small

While Turkey has a mineral-rich geology, a collaboration of Particle Scientists, Mining Engineers and private-sector partner are seeking to add real value to a traditional industry

Not only is Turkey rapidly growing its economy – in the difficult global economy of 2010, Turkish GDP grew by 8.9% making it the fastest growing European economy – it's a mineral-rich country, producing around 60 different metals and minerals. Globally, Turkey plays an important role in mineral supplies but it needs to expand its mining sector and take advantage of opportunities in productive new areas. Technology needs to be developed relevant to emerging commercial fields such as nanotechnology.

Turkey's İnönü University and the UK's University of Leeds have partnered with Nanoen R&D Consulting, specialists in manufacturing of hydrophobic and antibacterial surfaces, to design a programme focussing on education, research and development in the mining and minerals sector. Each of the partners brings high-level experience in the material science of nanometer-sized particles. The Institute of Particle Science and Engineering (IPSE) of University of Leeds is a national and international leader in particle technology, currently addressing low carbon futures by improving the energy efficiency of equipment. Mining Engineering is one

Project Partners

İNönü University

University of Leeds

Nanoen R&D Consulting

of İnönü University's key strengths in research and teaching and its Mining Engineering Department (MED) is renowned for its excellence in minerals research and relationships with the mining industry.

Health sector

Nanomaterials are used, for example, in engineering systems using heat transfer phenomena, such as the Automotive and Air Conditioning industries.

This project was developed to continue academic and industrial research, and development studies, on the use of organic fluids based nanofluids and nanocomposites for the effective transfer of heat. Nanomaterials are also used in the health sector for antibacterial surfaces. Antibacterial nanomaterials are more effective than others since they can easily be prepared and re-used without further modifications.

İNönü University's MED wants to explore new scientific and technological developments around the artificial synthesis, mechanical preparation and characterization of novel, so-called smart nano-sized powders such as Titanium Oxide (TiO₂) and Iron (II,III) oxide (Fe₃O₄) for industrial purposes.

Nanotechnology is built around nanosize particles, which display high reactivity and favorable properties

owing to their extremely small sizes. Gold, Silver, Iron and Titanium nanoparticles have been extensively researched and found to have offered groundbreaking potential in a variety of industrial applications. In socio-economic terms, mining and mineral processing sectors are one of the largest industries in the country. They employed over 100,000 people and contributed nearly £4billion to GNP according to 2005 national statistics. If the raw material exports are replaced with value-added products, the country can increase its earnings by several fold, enter into new markets such as high-tech, and enhance its importance in the world stage.

The expected outcome of the project is the successful application of highly thermally-conductive and highly antibacterial new nanomaterial on an industrial and commercial scale. The industrial partner Nanoen R&D Consulting has engaged in in this project from its inception. Their primary role is to test the final product at commercial scale and feedback on further developments. Academically, the Universities integrated this newly-acquired knowledge to teaching modules, creating a dynamic education experience for students who had access and insight into the very latest research and its commercial implementation.

Nanomaterials is a field that has a materials science based approach on nanotechnology. It studies materials with morphological features on the nanoscale, especially those that have special properties stemming from their nanoscale dimensions. Nanoscale is usually defined as smaller than a one tenth of a micrometer in at least one dimension, although it sometimes can include up to a micrometer.



Outputs

The preliminary results of the collaborative work were presented at the 11th UK Particle Technology Forum 2012, held at Loughborough University in April 2012.

Further links with industrial companies such as Dearman Engine Ltd, UK exploring efficient heating/cooling nanofluids were established.

Collaboration discussion has been conducted with Intelsius, a UK Yorkshire based SME, and Alstrom, a major EU company UK operations. Nanofactory Intelsus provided £ 10,000 funding for the project to formulate high performance heat transfer fluids.

The project team secured additional hub-funding in the total amount of £17,000 from the University of Leeds and High Value Manufacturing Hub Funds to upgrade their rheological measurement devices.

How to Reach A Target of 30 Percent Renewable Energy – by 2023

A collaboration between Boğaziçi University, Marmara University and the University of Cambridge looks to eco-friendly biofuels

A major modern dilemma is how we can find much needed energy sources that are sustainable, green and yet affordable at the same time? As global oil reserves are being depleted and greenhouse gasses contribute to global warming, energy consumption continues to rise worldwide. There is an urgent need to meet the growing demand with new sources of energy.

The goal of this project, a collaboration of Boğaziçi University, Marmara University and University of Cambridge, along with industry partners Tarkim (a Turkish bioethanol producer) and BioSyntha (a UK biotechnology company), is to create new sources for the production of high-quality bioethanol and biodiesel fuels. The most exciting aspect of this project is the fact that it will provide valuable contributions in the efforts towards ensuring environmental and socio-economic sustainability.

Both the UK and Turkey have good climatic and land potential for the development of biofuels so bioenergy research is equally important to both. This project is part of a large-scale investigation aiming to develop novel biotechnological processes for sustainable

production of bioethanol and other biofuels, and it will also provide novel technical know-how to both partner countries.

The original processing strategies developed in this project will have a global impact on social, scientific and economic areas. The continued growth in the use of biofuels will, in practice, affect not only Europe, but the global community as well.

Renewable energy sources

Biofuels offer promising possibilities as renewable and green energy sources. The increased linkage between the food and energy markets have turned attention towards the next generation of biofuels technologies that do not compete with food crops and agricultural land use and that can deliver energy resources in a more environmentally sustainable manner.



There are two main sources for biofuels: growing crops and oleaginous organisms. Examples of growing crops are: corn, soya and rapeseed that are used as seed-based fuels; and sugar cane and camelina are plant-

Project Partners

Boğaziçi University
Marmara University
The University of Cambridge
Tarkim and BioSynthia

based sources of fuel that are easy and cheap to grow. Oleaginous organisms such as algae, yeast, fungi and bacteria are also used in the production of biofuels. Other sources for biofuels include waste cooking oils, leftover fat from animal food products, cow manure and agricultural and industrial wastes.

Biomass generally refers to plants or plant-based materials that can be used as fuels. Presently, it appears to be the most feasible way to produce biofuels since it is renewable, economical, has a low sulphur content, involves no net release of carbon dioxide and has a great potential to become even more economically feasible in the near future. The abundance of various types of biomass provides a good justification to develop bioethanol processes. Of the liquid biofuels alternatives, bio-ethanol is expected to play a major role in expanding the global biofuel economy.

Currently, bioethanol is produced mainly from starchy feed stock by an energy-intensive, high temperature cooking process followed by enzymatic hydrolysis of starch to fermentable sugars. The use of amylolytic yeasts for the direct fermentation of starch in a

According to a recent Report released by the International Energy Agency (IEA, www.iea.org), the current annual biomass consumption in Turkey is almost five percent of the national primary energy supply. Among biomass consumers, wood-based industries and households have the largest share of biomass energy. The national target for renewable energy is to provide at least 30 percent of all electricity generation by 2023.

simultaneous saccharification and fermentation (SSF) process is an economically viable one-step alternative to the conventional and costly multi-stage process. Therefore, the research groups are focused on the development of non-cooking fermentation systems utilising amylolytic yeast strains. The response of these strains has been recorded and the next part of the project will be overcoming some of the instability issues they observed in the research.

Outputs

Promoting research: Working with other research projects globally and sharing the technical knowhow gained from this project to encourage the further use of biofuels and research by industry and the farming community alike. During the first year of the project the partners collaborated with two companies in the field, Tarkim (Turkey) and BioSynthia (UK). This collaboration will continue.

Sharing expertise: Through exchange visits, academic teams from Marmara and Boğaziçi Universities strengthened their collaborations, particularly at Steve Oliver's Lab at the University of Cambridge, UK. This was publicised through the publication and review of their findings in the New Biotechnology journal and at the 2012 International Symposium on Microbiology and Biotechnology in Brazil.

World Energy Demand to Double? Try the Water Solution

At current consumption rates, the world demand for energy is projected to more than double by 2050. Lucky then to have some far-sighted thinkers at Niğde and Loughborough Universities

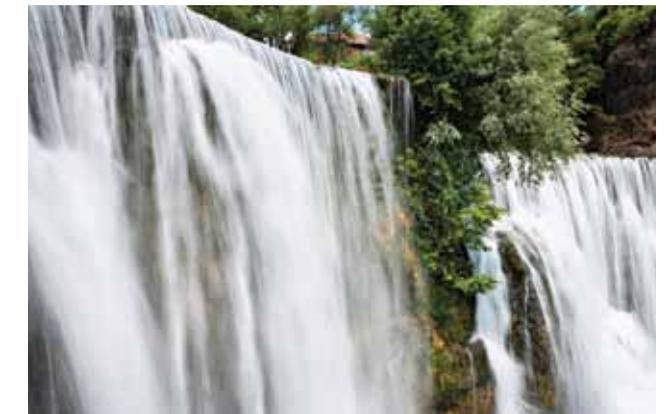
Sometimes the sheer scale of a problem makes new thinking unavoidable. With such an increase in the demand for energy, and existing energy sources are neither environmentally or economically sustainable, scientists at Niğde University's Department of Mechanical Engineering and Loughborough University's Department of Chemistry are looking to create a highly efficient tool to create energy from water.

Partnering with Hidroenerji Ltd they are exploring a new Proton Exchange Membrane (PEM) for efficient water electrolysis, in order to produce a totally carbon-free fuel from water in a more economical manner. Water electrolysis seems to be the only method that can currently efficiently store renewable energy such as solar and wind energy. Current electrolysers are not particularly efficient so any improvement in water electrolysis will result in a substantial cost cutting in hydrogen production (the source of this energy) and make markets much more keen on renewable energy as a serious and commercially viable alternative to wasteful fossil fuels.

Project Partners

Niğde University
Loughborough University
Hidroenerji Ltd

Thankfully we have an abundant, clean, energy resource – water. Water, which covers roughly 70 percent of the earth's surface, is one of the most abundant sources of hydrogen. In water electrolysis, the hydrogen is produced by electrochemically splitting water molecules into their constituents of hydrogen and oxygen. When the electrolysis is driven by the electricity generated by renewable energy methods, the process is referred to as 'renewable electrolysis'.



Affordable Costs

This project focuses on the development of novel low-cost oxygen and hydrogen evolution catalysts for PEM electrolysers that rival current stable commercial catalysts. The aim is that the new PEM electrolysers will

generate hydrogen through renewable electrolysis at a more affordable cost. Once the nanoparticle catalysts materials are developed, they will be incorporated onto an anode and cathode (in the PEM) for the characterization for electrochemical properties. Then, the PEM electrolyser will be assembled by combining the new membrane electrode assembly (MEA) and new cell.

The team has recently made significant advances in nanomaterial design and preparation in thin film form. Poor conductivity is a major issue in electrolyser cell efficiencies. It has already been established that a wide range of materials are suitable for microwave annealing, which is known to improve film crystallinity. This matters because a more crystalline film will have a higher conductivity. The project will look into investigating the effect of microwave annealing on the conductivity of the film.

A study will be performed to examine the performance and long-term stability of catalysts in real world PEM electrolysers, the catalysts' performance compared with the performance of commercial catalysts. The novel catalysts developed within this project will be incorporated into industrial-scale electrolysers by Hidronerji Ltd.

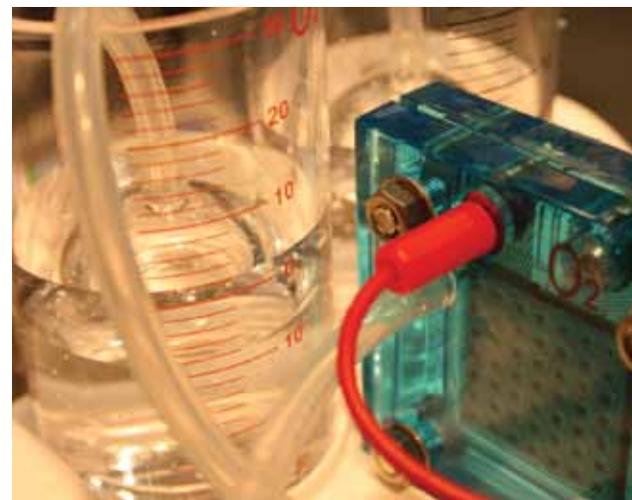
The only viable route to a sustainable, non-nuclear energy future is with a low carbon economy. Governments around the world have targeted increasing

What is Water Electrolysis?

It is the decomposition of water oxygen (O₂) and hydrogen gas (H₂) by an electric current being passed through the water.

energy generation substantially through low carbon renewable energy sources with a timeframe of the next ten to twenty years.

The method being developed by the team has the potential to reduce the greenhouse effect. Reaching this goal requires a collective approach from all nations around the world. The only way to achieve this goal is by facilitating international research collaborations such as this to find creative thinking that delivers workable solutions.



Hidronerji Ltd. is located in Ankara's Industrial Park. Their main concentration is hydrogen related technologies; specifically PEM electrolysers and they already have several PEM electrolysers in their product portfolio. The new MEA and new cell developed through the project will be directly used in Hidronerji's electrolyser. The new MEA has the potential to substantially reduce the cost of MEA's, thus the company a great advantage in the market.

Outputs

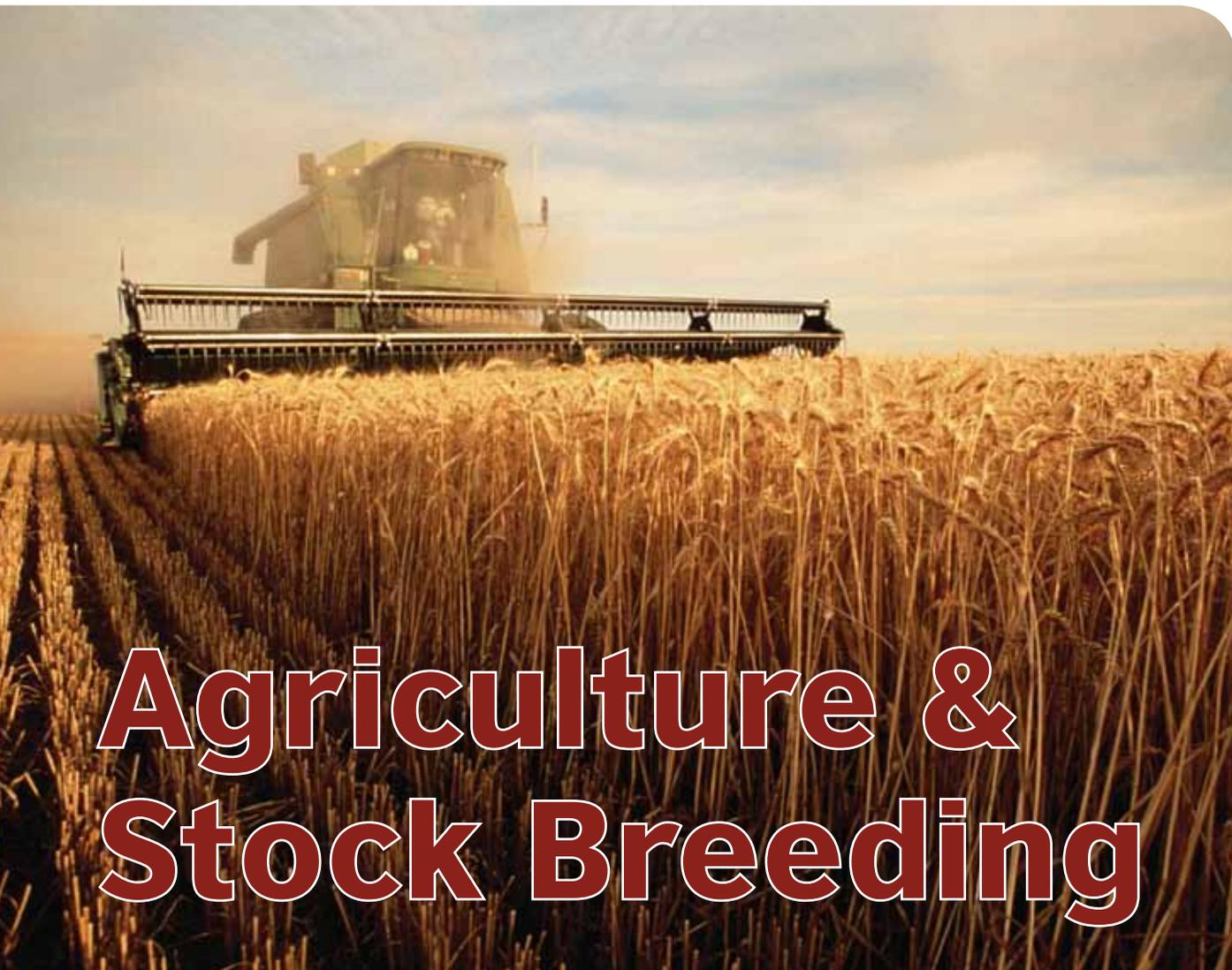
New Ventures: The complementary expertise of the two university teams are opening up many new opportunities. A joint project is being prepared for the FP7 project of the European Union on high temperature steam and carbon dioxide electrolysers, offering many advantages for converting solar-based electrical energy more efficiently than with PEM electrolysers.

Academic Program: A new proposal has also been submitted to the The Higher Education Funding Council for England for a joint PhD program on "Energy Material." Once funded, this project will go beyond the scope of the original programme and serve to establish a long-lasting link between the partners.

Commercial Opportunities: The close engagement with industrial affiliates by Loughborough and Nigde will provide clear pathways for commercial exploitation of the outcome of this project and building of capacity for industry collaboration with higher education.

Advanced and Applied Research: This forward-looking and commercial project allows us to balance advanced basic research as well as high-quality applied research. All partners will benefit from the exchange of know-how, expertise, and the expansion of the knowledge base.





Agriculture & Stock Breeding

The Chicken and the Egg, and the much-needed Graduates

There's a sector of the Turkish economy with a real shortage of skilled graduates. Don't worry, Harper Adams University College in the UK, and Ege University and Yüzüncü Yıl University have hatched a plan

At the end of 2012 the trade magazine Farmer's Weekly reported that Turkey's poultry meat sector had doubled in the previous decade. And Turkey is one of the top eleven egg producers in the world. It's no surprise that with such rapid growth, that throughout Europe, poultry companies are now experiencing a shortage of qualified and skilled new recruits for technical and management posts. A partnership between Harper Adams University College in the UK, and Ege University and Yüzüncü Yıl University in Turkey has helped respond to an increasing need in this growing industry.

The partnership is built on a successful model developed by Harper Adams in the UK, based on the fact that external training is an essential part of undergraduate study programme for animal science students. Poultry science is a highly specialized area of agricultural science and universities are unable to provide all the specialised training that is required to keep up with industry changes.

Project Partners

- Harper Adams University College
- Ege University
- Yüzüncü Yıl University
- BESD-BIR (Turkish Poultry Industry Representative Body)

The Poultry Scholarship Internship Programme for undergraduate students was designed to develop undergraduate student skills and experience in the poultry industry. The scholarship scheme gives undergraduate University students a structured work placement within a company where they can develop their skills and experience to underpin their academic training.



New Skillsets Required

Because poultry production has undergone a significant structural evolution in Turkey over the past 20 years with more integrated companies, skillsets and requirements of employees are evolving fast. Poultry companies usually train their employees on technical

skills rather than core competencies such as leadership skills, analytical abilities, motivation, ambition and problem-solving.

The industry in Turkey is broader than the approximately 8,900 establishments and 11,020 active poultry houses in the poultry industry. New graduates also need to be aware of the supporting sectors such as the feed, medicine, transportation, marketing and other professionals which amount to an additional 500,000 people employed in the wider industry.



The new programme began with each group of academic partners exchanging visits to the UK and Turkey, where the Harper Adams experience was shared, looking at the basic elements of the programmes such as visits to poultry companies and establishing evaluation methods during the training period. A total of 8 undergraduate students (4 from each Turkish University) were interviewed and selected by the companies to be involved in the project. During the students' training period in 2012, the part of the academic curriculum based on students getting acquainted with the practices and complexities of the

industrial world, the company supervisor acted as the student's supervisor.

Most importantly the students were able to get an overview of the professional world, a sense of the bigger picture while expanding their knowledge and skills.

Each student conducted a project at farm-level to find a solution to one of the problems being faced by the company and company technical personnel evaluated the students' training periods.

Industry Needs and Knowledge Expansion

The main benefit of the project to companies is that it provides Turkish poultry companies with suitably qualified new graduate recruits, which help these companies operate more efficiently. For undergraduates, it helps both broaden and focus their skillsets and experiences, enabling them to meet the needs of the industry and improve their employability.

Universities not only produce more knowledgeable and employable graduates, but this creates a more fluid and open dynamic with the wider industry. The increased frequency of meetings between university academics and industry personnel enables a greater understanding of industry problems, helping to sharpen research work that meets industry needs and expands the

In the early 1970s, the structure of the poultry sector in Turkey was in family managed establishments with very limited capacity. Since the 1980s, the poultry sector has become one of the fastest growing segments of the animal industry in Turkey.

knowledge of the discipline into productive areas. The personal contacts that have developed between poultry industry and university staff have been highly valuable in strengthening the links between the agricultural industry and the university sector.

The positive feedback from the Turkish poultry companies suggests that they will continue with this Internship scheme in the future. As the project's success story is disseminated to a broader audience, more companies and Turkish universities are expected to join the scheme, as its benefits become clear. It's envisaged that once the Turkish Poultry Scholarship scheme has been fully established, other possibilities for knowledge enrichment and collaboration will open up as opportunities develop for exchange students to get international experience in the UK and Turkish poultry industries.



Outputs

Training Programs: This project has helped to develop the partner universities' training programs for students who wish to continue their carrier in poultry science.

Industry Experience: The students increased their knowledge on poultry farming by working directly in the industry together with technical managers and staff.

Model Expanded: In 2013, this program was adapted for other animal sciences, including cattle, sheep and goats. Additional industry partners have been identified for the new areas.

Conference Papers: Four papers by the Yüzüncü Yıl University students were presented at the National Animal Science Student's Conference held in Erzurum in May 2013.

"Involvement in the Turkish Poultry Scholarship Internship Project has been valuable to Harper Adams University. Our staffs have been able to share and develop new ideas on best practice on how to manage and promote these scholarship schemes to the poultry industry. Valuable academic contacts with other Turkish Universities have also been made"

Dr David Llewellyn, Vice Chancellor of Harper Adams University

The Water Agenda: Recycling, Reusing and Taking Control

Technology is only part of the solution for increased agricultural demand for water. The key is education in environmental stewardship and enabling farmers to take control of water management

The available water per capita per year in Turkey is about one-fifth of water-rich countries and it is decreasing due to a relatively high growth rate of population, with rapid urbanization and industrialization causing additional pressures on water resources. It's why academics from Ankara University and Middle East Technical University in Turkey and Imperial College, London and Newcastle University have developed a pilot project in agricultural water management. Gölbaşı Governorship District Directorate of Food, Agriculture and Livestock is also a partner of the project to establish strong links with agricultural industry in the district. The first year assessed the situation in the Gölbaşı Special Environmental Protection Area (SEPA), located 20 kilometres south of the capital, Ankara. The most important parts of Gölbaşı are Mogan and Eymir Lakes, which are under intense pressure from pollution, caused mostly by urbanization, agricultural industry and recreational use. Since the area is not rich in terms of



water sources for agricultural purposes, water scarcity and quality are real problems. In recent years, the demand for groundwater has increased, especially for irrigation purposes. Additionally, the Ankara University Water Management Institute is located in Gölbaşı and there is an urgent need for a suitable water source for landscape irrigation. However, the water in the region is naturally contaminated with salinity and boron so it is essential to determine the current status of Gölbaşı's water resources in terms of water quality and consumption for irrigation and watering of livestock. There needs to be research into finding suitable treatment or reuse options for poorer quality water,

Project Partners

Ankara University
Middle East Technical University
Imperial College London
Newcastle University
Gölbaşı Governorship District Directorate of Food, Agriculture and Livestock

By raising awareness on water savings in agriculture, this project can help other sectors (industry and domestic use) to adopt methods of efficient water use and water recycling.



evaluating methods of saving water and on a wider scale drawing attention to this significant problem in order to find solutions.

Information, Irrigation, Action

The starting point is raising awareness about water scarcity and quality problems in the Gölbaşı area and change how water is used. Once residents of the area understand the situation concerning their water resources, they will be able to constructively consider precautions or treatment options to reduce salinity and boron or switch to alternative water sources such as harvesting rainwater. Information about environmental stewardship, water-saving and effective use of irrigation must be brought to the farmers in the region so that

they can take action. Currently, there is very limited irrigated farming in the region due to water scarcity. For that reason there are very few agricultural industries. So, there is really no considerable amount of wastewater that is recyclable. Instead, farmers can learn to practice rainwater harvesting, which will help decrease the demand for groundwater. Most importantly, in Turkey, working with higher education institutions is always beneficial for both the government and private sector. The advantage of a Turkish university collaborating with a UK university is that it positively influenced the local authority and villagers. And this project will only be a success when local citizens and farmers are enabled to make positive decisions, taking control of managing water usage to the benefit of everyone.

● Outputs

Research: During the project, 11 villages were visited in the Gölbaşı Special Environmental Protection Area. Approximately 50 people were directly reached, including farmers and agricultural enterprises. Samples were taken from 41 well, fountains, creeks and lagoons in the area. The project team has 18 researchers; 8 from Turkey and 10 from the UK.

University Input: The Water Management Institute supported this project via providing human resources and travel vehicles during sampling and analysis of water resources. Additionally, analysis costs were afforded by Water Management Institute.

Industry Input: In the project area there are many individual farmers, but few agricultural enterprises. As one of the important agricultural industries in the Gölbaşı district, Aydeniz Group was involved in the project. Their facility has water sources such as wells and lagoons. They grow plants, fruits and feed livestock for meat and milk. Their contribution was important for the project as they represent majority of the agriculture industry in the district.

Scientific and technological developments: The information gained from the project will directly benefit the welfare of the public in the Gölbaşı district. Villagers and enterprises in the areas will learn about the quality of their water source that they use for drinking, irrigation and watering of livestock. The result will be better water management in the future.

Capacity building: This partnership between Ankara University Water Management Institute, Middle East Technical University, Newcastle University and Imperial College London, is extremely beneficial for capacity building with Turkish HEIs and the agriculture industry in Gölbaşı district; especially the Water Management Institute and Gölbaşı Governorship District Directorate of Food, Agriculture and Livestock.

Boron is a relatively rare element in the Earth's crust. Turkey has 63% of the world's boron reserves. This part of Turkey has a great deal of contamination of groundwater from boron. Membrane technology (reverse osmosis) can be used to decrease the high boron rates in water.



The Plastic Film that Makes Greener Greenhouses

Conventional greenhouses can increase the longevity of pesticides on food. New management ideas plus speciality plastic films may be a solution

Crops grown under protected environments such as plastic greenhouses now contribute to a very large part of the agricultural economy both in Turkey and across Europe – particularly for soft fruits and salad crops. However while plastic environments are important to cultivating crops, the fate of pesticides on the produce is still not fully understood. Research has shown that protected crop systems result in an increase in the longevity of pesticides used on the food that's grown.

It's a problem being addressed in a collaboration between Bahçeşehir University, Adnan Menderes University, Lancaster University and later on Bursa Technical University in conjunction with industry partners BPI-Agri and Arid-Agritech. The research team is investigating the breakdown of pesticides in plastic protected structures compared to the breakdown in open fields.

Early research shows that contrasting light conditions can affect the degradation rates of pesticides within these plastic-covered environments. Field experiments

Crops grown under some sort of protective covering, such as greenhouses, now contribute to a very large part of the agricultural economy both in Turkey and across Europe. Nobody wants pesticide residues in their food and the Project approach will maintain the efficacy of pesticides but reduce unwanted residues in harvested produce.

Project Partners

Bahcesehir University
Bursa Technical University
Adnan Menderes University
University of Lancaster
BPI Agri
Arid-Agritech





will be conducted in an agricultural region of Turkey to assess rates of pesticide loss under a wide range of different agricultural plastic films that are commonly used in agriculture. The research is based on light manipulation using speciality plastic films to find the best solutions.

Reducing Pesticide Post-Harvest Residues

One of the results of the study will be better production, marketing and sales of speciality plastic-films for the agricultural sector. Additionally, this research will engage agrichemical companies and growers to examine pesticide-formulations and their general use in greenhouse type environments. The key to a successful outcome will be to develop pesticide-use management strategies based on sound science that maintains the effectiveness of the pesticides but reduces post-harvest residues. The research will benefit both the industry and growers and will forge academic relations between the participating universities.

Following the research phase of the project, a workshop is to be organized in Turkey to raise the subject with policy makers, agri-plastic manufacturers, agri-chem researchers, agronomists and growers. The workshop

is designed to enhance cooperation between the agri-plastics industry and food producers. The scientific results are the starting point for a wider discussion around changing agricultural practices in Turkey and elsewhere, in regards to the management of protected-crop systems and the use of agrichemicals. The goal is to provide benefit for growers as well as consumers.

The commercial, environmental and health benefits unfolding from the project meant the industry partners were keen to be involved. The benefits of marketing speciality plastics that allow the transmission of the UV-region of sunlight but help degrade unwanted chemical residues on crop surfaces were immediately obvious. The industry is developing such plastics already, but had not considered their use for pesticide management. The long-term outcome of the project is to develop an integrated pest management system specific to protected-crop systems that combines knowledge of the light conditions and the pest problem to be addressed. This will allow growers to make informed decisions about which pesticide product to use and when to apply it during the crop cycle to reduce unwanted residues.

Outputs

Field Experiments: Field experiments were conducted in an agricultural region of Turkey to assess rates of pesticide loss under a range of different agricultural plastic films that are commonly used in agriculture. Results indicated that with full sunlight conditions, a selection of different pesticides was seen to degrade much more slowly under the different plastic films than in the open field. This is because the UV regions of sunlight are poorly transmitted by the plastic films, thus slowing the rate at which the sunlight degrades the pesticides. This experimental information will be used to create better pesticide use management for cropping systems under plastic film to reduce post-harvest residues on crops, which is a growing problem in Turkey.



Commercial Development: The industry partners can clearly see the benefits of marketing speciality plastics that allow the transmission of the UV-region of sunlight to help degrade unwanted chemical residues on crop surfaces and they are eager to develop plastics for use in pesticide management.

Research Debate: Turkish partners visited the UK and a workshop was organized involving plant biologists, agronomists and industry representatives from the agri-plastics sector. This workshop encouraged the scientific partners to seek additional funds in order to disseminate findings to a wider group in Turkey.

Advice to Government: Reports about the project and findings have been sent to the Republic of Turkey Ministry of Food, Agriculture and Livestock and Ministry of Environment and Urbanization. These ministries will continue to receive updates as they become available.



In general, pesticides remain for longer on crops grown in greenhouses, depending on the plastic-covering used.



Small Farmers Innovate to Grow

A project created to foster greater entrepreneurialism among small and medium sized farmers may help address issues of food security

While agriculture plays an important role in the Turkish economy, there are several problems in the sector's Small and Middle Enterprises (SMEs). It lacks an entrepreneurial approach to enterprise development and management which limits potential and leads to short-term thinking. Plus, there are challenges relating to environmental management and sustainability issues, as well as organic production and food safety.

Some SME owner-managers acknowledge the potential of expanding their businesses by pursuing new business opportunities and enhancing their organizational management capacity. Unfortunately, though, many of them lack comprehensive and systematic knowledge in the areas of sustainable entrepreneurship and enterprise and environmental management.

Lack of Innovation Capacity

Most of the SMEs lack a long-term strategic orientation, focussing on day-to-day survival due to a lack of innovation capabilities as well as the lack of

an entrepreneurial outlook. When Food Security is increasingly an issue, this is not an insignificant problem.

The project which addresses these major inhibitors of development is a partnership between Adnan Menderes University and University of Southampton. A broad-ranging project it involves: research on entrepreneurship and SME development in agriculture; the latter includes educational activities including curriculum development; the revision of existing programmes and outreach to include workshops for SMEs and local government officials.

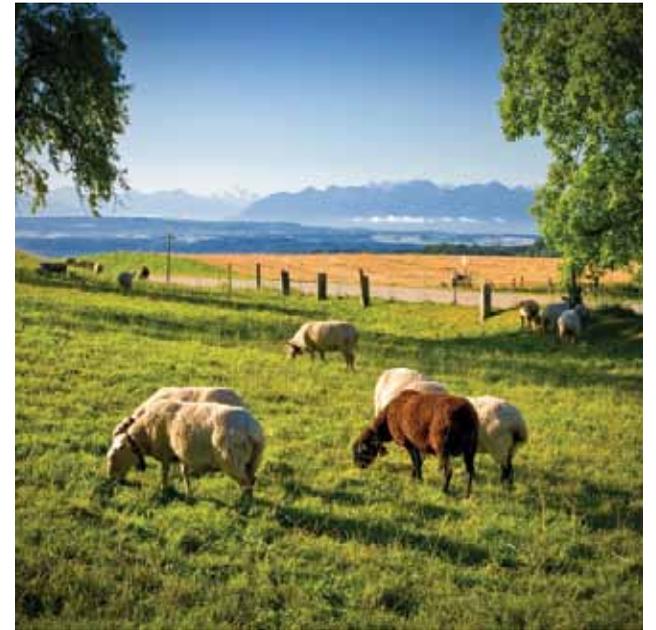


"It was very intriguing for me to talk to SME owner-managers in the field and learn about their challenges in running an agricultural SME as they see it and learn about their expectations from local government and universities." **Cagla Yavuz, Doctoral Researcher, University of Southampton.**

The University of Southampton and Adnan Menderes University have been collaborating since 2010, with reciprocal visits made between team members. This relationship has already produced fresh thinking and new directions. They developed an 'Entrepreneurship Camp' for university students held in Aydin, Turkey and visited several SMEs and intermediary regional development agencies and organizations in the area with the aim of developing ideas for a joint project geared towards industry needs. From these visits, the needs of SMEs were discussed, resulting in the setting up of a project team to consider potential contributions from researchers at the two universities, based on their areas of expertise.

This is important because it will have an impact on the lives of SME owner/managers in the agricultural sector, students studying related subjects (agricultural economics, management and entrepreneurship), academics and policy organisations. SME owner/managers will be able to gather information and change their managerial practice making entrepreneurialism part of their business ethos. For example, thinking about how to develop new products, new markets and new ways of delivering their produce to market.

The project has a wider social impact beyond food production and distribution. Students who are studying



enterprise and entrepreneurship will develop a higher level of awareness for starting up their own agricultural business and managing such businesses effectively. This is especially important for students who are disadvantaged in terms of economic profile with limited access to higher-level education, as they will receive training and education through partner-supported initiatives.

All these steps are a vital contribution in bridging the gap between university and industry. Evidence-based knowledge of agricultural SMEs in Turkey is critical firstly because it generates insights into the challenges and problems businesses face in developing and sustaining entrepreneurial activity, and secondly, in integrating innovation and environmental management into their strategy and operations.

Project Partners

Adnan Menderes University
University of Southampton
Aydin Chamber of Commerce
Aydin Chamber of Industry

Outputs

Economic: Wealth creation and economic regeneration through management capacity building, entrepreneurial and sustainable development of SMEs in agriculture enhanced by knowledge transfer and exchange with Higher Education Institutions (HEIs) in Turkey and the UK.

Social: Addressing the problem of social exclusion of disadvantaged groups (e.g. rural youth and women) and improving their inclusion in society and economy by equipping them with necessary knowledge and skills for enterprise development in agriculture. Accordingly, the project is engaged with women entrepreneurs in Aydin. Women entrepreneurship meetings will lead to joint project development and delivery of training programmes for women entrepreneurs.

Sustainability: Enhancing the effectiveness and sustainability of public sector organisations related to agriculture, enterprise development and environment and sustainability.

Research: Worldwide academic advancement by addressing issues of mutual importance in bridging the academy-industry gap in both countries, the UK and Turkey, in the chosen areas of study through knowledge created by an inter-disciplinary and international research project. Innovative methodology and associated research techniques applied in such a cross-disciplinary and applied research project. In total 40 interviews with SME owner-managers and government officials were carried out. A total of 40 surveys were conducted. Findings are evaluated by the project team and recommendations are reported.

Industry-informed curriculum: Improving teaching and learning in the areas of management capacity building of agricultural SMEs, their environmental and sustainable development strategies, and social inclusion of agricultural communities, particularly young people and women through enterprise development.

A new module entitled 'Agricultural Entrepreneurship and Business Management' was added to the curriculum at the Adnan Menderes University. The module is offered to 4th year undergraduate students, who can build on their agricultural engineering degree.

Partner universities initiated co-supervision on the master of science dissertations of the Adnan Menderes University – Agricultural Engineering students.

"We were pleased to participate in the stakeholder workshop held in Aydin, facilitated by the project team members from the Adnan Menderes University and University of Southampton. Discussions included the general state of the sector, opportunities, challenges pertaining to sustainable development and environmental management and focused on relationships between university-industry-government in agriculture. We found the workshop very useful in identifying areas of concern to all parties involved. Recommendations for solutions were discussed and since then, we have been exchanging ideas for good practice in the sector with representatives of both universities." Hasan Kosklu, Entrepreneur/SME representative.





Health

Database-Mining in Cancer Research

A collaboration between Koç University and Edinburgh University is pursuing an innovative new approach to developing drugs

Research into the development of new drugs to fight diseases has a direct impact on human health and welfare. However, before any new drug can be discovered, researchers first have to address how the disease itself works and unravel the underlying cause of the disease, including understanding genes, proteins and cells. On average, it takes 10-15 years for a drug to be developed.

Koç University, Edinburgh University and TPP Ltd joined forces to develop new methods for finding drug-binding sites on certain proteins that are active in cancer. They will search for commercial opportunities with the biotechnology and pharmaceutical sectors to work on research into the new drugs that will be the result of this important work. The research process will provide a template for use by future academic and commercial collaborations that can be used in numerous new drug targets. An excellent example of how an industry partner and educational institution can work together effectively in research, one important outcome has been to raise the international profile of Turkish researchers enabling them to contribute to leading edge research.

Project Partners
Koç University
Edinburgh University
TPP Global Development

The long term goal of this project is to develop novel and specific drugs that could have profound effects on the treatment of a number of diseases, including cancer.

New Computational Approaches

The Edinburgh team has already been working in this area for several years and the Koç team now brings their computational background to the project. By combining forces, and with a little luck and time, the team hopes to hit on the right lead molecule needed in their database. Research is centred on the Glycolytic Pathway, which plays a central role in metabolism and is an excellent target for finding drugs to treat a number of diseases, including cancer and diabetes. Researchers are working on understanding the complex behaviour of the proteins on this pathway, using bioinformatics tools to locate important amino acids on these proteins and design drug molecules that will either enhance or inhibit the functions of these proteins. Outcomes of the research will be shared with industrial partner TPP Ltd, who is interested in improving the molecules as value-added entities.

This collaboration has already led to more joint research, this time in the understanding of allostery,

Changing the Tools for Cancer Diagnostics and Malarial Therapy

Collaboration between two expert teams draws on an extraordinary diverse set of skills to plot one direction in Malaria and Cancer research

Malaria is one of the deadliest infectious diseases worldwide, including in Southeast Turkey and cancer is a major killer worldwide. The research project between the University of Leeds, Astbury Centre for Structural Molecular Biology and Sabanci University Nanotechnology Research and Application Centre (SUNUM) looks to explore new ways of addressing these devastating illnesses.

The teams are looking at the use of 'aptamers', which are short oligonucleotides widely used for the sensitive detection of target molecules, primarily for diagnostic purposes. Aptamers are highly powerful tools for developing detection tools for a variety of targets, such as environmental pollutants, DNA, proteins, street drugs, viruses, and even cancerous cells. Aptamers have a considerable binding affinity for their targets, they can be manufactured easily in a test tube unlike antibodies, they have a long shelf life, and they are easy to modify chemically during or after production. Because of these important advantages of aptamers over antibodies, it is thought that aptamers could successfully replace antibodies in existing methods. For example, microchips incorporating a great number of aptamers that could be

used for simultaneous analysis of many specific target molecules is just one example of what could make this project important and valuable.

Multi-Disciplinary Approach

The collaboration brings together two expert teams. The Astbury Centre for Structural Molecular Biology (ACSMB) is a leading interdisciplinary research centre at the University of Leeds. ACSMB brings together over fifty academic staff from four faculties – biological sciences, physical sciences (chemistry and physics), engineering and medicine. The Centre has outstanding expertise and research infrastructure in chemical biology, biophysics and all of the major techniques in structural molecular biology.

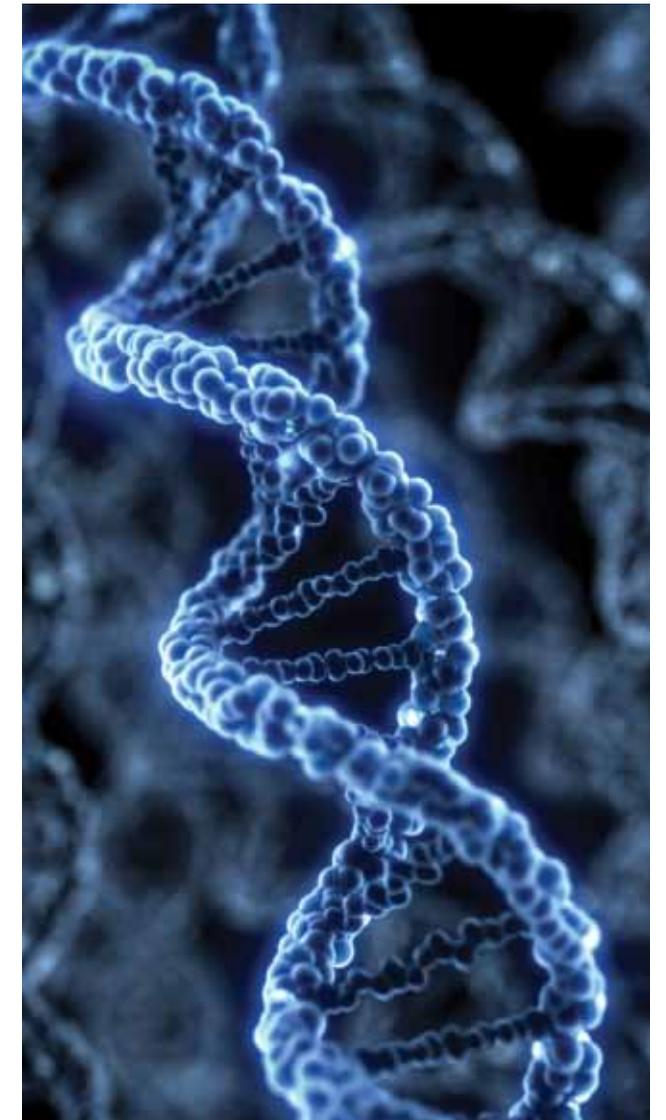
SUNUM started functioning in June 2011. The centre provides valuable additional capabilities to the existent research infrastructure of FENS (Faculty of Engineering and Natural Sciences). With a contributing team of 40 faculty members, 40 post-doctoral researchers, and 100 PhD. students, SUNUM boasts highly effective

As a newly emerged technology centre, **SUNUM** aims to improve its research and development facilities as quickly and efficiently as possible in order to be able to address global problems in science and technology, and find creative solutions using nanotechnology based approaches.

Aptamers are synthetic oligonucleotides or peptides that have specific binding abilities for their target molecules. They have been widely used in a broad range of bio-related applications, such as imaging, cell tracking, bio-sensing and construction multiplexed sensors.

multidisciplinary research programs including advanced materials, nano-biotechnology, nano-medicine, nano-electronics, micro-nano fluidics, nano-mechanics, nano-optics, micromachining, micro and nano systems and alternative energy sources.

This project is aimed at exchanging scientific knowledge, technology and skills, work-related training, research and development between Leeds University and Sabanci University. The project team has been working on aptamer production and its medical applications based on nanotechnology. Working with local cancer researchers at St James' Hospital Leeds, the team has evaluated the aptamers against the FGFR protein variants for detection and discrimination of cancerous tissues from normal, non-malignant ones. On the other hand, partners expect to obtain some novel aptamers that would inhibit infection by the Malaria parasite. This could either be further developed as a therapeutic agent or used in a screen for small molecular weight drugs. To sum up, anticipated results could pioneer innovative methodologies applied to protein purification procedures, enhancement of assay sensitivity and specificity, as well as multiplexing of assays in order to improve on the current rapid diagnostic tools. The team is also working with local intellectual property management teams to see if the aptamer sequences obtained can be protected through patenting.



The opportunities arising through this project will benefit **Leeds University** by extending its international collaborations, a major goal of the University's strategic plan, as well as opening future opportunities for follow-on research funding, such as the Human Frontiers Program.

Project Partners
Sabanci University
University of Leeds

Outputs

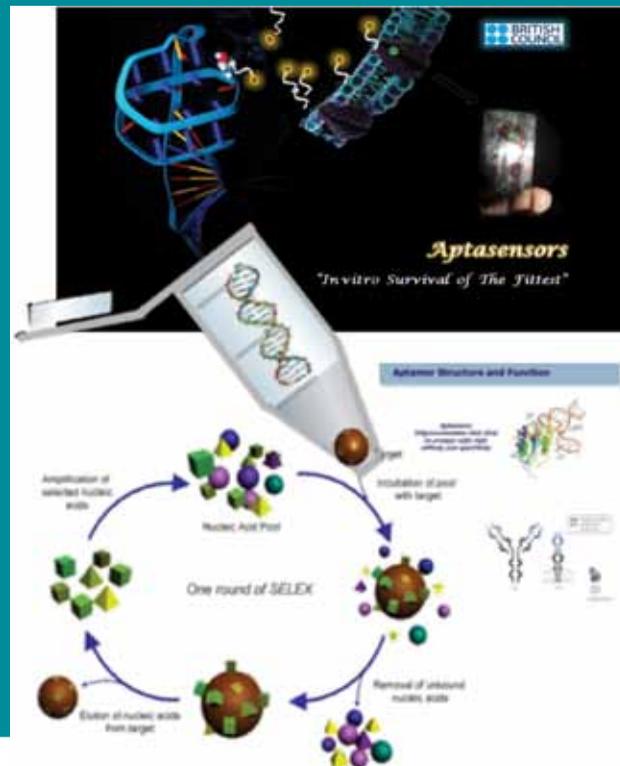
Knowledge Transfer: The first year results of the project are highly promising. The main scope of the first year was to ensure the transfer of scientific knowledge and experience in the field of synthetic affinity agents, known as aptamers. During the project, the project coordinator from Turkey Dr Meral Yüce and her team has gained a complete theoretical and practical knowledge of aptamer production.

Euro-Network: The project has enabled SUNUM to interact with other research entities in the European Union and expand their network in the EU region for further joint projects, proposals, development of pre-competitive strategic partnerships and the formation of pre-competitive consortium for research and intellectual property sharing.

Commercialisation: In the following period the Turkey team, will be performing assays to determine the precise active regions of the aptamers, discussing their future development with aptamer-based companies, e.g. Aptamer Solutions Ltd, York, and colleagues in Oxford, which is an essential step in future commercialisation of the aptamers. In this regard, the aptamer pools produced in the first year will be sent for Next Generation sequencing and the data will be evaluated using bio-informatics tools in order to select the best aptamer sequences.

Publications and Events: The principal outputs will be academic, namely research papers based on the isolation and characterisation of the aptamers. The secondary outputs will possibly include patents on the application of the aptamers produced. Additionally, the results will be disseminated at the National Biotechnology Conference 2014 in Turkey.

Sustainability: The project team developed an e-learning platform to be used in mobile learning for undergraduate and graduate Marketing programmes in both universities. Anadolu University has further supported this programme through BAP (Scientific Research Projects) Funding worth 120.000 TL.



Eliminating 'Side-Effects' – Making Cancer Treatments Smarter

For cancer sufferers, 'Side Effects' in their treatments can feel so much more than an afterthought. Scientists at The University of Warwick, Queen Mary University of London and The Izmir Institute of Technology look to a smart way of delivering medicine

While cancer treatments continue to improve, the side effects for patients often prove troubling. An innovative approach developed by the Department of Chemistry at The University of Warwick and the Department of Chemical Engineering at The Izmir Institute of Technology (IzTech) (and later in the project bringing in Queen Mary, University of London) will enable the treatment of cancer cells with fewer drugs – minimizing side effects. If successful, there is potential for new treatments for several types of cancers as well as HIV and Hepatitis C.

In the human body, most biological reactions are controlled by sugars and sugar proteins (glycoproteins). The development of new macromolecules with sugar units that will interact with cells will cause interference with the 'sugar code' – a code used in living organisms. Smart medicines, or next generation drugs, will target specific cells and deliver the desired amount of drugs into cells. Using a combination of glycopolymers and proton-sponge polymers, researchers will be able to deliver high-value drugs into specific cells.

Project Partners

The University of Warwick
Queen Mary University of London
Izmir Institute of Technology
Bilim Pharmaceuticals
Warwick Effect Polymers

What are Glycopolymers?

Glycopolymers play an important role in many biological recognition events such as cell-cell adhesion, development of new tissues and infectious behaviour in viruses and bacteria. There is a high potential for their use in targeted drug delivery, tissue engineering and the synthesis of bio-compatible materials.



What are Proton-Sponge Polymers?

'Proton-sponge' polymers prevent acidification of certain intracellular vesicles called endosomes, causing swelling and rupture of the vesicle membrane. This effect releases the polymer-drug complexes entrapped in the vesicle, into the cytosol of cells where the drug molecules show their therapeutic activity.

Patients needing a drug treatment programme are usually prescribed a tablet to take several times a day and they may suffer from serious side effects. The main reason for those side effects is due to taking a drug in large, concentrated dosages. While the active compounds in drugs are working to attack the specific intended target, they occasionally cause more serious damage in another part of the body. With new nanotechnological advances, the active compounds can be delivered to only the desired target, not the entire body. This is typically achieved by understanding the ‘sugar code’ of human bodies. The sugar code is nature’s own powerful information tool and the role of reading the sugar-encoded messages is mainly played by a class of carbohydrate binding proteins called lectins. The advantage of nanomedicines is that active compounds can be released for a prolonged period of time, thus avoiding having a patient take multiple doses a day.



Novel Method of Drug Delivery

The joint project focuses on the development of a novel drug carrier that allows carrying the active drug molecule to the desired location. This is called

The project aims to produce the next generation of medicines. In the long-term, pharmaceutical industries would potentially benefit from the outcomes of the project, as well as the medical sector and patients.

‘targeted drug delivery’ and is typically achieved by using designed functional polymers. Polymers are long chains of molecules linked together, much like a necklace, and can carry multiple functional groups. For instance, the designed polymer chain carries targeting groups (sugars), a marker (dye) and drug conjugating groups (for example siRNA – small interfering RNA, a class of molecules). Sugar units provide the recognition and they spot the right place to deliver the drug while the marker allows for monitoring of the delivery. This novel method of drug delivery will minimize the amount of drugs administered. However, there are several synthetic and biological challenges. Therefore, a clever design of a macromolecule and its fundamental biological tests must be performed under relevant biological conditions.

High-Level Expertise

Research is conducted at both the Izmir Institute of Technology and at Warwick University. Bilim Pharmaceuticals from Turkey and Polytherics from UK are partner companies in the project and directly involved with the project through quarterly progress reports along with regular discussions and meetings. Bilim Pharmaceuticals provided drug molecules to be tested in intracellular delivery.

The project leaders – Queen Mary, University of London’s Dr. Remzi Becer (formerly of Warwick

University) and Izmir Institute of Technology’s Dr. Volga Bulmus – and their graduate students already benefited from the partnership. The project has provided the forum to swap ideas, engage in research and has provided hands-on experiences in the newly emerging scientific field of nanomedicine. The different high-level expertise each team brings to the project has greatly improved the professional and international research skills of both academic teams.

As an extension of the partnership, the Turkish and British teams have already submitted applications for funding further research collaboration through EU research funding schemes. Further funding from TUBITAK and EPSRC is also a possibility. The goal is to extend the collaboration to involve scientists from medical schools for in vivo and clinical trials of the materials being developed within the scope of this project

Research activities are very important to develop Turkey and contribute to economic growth. However, the private sector is not research-oriented and their perspective is totally different from universities. These kind of projects are giving the chance to create collaborations with universities and they bring R&D culture to companies.
Dr.Nurgul AKCIN ONEL / BİLİM PHARMACEUTICALS

Outputs

Focused Therapy: The proposed study is potentially significant for pharmaceutical and life science industries as well as for the relevant scientific community, because it aims to address an important problem – the inefficient intracellular and targeted delivery of therapeutics.

Develop Expertise: The main barrier to entry for researchers in interdisciplinary areas is generally the lack of expertise, as diverse fields are relatively self-contained. This project uses the research support to create the opportunity to develop and train expertise both in UK and Turkey in the interdisciplinary field of nanomedicine.

Updates: The results of this project will be disseminated in quarterly progress reports, a final report, joint research paper in an international journal, and lectures at international conferences.

Further Collaborations: As an extension of the partnership, the Turkish and British teams have submitted applications for funding further research collaboration through EU research funding schemes.

Industry partner of the project; Bilim Pharmaceuticals is one of the leading pharmaceutical companies in Turkey and they are very keen on developing new drug delivery techniques. Polytherics is a spin-off company with the primary aim of developing new technologies.

The Changing World of the '100'

Bathroom design for an ageing population

One key to good design is getting quality insight from research. But when it comes to something as private as getting people to open up about their bathroom habits, research and insight is trickier. And when it comes to the elderly or disabled, for whom accessibility is a huge problem, it is even more difficult as culturally and commercially, they often aren't give a voice.

'Loo-lab', a creation of Sheffield Hallam University (SHU) and Istanbul Technical University (ITU), in partnership with Vitra, part of the Eczacıbaşı Group, one of the largest industrial conglomerates of Turkey, addresses these issues with a series of exhibitions and a website (www.loo-lab.com). Designed to provide a platform where people can comfortably discuss ideas and suggest needed changes, this new approach allows consumers to contribute directly to the design process.

Since we are all sensitive about the whole bathroom issue, there is a wonderful verbal/visual synchronicity between the humorous play on the British word 'loo' and the Turkish equivalent, 'room 100', which helps to break the ice with participants. The main part of the project is an

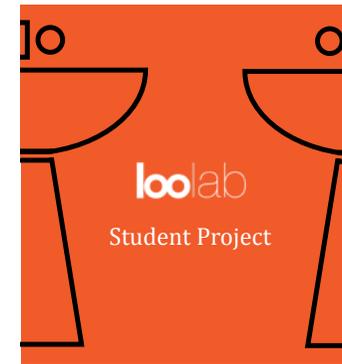
innovative field lab and exhibition that is also a meeting space to share thoughts and ideas freely. The lab forms the foundation of a user-centred design lab based at ITU, focussing on the older generation as well as the mobility-impaired population.

Through the project website, a widespread virtual community has been created that encouraged users to share digital data such as text messages and photos. Additionally, the exhibition lab in Istanbul Technical University invites people to look at new products, hold conversations and respond through drawings and writing. These two methods together provide a greater understanding of the cultural aspects of bathroom use.



Researchers have developed an approach where the older participants are seen as active participants rather than passive respondents. The goal is to design 'with' instead of only 'for' consumers.

Project Partners
 Sheffield Hallam University
 Istanbul Technical University
 Vitra/ Eczacıbaşı Group



During 2012-2013 Fall Semester, 2nd year undergraduate students from Sheffield Hallam University Furniture & Product Design Program and Istanbul Technical University Industrial Product Design Program worked together on the same design brief and communicated with each other via a Facebook group created for the project. The project title was "Better Bathroom Experience for All - Organizing the bathroom". This is a selection of the students' work.



The demographics

Globally, the over-50s are a rapidly growing part of the population. Older consumers often suffer from disabilities such as arthritis, sensory loss and mobility problems. The result is that just the simple task of using the bathroom can end up being a source of stress, difficulties and hazards.

There is a very small part of the bathroom market that specializes in addressing these problems in creative, yet

effective ways. Most bathroom products do not take the needs of an aging market into account. There is a great need for products designed for older users that are aesthetically pleasing as well as functional.

However, the bathroom is not only a space for individual use. It has to fulfil the demands of those living with disabled people as well as visiting family and friends. It has to fulfil all these needs at once. The challenge is to create inclusive yet sustainable products.

Understanding older users' experiences

VitrA, the industrial partner, worked closely with the SHU and ITU team and sponsored an external design consultant to design the website. After several meetings, the team held a workshop for 26 older users ranging in age from 70 to 95. The input gained from the workshop helped to further define the goals of the project.

The two-week 'loo-lab' exhibition drew approximately 500 visitors, including academic staff, architects, product designers, press, industry representatives and the general public. The website reached a number of approximately 8000 visitors in total. 26 older users took part in the workshop held in conjunction with the 'loo-lab' exhibition. In addition, there are 40 students from both universities engaged with the project through a parallel design brief communicating and sharing knowledge through Facebook and the results of this design brief were displayed in the loo-lab exhibition). The project has also reached a wider audience via digital and printed media, especially in Turkey.

The collaboration has provided a better understanding of older users' experiences and needs, as well as encouraging an inter-generational and cross-cultural discussion that is needed to provide useful and aesthetically pleasing bathroom products. By using creative methods to gather information, the project has provided the industry with vital information needed to accommodate an ageing population.

The ultimate aim is to use knowledge and insight gained to design bathroom products that will help encourage independence and dignity in later life



Paul Chamberlain Project Lead UK

"The project shows a commitment to user-centred design, giving people an opportunity to share their thoughts and experiences of bathrooms, a topic rarely discussed."

Roger Bateman, teacher of furniture design at Sheffield Hallam,

"This project is a great example of an international collaboration which combines expertise in teaching, research and industry."

Berrak Karaca Salgamcioglu, Istanbul Technical University

"Students from both universities enjoyed an engaging exchange of ideas and the exhibition is an excellent way of encouraging even more user-informed discussion on design."

Outputs

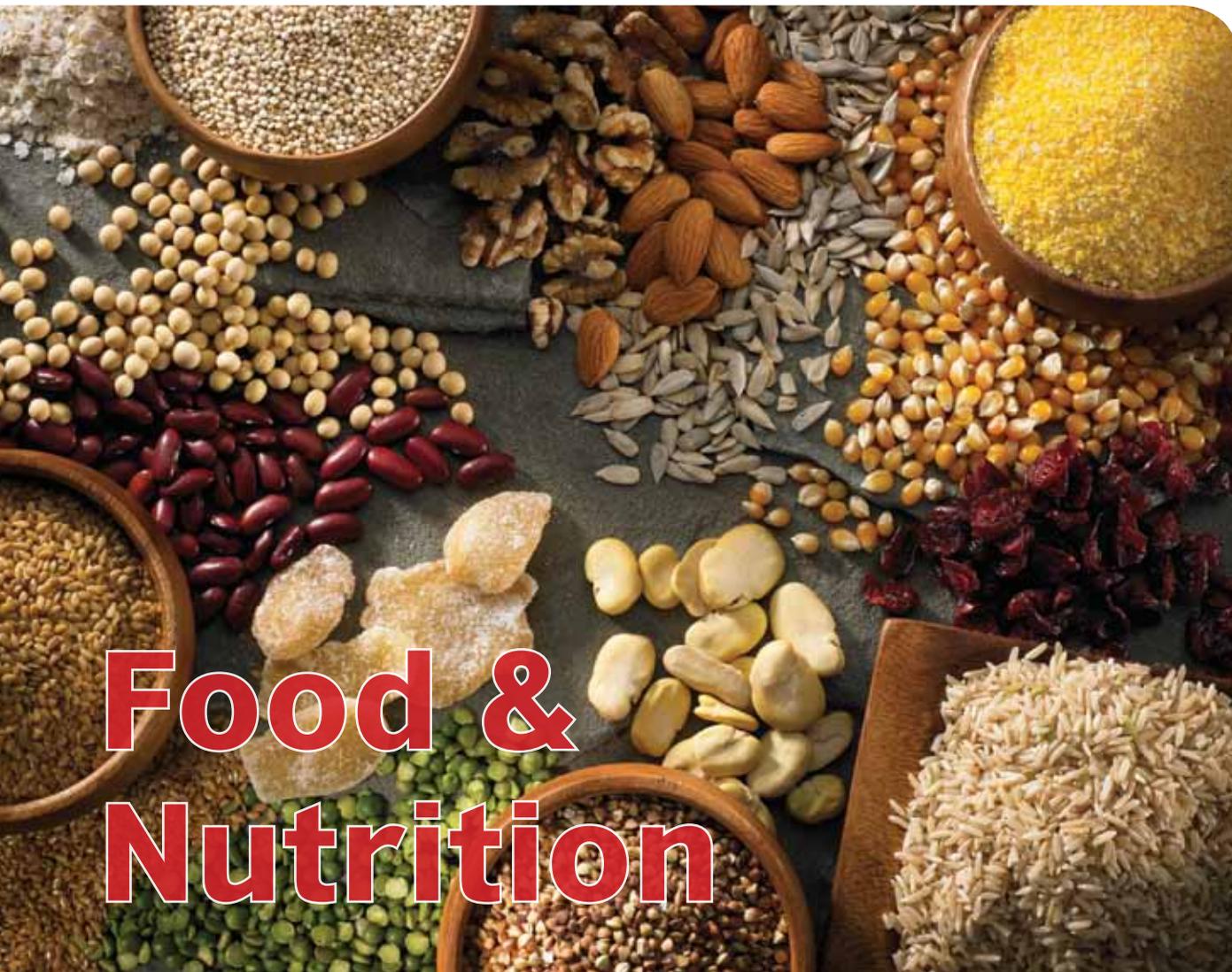
International Conferences: The collaboration between the academic and industrial partners continue, with joint participation in the 2nd European Conference on Design4Health in Sheffield, International Initiative on Ageing and the IDA Congress, both being held in Istanbul.

Curriculum Development: The academic partners are exploring potential shared curriculum development and on-going commercial opportunities will be explored with VitrA. The information gained in this project will reach a broad spectrum of society, including care homes, new home-builders, public facilities planners and government policy makers.

Applied Research: The development of a methodology to increase the potential for applied research within academia in Turkey, will help change the balance of basic research to applied research.

Product-Generation: Through applied research, increase opportunity for commercial income through research-informed, usable and desirable products for an ageing consumer both in the UK and Turkey.

Media Exposure: This project has already generated extensive exposure through the website (www.loo-lab.com) as well as with local media and will continue to expand.



Food & Nutrition

Gluten-Free Products for Better Health

Addressing the Needs of Those With Coeliac Disease

The World Gastroenterology Organisation estimates that between one in 100 and one in 300 people have Coeliac Disease. Currently, there is no cure. So a high-powered group which includes researchers from University of Gaziantep and Manchester Metropolitan University, along with The Village Bakery (Nutrition) Ltd, Goodlife Foods LTD, Coeliac UK, Besler Foods and Trade Corporation and Coeliac Society of Turkey have joined forces to expand awareness of the disease and search for new approaches to producing gluten-free goods

While there is research into a vaccine, it may be many years before it is developed. So current treatment is a gluten-free diet. Tennis star Novak Djokovic discovered he had sensitivity to gluten, changing his diet which launched a winning streak. However the avoidance of all products containing gluten is not easy since gluten is widely used in manufacturing foods as a stabilizing agent. Gluten is the main structure-

forming protein in wheat flour and is responsible for the elastic characteristics of dough, and contributes to the appearance and crumb structure of many baked products. Wheat and gluten removal results in major problems for bakers, giving rise to physical and sensorial challenges in terms of taste, appearance (loaf volume, colour), texture and shelf-life as well as affecting the nutritional qualities.

For Coeliac Disease sufferers, gluten-free alternatives often aren't as appetising, so attention is being paid

Project Partners

- University of Gaziantep
- Manchester Metropolitan University
- The Village Bakery (Nutrition) Ltd
- Goodlife Foods LTD
- Coeliac UK
- Coeliac Society of Turkey
- Besler Foods and Trade Corporation



to improving these products with ingredients such as emulsifiers, enzymes, gums and grains. Additionally, those on a gluten-free diet must consider the ingredients in all foods as well as medicines, vitamins and cosmetics.

Developing Affordable Gluten-Free Produce

Many people are unaware of food allergies, their causes, symptoms and treatments. In Turkey, especially in children, gluten intolerance or Coeliac Disease is very common but is often misdiagnosed or overlooked completely. A very common form of food intolerance, affecting approximately 5% of the population, there are a large number of people who go undiagnosed for years. Increasing awareness of this disease and developing affordable gluten-free products is of utmost importance in both the UK and Turkey.

However gluten-free products are expensive option for



many. Gluten-free products are currently imported into Turkey, the price of gluten-free items are high, which

This project will provide Coeliac patients with alternative and more affordable sources of food.

limits availability to those with the disease. Through research with industry partners, the production of locally produced gluten-free products can provide patients with and alternative and more affordable sources of food.

The Manchester Food Research centre, which is a part of Manchester Metropolitan University, already has a well-established collaboration with the food industry, mainly in the North-West of the UK. The strong applied research/ consultancy that the University provides as well as the excellent collaboration with consumers and the showcases that they have organised in the last three years, proved an attraction for companies to the current project. Negotiations are already underway with a gluten-free company for a possible new project.

What is Coeliac Disease?

Coeliac Disease is an autoimmune disease. Gluten, found in wheat, barley and rye, triggers an immune reaction in people with Coeliac Disease. This means that eating gluten damages the lining of the small intestine. Other parts of the body may be affected as well.

Outputs

Export Potential: The partnership between University of Gaziantep, Manchester Metropolitan University and the Besler Group is leading to new export potential for the Turkish industry partner in an area of health about which there is currently relatively little awareness in Turkey.

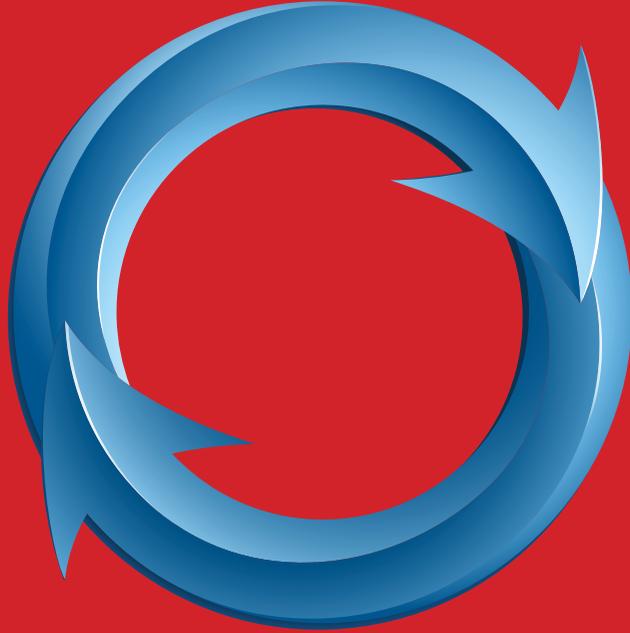
Knowledge Transfer: The project has now been established under the UK's Knowledge Transfer Partnership scheme. A student from University of Gaziantep is expected to undertake an apprenticeship in the UK industry partner as a part of the programme.

Knowledge Network: To date, this project has directly reached 50 students, over 30 industrial representatives, 10 researchers, 80 members of the Coeliac Society, as well as representatives from the Leading Food Centre in the UK, the British Edible Association and the Coeliac Society of Turkey. As the programme continues, more people will be reached directly and indirectly.

Conference: A two day Gluten-free Conference "Innovating to Meet the Needs of Coeliacs and Workshop" was held at the Manchester Metropolitan University on 7th and 8th March 2013. This event brought together members of the Coeliac Society, doctors, academics, students and industry to investigate how they can work together to improve the experiences of people living on gluten-free diets. The conference started with the showcase of a number of innovative gluten-free products developed by the final and MSc students followed by a series of presentations and speakers from the Coeliac Society, medicine, academia and industry.

"The real delight for me was the way the students had risen to this unusual challenge and come up with some really innovative ideas; something the industry has been slow to develop." **Salvador Potter, speaker at the two day Gluten-free Conference, British Edible Association, UK.**

"After all the hard work we put into the development process, it was great to hear such great feedback on our product from people within the food industry and also Coeliacs the potential consumers." **Michael Baumber, Food and Nutrition student attending the two day Gluten-free Conference**



Türkçe için lütfen kitabı ters çeviriniz