



**I3E**  
*South East Europe TCP*

## **Final Document**

***30 Best Practices  
SWOT ANALYSIS***

**Document type** : Report  
**Document version** : Final  
**Document Preparation Date** : August 2011  
**Classification** : Internal  
**Contact** : aslavinski@nbu.bg  
**Project co-ordination** : ISI – Industrial Systems Institute  
**Deliverable Responsible** : FNBU

<b>Rev.</b>	<b>Content</b>	<b>Resp. Partner</b>	<b>Date</b>
0.1	Creation of document	FNBU	07.2011
0.2	Revision of the draft document	ISI	08.2011
0.3	Revision of the draft document	BICT	08.2011
0.4	Revision of the draft document	ECOPLUS	08.2011

Everybody please state revision index and short description of what has been done + partners involved and date.

<b>Final approval</b>	<b>Name</b>	<b>Partner</b>
<b>Reviewer</b>		

Table of content

<b>I. EMBEDDED SYSTEMS FUNDAMENTALS .....</b>	<b>5</b>
<b>II. BEST PRACTICE CASES .....</b>	<b>11</b>
1. ECOPLUS - Technopol Program Wiener Neustadt Center for Modern Industrial Technologies .....	11
2. IEA - TECHNO SEED - A concrete way to promote entrepreneurial initiatives in ICT field.....	13
3. UOM - Finland’s Strategic Centers for Science, Technology and Innovation Example: TIVIT - Producing Innovations for the ICT Industry .....	15
4. ISI – Syrinix.....	17
5. ISI – INNOPOLE Regional Innovation Pole of the Region of Western Greece .....	19
6. BICT - Sirma Young Spirit (SYS) -Early Stage Financing.....	21
7. ISI - Intelesens Limited Sensor Technology & Devices (ST&D) .....	23
8. JSI - Cardio & Brain Signals - Signal conditioning system for physiological signals 25	
9. ISI - CORALIA Clusters Initiative .....	27
10. JSI - KIBERSik– Electricity Peak Shedding System for energy efficiency in industry 29	
11. RDF-RWG - Competence Brokering Linking SME Needs to Research Opportunities.....	31
12. FNBU - EuroGPS SafeDrive .....	33
13. ECOPLUS - Mobile Asset Management Platform .....	35
14. UOK – MikroElektronika .....	37
15. RDF-RWG - PFAU-Program for the financial support of start-ups from Universities in North Rhine-Westphalia (NRW) .....	39
16. OEAW - Foundation of Spin-Off Company from Research Group at University ...	41
17. UOM - NORDITE Program.....	43
18. UOK - Virtual Manufacturing Support for Enterprises in Serbia .....	45
19. ISI – UltraSOC.....	47

20.	FNBU - IMS-BAS embedded systems .....	49
21.	ONPU – Innovation technological centre of St. Petersburg state electro technical institute, St. Petersburg, Russia.....	51
22.	ONPU - “Slalen” innovation centre .....	53
23.	UOK - Vlatacom Document Reader–Handheld .....	55
24.	BICT - Inland AIS System Implementation .....	57
25.	IEA - BASILICATA INNOVAZIONE .....	59
26.	ECOPLUS - Energy Harvesting for Mobile Eco-Efficient Wireless Sensor Networks .....	61
27.	TUCN - TrackGPS Business .....	63
28.	JSI - Vacuum pressure control at the plasma annealing and cleaning machine .....	65
29.	ECOPLUS - Frozen Food Temperature Monitoring during Transportation and Storage .....	67
30.	TUCN - Rehabilitation of a Network of Water Wells for Capturing Raw Water - Automation System for Monitoring and Command .....	69
	<b>IV. SWOT ANALYSIS.....</b>	<b>71</b>

## **I. EMBEDDED SYSTEMS FUNDAMENTALS**

Each day our lives become more dependent on embedded systems, which include not only safety-critical applications such as automotive devices and control, aircraft, aerospace and medical devices, but also communications, mobile and electronic worlds, the 'smart' home, clothes, factories etc. All of these have wide ranging impacts on society, including security, privacy and modes of working and living. More than 98% of the processors applied today are in embedded systems, and are no longer visible to the customer as 'computers' in the ordinary sense.

**Definition:** An embedded system is a combination of hardware and software which creates a dedicated computer system that performs specific, pre-defined tasks and which is embedded as a subsystem in a larger system, if it is not an independent device. An embedded system can be also defined as single purpose computer.

**Special Features:** In general, an embedded system

- Is a system built to perform its duty, completely or partially independent of human intervention;
- Is specially designed to perform a few tasks in the most efficient way;
- Interacts with physical elements in our environment, controlling and driving motor, sensing temperature, etc.

Most embedded systems are time-critical applications (Real-Time Constraints, RTS) meaning that the embedded system is working in an environment where timing is very important: the results of an operation are only relevant if they take place in a specific time frame. The right answers arriving too late or even too early are wrong. For example, an autopilot in an aircraft is a time-critical system. If the autopilot detects that the plane for some reason is going into a stall then it should take a step to correct this within milliseconds or there would be catastrophic results. There are embedded systems which are not RTS (for example off line Palm tops).

From an implementation point of view, there is a major difference between a computer and an embedded system. Embedded systems are often required to provide real-time response. A real-time system is defined as a system whose correctness depends on the timeliness of its response. In some real-time delay in response is a fatal error, but in others a small delay is acceptable. The real-time systems can be classified as:

- Hard real-time system – systems with severe constraints of timeliness of the response. Examples are flight control system of aircraft and sensor systems in a nuclear reactors and power plants.
- Soft real-time systems – systems which tolerate small variations in response times.
- Hybrid real-time systems – systems which exhibit both hard and soft constraints of its performance.

Embedded systems could be economical, but they are often prone to some very specific problems. A personal computer may ship with a glitch in the software, and once discovered, a software patch can often be shipped out to fix the problem. An embedded system, however, is frequently programmed once, and the software cannot be patched. Even if it is possible to patch faulty software on an embedded system, the process is

frequently far too complicated for the user. Another problem with embedded systems is that they are often installed in bigger system for which unreliability is not an option. For instance, the embedded system controlling the brakes of a car cannot be allowed to fail under any condition. As such, many of the programming techniques used when throwing together production software cannot be used in embedded systems. Reliability must be guaranteed before the chip leaves the factory. This means that every embedded system needs to be tested and analyzed extensively. An embedded system will have very few resources when compared to full blown computing systems like desktop computer, the memory capacity and processing power in an embedded system is limited. It is more challenging to develop an embedded system when compared to developing an application for a desktop system as we are developing a program for a very constricted environment. Some embedded systems run a scaled down version of operating system called a real time operating system (RTOS).

The general characteristics of embedded systems are:

- Perform a single task (usually embedded systems are not for general purpose);
- Increasingly high performance and real time constrained;
- Power, cost and reliability are important considerations;
- They are hardware & software (HW-SW) systems – software is used for more feature and flexibility and hardware for performance and security.

A detailed view on embedded systems shows that:

- The vast majority of CPU-chips produced world-wide today are used in the embedded systems and only a small portion of CPU's is applied in personal computers;
- Each year the embedded software is written five times as much as 'regular' software. The number of constructors of embedded systems ware rose from 2 million in 1994 to more then 10 million in 2010.

One of the waste used classifications of embedded systems is:

- Distributed and non distributed;
- Reactive and transformational;
- Control dominated and data dominated.

### **Generic structure and properties:**

In the general structure the processor can be microprocessor, digital signal processor or microcontroller (8-bits in old embedded systems and 16-bits or 32-bits in up-to-day systems - Fig. 1). The new applications in the areas of imaging, rendering and compression, multimedia and recognition demand higher bandwidth enhanced processing capabilities, quicker response times and more efficient algorithms. There is definite requirement of processors with multiple cores that would improve the throughput of the application while reducing power consumption, cost and operation and increasing reliability. Many of gaming consoles and network processors use multi-core processors. The memory in embedded systems is on-chip or off chip.

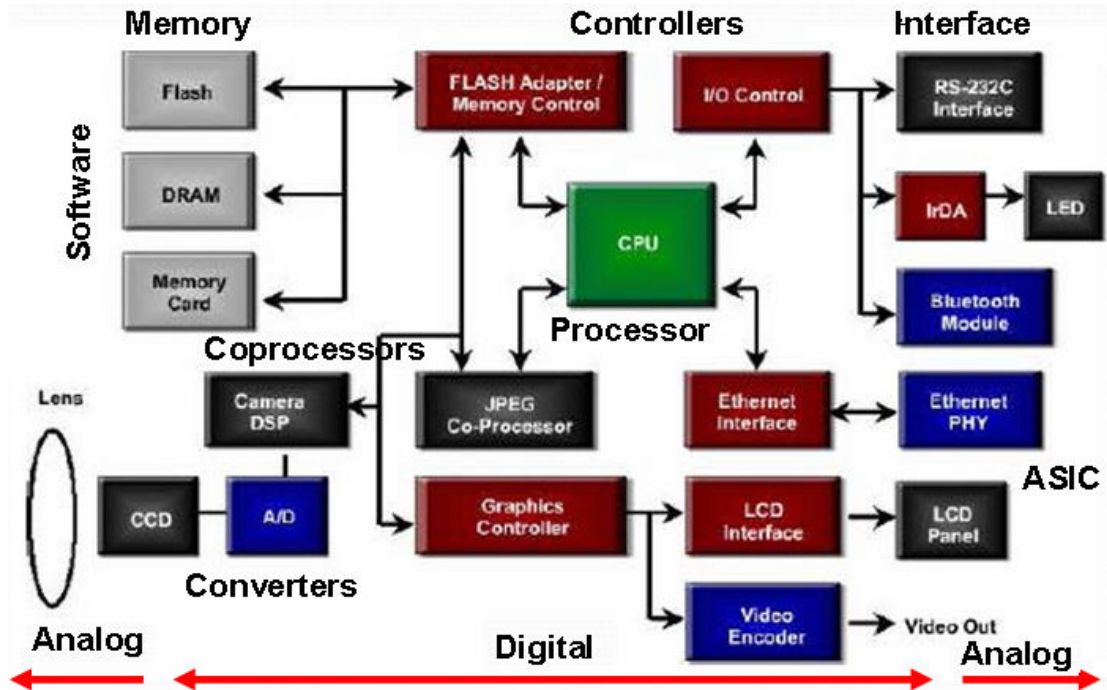


Figure 1. Generic structure of embedded system

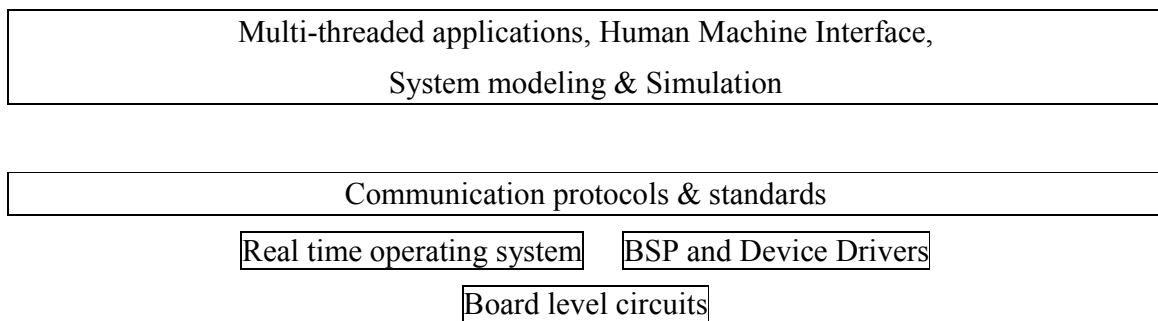
The system has a communication path with interfacing environment. For a long time, embedded systems were mostly operating as stand-alone systems, but this is changed with the advent of wireless connectivity. The recent trends in wireless for use in embedded systems are in the area of System-on-Chip (SoC) architecture, reduced power consumption and application of short range protocols. Generally, SoC is the integration of a microcontroller with the radio modem in a regular 64-pin out single chip, which requires few external components and the programming is simple. The critical part in SoC is the optimization of the printed antenna with the transmitter and receiver. In the near future more widespread applications on the base of both short-range wireless protocols (Bluetooth, Zigbee, Radio Frequency Identification, Near Field Communications) and long-range protocols (Wireless Local Area Network, WiMAX, cellular communications) will be created.

Note that all embedded systems are processor based systems, but all processor based systems may not be amenable to embedding. Application-specific integrated circuits (ASIC) are a significant component with advantages the low power, low cost and enhanced performance and disadvantages higher development effort (debuggers, compilers etc) and larger time to market. Note that usually an embedded system requires mechanical assembly to accommodate all the components and create a product or a complete embedded device.

The lowermost layer comprises the printed circuit board that accommodates all the semiconductor devices, buses and related electronics. The semiconductor devices may include Application Specific Integrated Chips (ASIC), Microcontrollers (MCU), Field-Programmable Gate Arrays (FPGA) or a System on a Programmable Chip Builder (SoPC). The operating system traditionally is proprietary and significant overhead faced by manufactures of embedded systems was the payment of royalty. This is changed due to the

operating system Embedded Linux with free and licensed versions, which remains an attractive choice for developer of embedded systems. Therefore an increasing number of manufactures are providing their source code free of cost to engineers or other manufactures. The same is with the Android software of Google.

The architectural layers for an embedded system are as follow (Fig. 2).



*Figure 2. Architectural layers for an embedded system*

The board support package (BSP) is implementation specific support code for a given board (for example the device motherboard) that conforms to a given operating system. It is commonly built with a boot loader that contains the minimal device support to load the operating system. The uppermost layer is the application layer. Note too that some key differences in the design and use of embedded systems as compared to the general computing system. The embedded systems perform a limited set of pre-defined functions and have a limited field configuration capability.

The security of embedded systems is critical by the reason of increasing interconnected world. The security requirements for the huge base of embedded systems are distinct on account of the limited memory, constrained middleware, and low computing power. The confidentiality and integrity of sensitive information is partially implemented through the use symmetric key algorithms as Data Encryption Standard (DES and 3-DES) and Advanced Encryption Standard (AES). Unfortunately, many networked embedded systems lack robust encryption to protect sensitive information. This could be due to resource limitations, cost restrictions, or design limitations. Extension of a legacy system onto an open network (Ethernet or Intellectual Property) could also cause security loopholes in the system. Regardless the reason, the lack of robust encryption may lead to potentially disastrous consequences. Intruder or malicious insiders could read, intercept, modify or remove communications. If proprietary wireless RF links are involved, the danger is further amplified. Anyone with suitable equipment can attack the system, possibly from a substantial distance given a high-gain antenna. Insufficient cryptographic protection can lead to compromises, many of which are nor apparent at the time of system design. A prudent designer must consider the implications of intercepted, deleted, modified and forget information from all components of a networked system, and take appropriate steps to protect the system against attacks. On Fig. 3 you may see the block diagram with more detailed ‘typical’ architecture of embedded system.

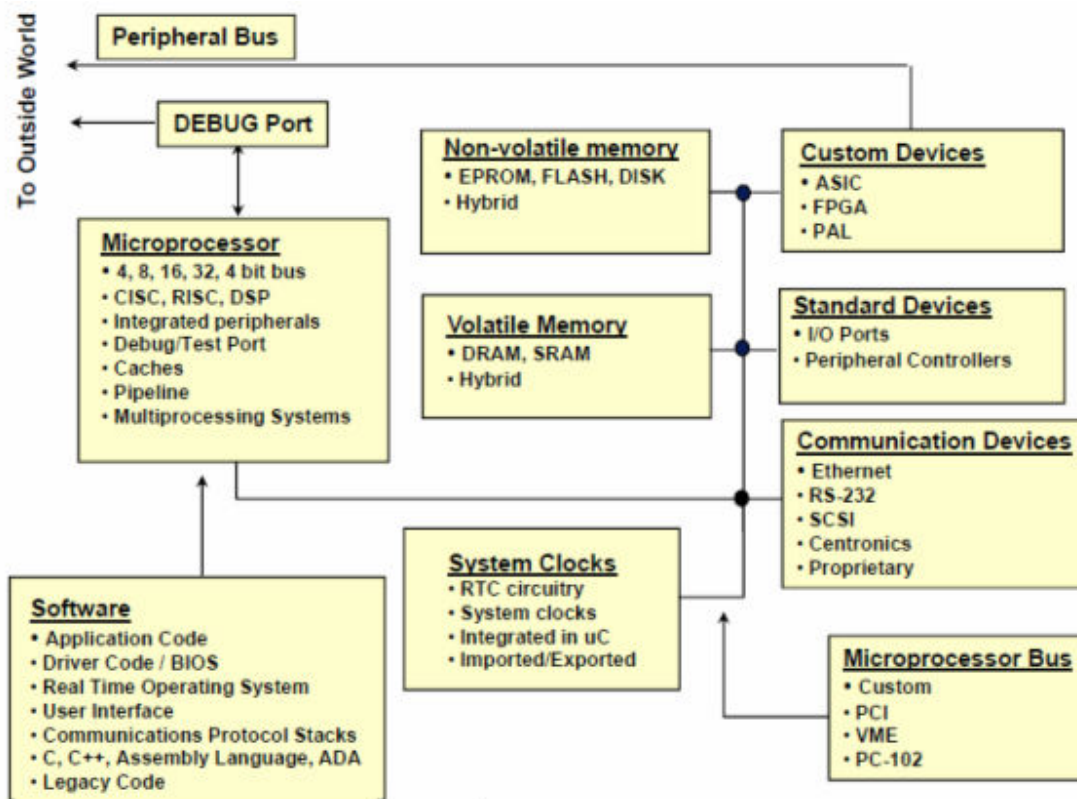


Figure 3. Block diagram of embedded system

The packaging of embedded systems is standardized, which enable them to be relatively static and simple in functionality. There is a requirement too for low cost, small physical footprint and negligible energy consumption and electrical radiation. At the same time the embedded systems need to be physically rugged and impervious to external electrical and electronic interference. The embedded systems invariable have limited resources in terms of memory, central processor unit, screen size, a limited set (or absence) of key inputs, diskless operation, which play a crucial part during the design, development and testing of systems. They also require a host of diverse skill-sets related to hardware, embedded software, electronic and mechanical domains, which render further complexity to their development.

**Application areas:** Embedded systems can be found in an enormous range of electrical items ranging from simple, inexpensive products such a digital watch to expensive, complex products. They have become an integral part of daily life. Be a cell phone, a smart card, a music player, a router, or the electronics in automobile – these systems have been touching and changing modern live like never before.

**Consumer products.** There are endless uses for embedded systems in consumer products with new methods of exploiting them every year. The use of embedded systems in electrical products can solve many problems of complexity and product size. The most obvious beneficiaries are those enterprises concerned with the manufacture and sale of electrical devices, as the inclusion of microcontrollers to replace general purpose microprocessors can drive down unit manufacturing costs and end user prices dramatically, resulting in increased sales and an improved profit margin. As embedded systems in

consumer electronics can be cited home appliances, PDAs, music and DVD players, set-top boxes, digital cameras, video games.

***Telecommunications and data communications.*** Here can be cited the router, switches, bridges, cellular phones, smart devices, networking gateways, copiers, printers, fax machines, multi-function peripherals, storage devices and smart cards.

***Automation and industrial control.*** To be cited building automation (heating, ventilation, air-conditioning), utility meters, special purpose controllers, networking and process control, smart sensors. In the last case the principle ‘sense and transmit’ is valid: the sensing is scheduled so that the device is sleeping more than 99% of the time and the current consumption is of the order of 1-2microA.

***Automobiles.*** A modern automobile may contain dozens of embedded systems to control a wide range of processes within the car, ranging from brake balance control to air conditioning to the ignition system. Without embedded systems it would be impossible to computerize all of these features without the inclusion of mass of complicated, fault prone electronics. The only realistic alternative to using embedded systems in a modern automobile would be to install a fully functional personal computer within the car to control all of the functions currently managed by microcontrollers. While this may be feasible it would raise two basics issues:

- Size & weight: Microcontrollers are designed to deliver maximum performance for minimum size and weight. A centralized on-board computer system would greatly outweigh a collection of microcontrollers.
- Efficiency: Microcontrollers are designed to perform repeated functions for long periods of time without failing or requiring service. Other computer systems are prone to software and hardware failure as well as a whole host of other problems recognizable to the users of any home computer. Above all other considerations, computer systems must be 100% reliable when trusted to control such functions as braking in an automobile.

Some embedded systems in automobiles are electronics for security and power train, in-vehicle entertainment and infotainment systems.

***Medical electronics.*** To be cited the patient monitoring, diagnostic equipment, surgical systems, imaging, and electronic stethoscopes.

***Aerospace and military.*** In this area the mission- and safety-critical aerospace and defense embedded systems require hard real-time performance, scalability and high-availability facilities. An elaborated hardware and certificated software (for example based on RTCA DO-178B standard) are obligatory. In some cases a software platform backed by powerful distributed computing is applied. As embedded systems be cited the satellite systems, weather systems, flight control systems, aircraft management systems, radar, navigation and sonar.

## **II. BEST PRACTICE CASES**

### **1. ECOPLUS - Technopol Program Wiener Neustadt Center for Modern Industrial Technologies**

Technopol Wiener Neustadt, with focus on “Modern Industrial Technologies”, represents an innovative approach to support regional development in the frame of the Lower Austria’s Technopol Program.

With the objective of bridging the gap between higher education, industry and research and development (R&D) the so called “Technopol-program” of Lower Austria was founded in 2004. In order to enable a coordinated technology-oriented regional development for each of the three Technopol locations at lower Austria, one local expert per Technopol was hired. The duty of the Technopol manager was to act as a hub between the stakeholders.

The Technopol location Wiener Neustadt focuses on five technology fields such as a) materials, b) surfaces, c) medical technology, d) processes and e) sensors-actors, which are summarized as “Modern Industrial Technologies”. In each of these areas at least three independent facilities with overall staff of at least 30 scientists ensure the necessary critical mass.

The aim of the Technopol manager is to double the amount of scientists from 300 to 600 at the Technopol till 2013 and to build a strong network between the thematic-linked companies, higher education and R&D facilities.

<http://www.ecoplus.at/>

#### **SWOT ANALYSIS**

##### **Strengths:**

- This case of the Technopol-Program (founded in 2004) is a successful paradigm (an innovative approach) for the productive “connection” of the areas of research, academia, and high-tech industry to support regional development (through innovation) in the frame of the Lower Austria’s Technopol Program;
- Broad area of activity in 5 technological segments of development: Materials; sensors-actors; surfaces; medical-technology; processes and engineering;
- The regional industry gets continuously information about the R&D offer and funding possibilities for R&D projects. Also, it Industry gets support during identification problems, elaboration project proposals, to find the proper partner;
- R&D team is established by a lot of participants from academy institutions, R&D structures and Industry;
- New, additional, jobs are crated (till now 315 employees);
- Proper financial mechanism: The Technopol-Program is partly financed by the province of Lower Austria and the European Union – ERDF. R&D facilities finance themselves by different funding schemes.

### **Weakness:**

- The R&D facilities depend on time-limited funding schemes which last for 3 to 10 Years, depending on the individual funding program, the R&D Offer and the thematic fields of specialization are in a continuous modification. Also the R&D Know-how and the service offer changes every Year. On the other side, also the requirements from industry have changed e.g. due to the financial crisis.
- The estimation of the potential benefits is not mentioned.
- The evaluation criterion of the program benefits is unclear and difficult to be metered.
- These facts require a permanent Technopol-Management on site, to keep all involved parties permanently up-to-date and to support all in every phase of development.

### **Opportunities:**

- The project is in accordance with the Strategy of EU, the country Austria as well as with the strategy of the province of Lower Austria;
- The players at the TP Wiener Neustadt engage actively in the fields of technological progress, while the Country of Lower Austria supports these efforts in a very efficient way through funding, consultancy and support services;
- The extension of the program to other countries is possible;
- The Technopol-Program was developed on basis of a detailed analysis of the region, the innovation support system, funding programs and individually set up per Technopol location. Basically, the idea of establishing a Technopol-Program and – Management is transferable to comparable provinces if infrastructure, funding, and will are given.

### **Threats:**

- There is not given information about vision of how the Technopol will operate in conditions of prolonged financial crisis.
- The partner competition diminishes the openness for cooperation.
- The changing of partner requirements and expectations is difficult to be monitored continuously.

## **2. IEA - TECHNO SEED - A concrete way to promote entrepreneurial initiatives in ICT field**

The Techno Seed is an initiative founded by the Ministry of Economic Development of Italy with participation of University of Udine and two research centers. It has been developed in North-East Italy and is one of the 11 incubation projects founded by the Ministry. The aim is to collect good and innovative ideas in the ICT field, turn them into concrete innovations, and launch business through the creation of new enterprises. The project aims also to stimulate the development of an entrepreneurial culture and strengthen the relations between the University and the regional economic system. This initiative will make it possible an expert's team to develop an idea and transform it in into real enterprise.

The project structure has three phases:

- The first one is Entrepreneurial Training, which consists of carrying out workshops on business culture and preparation of a provisional business plan (really 32 seminars were organized with about 1000 participants). Finally, the Scientific and Technical Committee chaired by the scientific director of the project and composed of 9 members, selects 36 potential entrepreneurs.
- The second phase is Entrepreneurial Project Development, which ensures advice and support services to develop a business plan. An entrepreneurial laboratory is going to support the business plan preparation and a technological laboratory – to verify the feasibility of the idea. This phase brings to the identification of 12 new enterprises.
- The third phase “Start-Up and Incubation” foresees a possibility to use financial contribution to start the activity and to use the incubation services inside appropriated spaces – the sustaining of each enterprise was ensured with financial support of €20000.

<http://technoseed.it/>

### **SWOT ANALYSIS**

#### **Strengths:**

- Good initiative for collecting innovative ideas in ICT field as well makes them reality through the creation of new enterprises. The main benefit achieved thanks to this project is the creation of new enterprises which enrich the social and economic fabric of the zone. In fact, at the end of the project, the 15 new enterprises created give employment to 74 persons and this number is continuously increasing;
- Techno Seed is one of the 11 incubation projects funded by the Ministry and it is promoted by Friuli Innovazione (a research center), by University of Udine and by Ires FVG (Economic and Social Research Center)
- Stimulation of relations between University and the regional economic system. A sophisticated models for acquiring optimal synergism between Academics and Industrial party;
- Long term experience aggregation (project started at the beginning of 2000 years);

- Techno Seed project recognized the necessity of providing a concrete action of entrepreneurial training, from the moment that most of the potential entrepreneurs have no skills in economic, administrative or communication field, being these persons mostly researchers and technical;
- Support services to develop a definitive business plan and possibility to use a financial contribution.

### **Weaknesses:**

- Activity developed only for North-East of Italy;
- Lack of multi language availability on the official site “www.technoseed.it” /at least English is mandatory/;
- Despite the current public funding (in the framework of the project) the challenge is to obtain of new funding, both public and private. Is it certainly feasible? What about the additional funding coming from FRIULIA spa and Mediocredito FVG?
- The expansion of the incubated enterprises sectors, into hi-tech fields. Which are these fields into the major area of ICT? The same as now (software design and development for business or research applications, application software in the field of mobile device, environmental technologies, safety, informative architecture services to enterprises, e-learning instruments and measurement instruments)? Are they really innovative?

### **Opportunities:**

- Intensify the local industry. Innovative approaches leading to a successful businesses;
- New market that you can enter with technology that shall speed-up idea realization;
- Strengthen technological transfer between the researchers and economic sector;
- It is mentioned the partnership with the ACHIEVE network which assembles about 20 European incubators specialized in ICT. This network is funded by the European Community and is coordinated by the Cambridge University.

### **Threats:**

- There are more attractive proposals from other regions or countries.
- Uncertain competitively and advancing of created companies.
- There is a possibility of lack of financial resources.

### **3. UOM - Finland's Strategic Centers for Science, Technology and Innovation Example: TIVIT - Producing Innovations for the ICT Industry**

TIVIT is abbreviation of the Finnish title “Information and communication industry and services” of one of the Finnish Strategic Centers for Science, Technology and Innovation. The Center is founded in February 2008 as a non-profit organization with the main goal to unify the efforts of 16 Universities, 5 Research Centers and 25 companies and public organizations (including Ericsson, Nokia and the Finnish Information Society). It aims to implement innovation policy in the ICT industry, to foster research and to ensure that the research results are used in the business more rapidly than it has been possible. International cooperation plays a key role in the center's activities. The companies and the institutions involved in the projects can enlarge and enrich their know-how, which in the same time can be transferred into new projects, to be copied and used in new market sectors. Each presented project must comply with 5 criteria, including: Prove of novelty and strategic impact of the research; Balance between industry and research at program level; International collaboration and impact.

The annual investments in the Center are around €40-60 million. Currently, six programs are underway: Future Internet, Flexible Services (electronic services in which the needs of local production are emphasized), Devices and Interoperability Ecosystems (new reality and networking intelligent devices and spaces), Cooperative Traffic (road traffic and traveling for the next generation), Cloud Software (Internet services and information security) and Next Media. Business concepts must be also created for increasing the pace of development of both products and services, to prepare the market for their arrival, as well as to receive feedback from the market. The research as a whole aims to meet the needs of Finnish industry and society within a five-to-ten-year period. The decisions in the Center are taken by a board composed of 12 members and 12 deputy members, all coming from industry.

[www.tivit.fi](http://www.tivit.fi)

#### **SWOT ANALYSIS**

##### **Strengths:**

- Information and communication industry and services (Tivit) is one of the Finnish Strategic Centers for Science, Technology and Innovation (SHOKs), seeking to implement innovation policy in information and communication industry, combine and systematize research and at the same time ensure that the results are used in the business world more rapidly than has previously been possible;
- This Tivit is a promising paradigm (an innovative approach) of the productive “connection” of the areas of research, academia, and industry providing all necessary conditions to form ecosystems of partners within which new ideas can be created, cross-fertilised, developed, implemented and marketed;

- The range and nature of Tivit’s work is determined by the strategic research areas as outlined by the established 46 companies, universities and public organisations – of various sizes - which own Tivit;
- State institutions have identified very quickly emerging new high technologies, where some Scandinavian companies and research organizations were already leading;
- Regional joint ventures were formed, giving opportunity to the new-coming members to faster gain knowledge, and at the same time the leading companies and institutions to get more support in resources and in funding;
- Public and private funding.

#### **Weaknesses:**

- There isn’t information or examples for concrete projects realized by the Centre;
- Tivit is a rather new organization (since 2008) with limited experience;
- SRAs are just reviewed once per year.

#### **Opportunities:**

- According to Harvard Business Review, March 2009, at the present moment Finland is the second “hottest” hotbed of innovation. The aim of Tivit’s activity is to retain and advance this status for the future;
- Opportunity to broaden TIVIT to more than 6 research areas;
- Opportunity of being additionally funded by the EU in the future.

#### **Threats:**

- The six SRAs are only defined: it is not clear which results are obtained;
- No information about the results from the BPs;
- Threat of having too many different views due to 46 different voices und thus a loss of strategic line.

## 4. ISI – Syrinix

Syrinix Limited is a company established in 2004. Syrinix is a spin-out company from the University of East Anglia in Norwich. It is aware that the water leak detection and location facilitates the prevention of larger leaks and allows the water companies to intervene successfully to prevent the catastrophic failure of pipes and the subsequent loss of water and potential damage to surrounding infrastructure (buildings, roads, etc.). Therefore, the company Syrinix developed signal processing techniques and equipment to detect and locate very small leaks in large-trunk water mains. The detection stops bigger, more devastating leaks from springing up and helps water companies preventing massive loss of water and damages to roads and buildings surrounding the pipes. The company believes that the created algorithms are the most sophisticated and the most sensitive leak detection algorithms available. In the project, novel data acquisition tools were developed, which can capture and communicate high frequency hydraulic data from water mains. This enables optimal pump scheduling to be used in a low-risk manner leading to a reduction in energy consumption. Even small reductions in the use of water pumps represent significant carbon savings. The project provides an integrated solution which continuously monitors and analyses the dynamic hydraulic conditions in large diameter water transmission pipelines. The data will be used to classify and track the pressure changes in the pipes and produce a model for optimal pump scheduling, thus minimizing energy consumption. Using a state-of-the-art multi-sensor head attached to a tapping on the main, the developed system continuously monitors the section of pipes spanned by a pair of sensors. A stochastic modeling system spots new leaks and raises an alarm. The pipe can then be repaired before it fails catastrophically.

<http://syrinix.co.uk/>

### SWOT ANALYSIS

#### Strengths:

- Syrinix has the most advanced technology for water leak detection;
- Syrinix idea was awarded as the best business initiative of the year 2006;
- Products are successful transformation of academic research into industrial product and methodology;
- Core expert team composed of experienced engineers;
- Project and product are developed in tide cooperation with Imperial College;
- Syrinix solutions are applicable in wide variety of water distribution systems, from small to very large systems.

#### Weaknesses:

- The mounting on existing pipes is relatively difficult and costly;
- The products have not reached the market in industrial versions. For these reason it is difficult to assess the real commercial value of the products, market

range and overall contribution to more reliable and cost effective functioning of water distribution system;

- Non sufficient financial and production capacity of the company;
- Only trial version of the product is available – not yet tested on the market;
- The mounting on existing pipes is relatively difficult and costly.

### **Opportunities:**

- Syrinix technology enables very important savings of water distribution system. Up to 30% of water is nowadays lost due to water leakage;
- Diversification of Syrinix products to other liquid/gas distribution systems (e.g. sewage system, hot water distribution system, gas distribution system, etc.);
- Emerging markets of SEE Region;
- Low level of competition on markets of SEE Region.

### **Threats:**

- Big financing resources are needed for systems realization with both products;
- Application of Syrinix system in older water distribution systems can be questionable due to the bigger construction works needed;
- Recession leading to decrease on demands in emerging markets in SEE Region.

## **5. ISI – INNOPOLE Regional Innovation Pole of the Region of Western Greece**

The Regional Innovation Pole of Western Greece is a union of public and private sector key players in the Region of Western Greece aiming at the development, promotion and exploitation of innovation in the Region. The pole has succeeded in bringing together universities, technological institutions, research institutions, business support organizations, regional authorities and the entrepreneurial stakeholders of Western Greece in the effort to combine their capabilities and to facilitate the overall growth of the Region. The Regional Innovation Pole focuses on three axes that represent the areas of strategic importance of the Region of Western Greece: Technologies of Informatics and Communications, Safety and Technologies of Foods, Environmental Management and Protection. The tools utilized by the pole comprise 9 R&D consortia, 4 infrastructure development activities, 3 spin-off companies, 1 technological platform, 1 educational / training course, 6 horizontal activities for the development of tools and methods for the pole viability.

The Regional Innovation Pole of Western Greece was funded by the Greek Operational Program Competitiveness under priority axis 4 “Technological Innovation & Research” and measure 4.6 “Creation of Regional Innovation Poles”. The overall budget of the project amounted to 4, 39 M€ of which 25.6% was private sector participation while public expense came from the Greek state (50%) and from the European Union (50%). The project followed a public call procedure and was accepted on a competitive way.

<http://www.innopolewest.gr>

### **SWOT ANALYSIS**

#### **Strengths:**

- Both, public and private sector players are involved which exploits the maximum of potential;
- Triple-helix-approach: academia, government, and industry, as well as R&D, business support organizations, regional authorities and entrepreneurs;
- Good balance in the participation of various players in the pool, which gives a warranty for successful establishment of bonds between academia/research and the entrepreneurial world with a focus on the enhancement of the technological and innovation performance of the Region of Western Greece;
- Well-defined hierarchy at the project management.
- Strong presence of research units (2 Universities, of which the University of Patras participates through 10 different laboratories; 3 Research institutions, 2 Technological institutions);
- Sources of funding are clearly defined (The overall budget of the project amounted to 4,39 M€ of which 25.6% - private sector participation; public expense comes by 50% from the Greek state and by 50% by the European Union).

### **Weaknesses:**

- Not described current results of the pool activity;
- Are there any barriers to get into this circle of InnoPole as an outsider of InnoPole within the Region of Western Greece? –If yes, this might scare off newcomers;
- Are there any barriers to get into this circle of InnoPole as an outsider of InnoPole within the Region of Western Greece? –If yes, this might scare off newcomers.

### **Opportunities:**

- The project is in accordance with the EU strategy;
- Full exploitation of competencies within the area by building a strong network within the Region of Western Greece;
- The project has been regarded as the second most successful Regional Innovation Pole in Greece by the Ministry of Development (there are 5 of them in Greece);
- Opportunity to broaden the geographical reach to allow growth not only within the instant area of Western Greece.

### **Threats:**

- 75% of the financing of the project depends on government and EU funding;
- How was the crisis managed?
- The influence of political and economic instability isn't considered.

## **6. BICT - Sirma Young Spirit (SYS) -Early Stage Financing**

Sirma Young Spirit program is a natural continuation of the internal R&D activities of the Bulgarian company Sirma Group. It is designed to help young entrepreneurs developing their business models in the field of Information Technologies (IT) and providing them with seed investments, which are the earliest stage in the chain of venture funding. The program is key part of Sirma's strategy to look for new business ideas and to seek, promote and develop innovations. The program encourages and supports innovative idea in the field of Information Technology if a team of 2 to 5 young entrepreneurs stands behind the idea and they are ready to work overtime and exclusively on the idea for the next 6 to 12 months without any side committed with full dedication. The main goal of the program is to help young entrepreneurs go through the first phase of development of their business models: develop an impressive prototype and business plan to attract further investment, develop an initial version of their product or try to reach the market. The implementation of each project within the program is based on the principles: strong project management and development team, strong preliminary analysis of the market to assess key product/service requirements, proper planning, adequate financing, on-time development, well prepared product/service launch, and on-going development.

<http://www.sirma.bg/sys>

### **SWOT ANALYSIS**

#### **Strengths:**

- Innovative financial mechanism;
- Could be implemented in every bigger company lacking innovation or having the need of some “fresh air” in its future development;
- The main objective of the SYS seed investment is to allow the entrepreneurs to focus and devote their efforts completely to project implementation thus bringing it to success; Along with the project technological development, the mentor and Sirma’s business teams will work with the entrepreneurs on business plan development;
- SYS will also assist entrepreneurs in meeting future investors and negotiate best terms for second round of investment; Entrepreneurs will have access to the international network of Sirma’s partners and distributors – thus facilitating meetings with strategic international partners for the developed business model;
- Sirma Group is the largest private Bulgarian group of IT companies (founded in 1992) and now includes 18 subsidiaries and associated companies operating in different areas of IT. During 17 years of successful growth the group has accumulated a substantial capital of unique technologies, goodwill, technical and business expertise;
- One of the few programs in Bulgaria that give an opportunity to people to develop work and promote to the market their ideas.

### **Weaknesses:**

- Missing list of successful examples;
- Lack of cooperation with universities and other research institutions;
- Lack of information about the patent rights of the sponsored ideas/products;
- It is mentioned that the R&D facilities depend on time-limited funding schemes, which last for 3 to 10 Years, depending on the individual funding program;
- Only within Bulgaria – would transnational Project / Co-operations be funded?
- The culture of the funding / mother organization has to be highly innovation-friendly and facilitating which is not always easy to provide. – How is this obtained?
- How is IP- rights managed? Does SIRMA require a certain share of return once the product or service is profitable at a certain point of its lifecycle? What about the contracting procedures? Is the topic of IP-rights regulated with patents or trademarks?

### **Opportunities:**

- Shall be promoted also outside Bulgaria. The SEE region for example will be a good start;
- Good opportunities due to the “Investment” of SYS in young active entrepreneurs in the field of Information Technologies (IT) and their initial support with the necessary seed fund;
- SYS helps a new company (established by young entrepreneurs) in a way that will allow it to make a successful future development;
- Probability to expand this Early Stage Financing to other fields.

### **Threats:**

- It is not 100% clear what happens with the legal entity that will be assembled between SIRMA and the people with ideas;
- The seed funding probably will be affected by the financial crisis;
- How is the newly built entity managed? Is it incorporated into SIRMA or a separate legal entity?

## **7. ISI - Intelesens Limited Sensor Technology & Devices (ST&D)**

Intelesens is a leading innovator in targeted non-invasive vital signs monitoring in UK. It develops and manufactures own products and also designs products for OEMs. The company competitive advantages are due to its non-invasive wireless medical devices combined with medical sensors and electrodes, which involves in-depth expertise including wireless telemetry, low power consumption electronics, embedded software, cardiology, body sensors and low level signal processing, screen printing solid gel electrode manufacture, science of the skin including long-term non-irritant materials, defibrillation techniques and recovery as well as medical systems approval. The company's non-invasive wireless medical devices combined with medical sensors and electrodes are ultra miniature intelligent sensors which are worn on the chest and can monitor a range of vital signs including ECG, heart rate, respiration, temperature and motion – all with hugely reduced motion artefact. Super efficient, customized patch electrodes, on-board intelligence and efficient electronics and telemetry greatly extend battery life as only the clinically significant data needs to be transmitted. The company is shipping the world's first intelligent system that monitors ECG arrhythmia event, temperature and respiration rate continuously. It is shipping an in-home foetal monitoring patch that could help expectant mothers predict the onset of their own labour as well the OEM products for monitoring of other human vital signs such as blood pressure and the physiological measurement of muscular or vascular activity.

<http://intelesens.com/>

### **SWOT ANALYSIS**

#### **Strengths:**

- Intelesens is an internationally recognized provider of high performance electrodes including a range of cost reducing defibrillation pads;
- Intelesens was incorporated in August 2000 (with Enterprise Equity leading an investment of £1.7m into the company in May 2005) by 3 of the province's leading scientists as a University of Ulster spin-out company, thereby ensuring the continued identification and design of world beating new products;
- Intelesens has established strong partnerships with a number of key – player companies in the field of medical technology such as Welch Allyn, EquipMed, Intel Digital Health and others;
- Firm's audited and accredited Quality Management System;
- Powerful research team;
- Firm's technology and design are to be found in the products of different world's leading medical devices manufactures;
- 20 years experience of the research team.

### **Weaknesses:**

- Lack of comparison with similar products;
- Unknown prices of products;
- Unknown competitiveness of products;
- The project key concepts aren't defined. Instead the firm's activities are described;
- Instead sustainability a journal citation for firm's activities is given;
- CE marking is a mandatory European approval for medical devices to indicate conformity with the essential requirements set out in European Directives. This milestone opens up extensive new markets in Europe and South-East Asia;
- Medical systems approval – FDA and CE.

### **Opportunities:**

- Development of general purpose wireless monitor for five vital signs in a single unit;
- Developing of more efficient monitored healthcare in hospitals and home settings;
- The potential users of such technologies are not forming a homogeneous group. They include young and healthy individuals, who are mainly interested in "lifestyle functionalities" in order to improve their individual quality of life;
- The three Founders of Intelesens are part of a knowledgeable R&D group with substantial expertise in the field of sensors and related technologies. They have an impressive record of publications, conference visits, guest speaking assignments and patents demonstrating world-class skills in Clinical Instrumentation, Thin Film Devices & Physiological Sensors.

### **Threats:**

- Global market uncertainty;
- Possible lack of financial found for future product's development;
- In this field the Intelesens Company is vulnerable to a negative publicity.

## 8. JSI - Cardio & Brain Signals - Signal conditioning system for physiological signals

The Cardio & Brain Signals – a Signal conditioning system for physiological signals was developed by joint effort of several research institutions under the 6<sup>th</sup> framework project BRACCIA. The development team was funded by the EU and Slovenian research and development agency with the main goal to design and develop a new system for data acquisition easy-to-use and operate. The system was successfully used for a number of measurements on humans and rats during anesthesia under the project BRACCIA and by other research institutions for their specific use more specifically the Faculty of Arts at the University of Ljubljana.

The Cardio & Brain Signals is a 12-channel signal conditioning and acquisition system, specially designed for the purpose of measuring and observation of the causality of interactions between the natural biophysical oscillations during general anesthesia. The device technical design is based upon high-end A/D conversion. The obtained digital signals are preprocessed by a soft-core processor and sent via USB to a standard PC equipped with custom software for additional data processing, monitoring and storage. The fact that the signals are preprocessed by an embedded system makes it very easy to use.

The device was designed to target hospitals and various research institutions as primary customers/users. With new publications in international journals from studies performed with the Cardio & Brain Signals, the device has proven to be useful in different areas than it was designed for, and it has been internationally recognized. Its hardware could be used in different scenarios by simply modifying the acquisition software running on standard PC. Additionally, the system is easy to use by personnel with different professional backgrounds, mostly medical staff. As the device was designed with simple housing with no buttons, the operator must only attach the sensors and connect the device to the PC with single USB cable and start the software to begin recording. Additionally, the device could be powered via mains power supply or in case of bad signal quality with battery.

The project received an important feedback from a large set of measurements performed at three research institutions during the project BRACCIA. The device and the accompanying software went through several iterations where the hardware and software were upgraded to improve performance and eliminate any possible errors. Besides that, several journal papers were published from data recorded with the Cardio & Brain Signals.

<http://dsc.ijs.si/en/>

### SWOT ANALYSIS

#### Strengths:

- The device implements high standards for medical safety;
- Flexible device. The hardware can be used in different scenarios by simply modifying the acquisition software running on standard PC;
- The device can operate in electrically polluted environments efficiently;

- New algorithms for the analysis of complex cardiovascular and neural signals were developed, which enable improvement the understanding of the process of anesthesia;
- The transnational research team ensured synergy of ideas;
- Private initiative followed the initial public funding of the project;
- Ideas from different professional backgrounds were include in the specifications of the device. Therefore, the area of interest was covered properly by different experts.

### **Weaknesses:**

- No list for potential customers;
- No plan for future financing of future production;
- Lack of comparison with similar devices;
- The operators experience difficulties when performing measurements. The main source of these difficulties is that the wires are in impractical in certain measurement setups;
- The device has not reached the market;
- There is no market experts involved directly in the project.

### **Opportunities:**

- The system shows wide prospects in terms of applicability due to the universal nature of the approach;
- The system can be combined with additional hardware to serve as a prototype to test new medical applications, which have the potential to improve the quality of service in medical institutions;
- The device can be used in different fields of medicine either as purely experimental device or as commercial device targeting specific needs;
- New medical products and systems could be developed on the base of created device.

### **Threats:**

- Insufficient financial founds for opportunities realization;
- It is not possible to perform the expected technological enhancements;
- Without considerable marketing and promotion efforts the results of the BP can never be transformed into a product.

## 9. ISI - CORALLIA Clusters Initiative

The Corallia Clusters Initiative is funded in the framework of the Greek Operational Program Competitiveness and the Regional Operational Programs 2007-2013 as a facilitator of innovation clusters. The initiative aims at development of innovation clusters in high technology sectors that present high potential for increasing their competitiveness, improving their position in the global market and adopting a model for the provision of high added-value services. The emphasis of the initiative is on the transformation of the Greek economy from a “low labor-cost economy” model to a “high added-value service” model focusing on knowledge economy. Corallia has already supported the development of a cluster in the sectors of nano/micro electronics and embedded systems with over 100 Greek innovation companies in these fields and about 40 academic labs and research institutions coming from industry, academic and research organisations all over Greece. The Corallia initiative is in line with the Greek policy for the promotion of clustering in knowledge-intensive and exports-oriented technology segments, where Greece has the capacity to build a sustainable innovation ecosystem and can attain a worldwide competitive advantage. During the first phase, on January 2007 was established a Microelectronics Innovation Centre in Marousi, Athens, Greece providing a reference point for all interested stakeholders involved in Nano/Microelectronics & Embedded Systems. At present, the project is at its second phase, whereas the following R&D projects have been implemented:

- action I - Support of 10 New and Very Small Innovative Enterprises,
- action II – 3 Collaborative Research and Development Projects,
- action III - State-of-the-art industrial research of 7 innovative enterprises with co-investment from private investors,
- action IV - Horizontal support of entrepreneurial development of 34 enterprises for actions like submission of patents, professional training, and participation in international fairs
- action V - for the support of mi-Cluster with 8 projects.

<http://www.corallia.org/en.html>

### SWOT ANALYSIS

#### Strengths:

- Emphasis in the transformation of Greek economy model to the “high added value service” model;
- The Corallia cluster is in the sector of nano/microelectronics and embedded systems with about 100 companies and about 40 academic laboratories;
- The realisation of ten projects to support new and very small innovative enterprises;
- The collaborative research performed by industry and academia;

- The participating companies have increased their revenues with 60%, the exports with 110% and the number of patents with 138% in the last 2 years;
- The project shows a proved example of trans-institutional cooperation in a certain sector creating a synergy of industry, academia and governmental institutions;
- The offered approach relies on wide range aggregated experience.

#### **Weaknesses:**

- There aren't prove that the increasing activities of participants are due to the Corallia;
- The next steps of the BP until 2013 aren't given;
- Regional variation and local agglomerations;
- Missing systematic comparison between more successful and less successful regions;
- Some important sections on their official site like (Research and Development Projects) are only in Greece.

#### **Opportunities:**

- Created a solid base for hi-tech development in region that will show results in years to come;
- Make a standard likewise - the key interventions, from public sector initiatives, private entrepreneurship or community-based civic entrepreneurs that have stimulated the growth of successful clusters;
- The clear possibilities for development of some promising areas of nano/microelectronics and embedded systems.

#### **Threats:**

- Insufficient funds for finishing the BP;
- Possible difficulties in the mass production of the developed products;
- Appropriate public policies are missing.

## **10. JSI - KIBERSik– Electricity Peak Shedding System for energy efficiency in industry**

The KIBERSik system is part of SmartGrid technology and enables consumers and producers of electrical energy to become inter-active with electricity networks. It uses the technology of targeting the power consumption in fifteen-minute intervals, which considerably reduces electricity bills in a not well balanced or adapted consumption. The system can be used in all types of industries, but also other types of companies, for example in metal industry, wood industry, textile industry, glazier industry, paper industry, rubber industry, metallurgic industry, food industry, etc. KIBERSik system is already available in Mitsubishi sellers grid in Europe and South Africa. The predicted savings in electrical energy expenses, apart from other effects of the system on production costs and quality, are in average at 13% peak demand reduction and 0.9 years pay-back period with highs in energy intensive industries at over 20% reduction, and the longest paybacks registered at 2.2 years. Companies can have different contracts on supply as well as on the measurement of peaks, and the KIBERSik system covers all the possibilities enabled by the tariff system. Based on the use of advanced methods of predicting energy consumption and scheduling, the peaks are reduced by load shedding - switching off or discharging loads, by scheduling of operations and by using own electric power generation sources. The KIBERSik system is composed of one or several industrial controllers to which measurements and loads are connected, and of one or several control computers. All computers are interconnected in a network. The system was evaluated on 5 locations – by representatives of paper, paperboard, foundry and process industry and a distributor of electrical energy.

[www.inea.si](http://www.inea.si)

### **SWOT ANALYSIS**

#### **Strengths:**

- Interesting topic/idea. The predicted savings in electrical energy expenses are in average at 13% peak demand reduction and 0.9 years pay-back period; with highs in energy intensive industries at over 20% reduction; and the longest paybacks registered at 2.2 years;
- The system is designed to meet demanding challenges of the future SmartGrid technologies;
- The systems can be used in all types of industries;
- The research team is structured from different research and industrial fields and environments. The working teams included PLC specialists, SCADA specialists, technologists for optimization, technologists for electrical grid model and predicted algorithms, specialists for IT, specialists for economic optimization, specialists for power plants, specialists for loads shedding and specialists for reliability;
- KIBERSik, at this early stage, is installed now on 4 locations in Slovenia, while the market is very broad worldwide;

- The system is a part of family, which was chosen on SET-plan conference in Madrid 2010 as one of the 20 best energetic solutions.

### **Weaknesses:**

- The idea to decrease of peak power consumption by load disconnection is not always applicable;
- The possibility of system's use in households isn't treated;
- It is still a research project co-funded by European structural funds and the Slovenian Ministry of Higher Education, Science and Technology. The system has not reached the market;
- Not a clear time schedule for the full commercialization of the proposed solution.

### **Opportunities:**

- The KIBERSik systems can be used in all types of industries but also in other types of companies, for example in metal industry, wood industry, textile industry, glazier industry, paper industry, rubber industry, metallurgic industry, food industry. Market locations can be found all over the world. KIBERSik system is already selling in Mitsubishi sellers grid in Europe and South Africa;
- That goal of EU to use energy only from renewable sources by the year 2050 is impossible without systems like developed one.

### **Threats:**

- It is possible to have a wrong loads disconnection;
- The integrated system development is still at early stage (research program), concerning market;
- It is possible market failure due to the strong antagonism.

## **11. RDF-RWG - Competence Brokering Linking SME Needs to Research Opportunities**

Research-based brokering is a sub-program of the program Mobilisation for R&D-related innovation (MOBI), organized by the Research Council of Norway. A host institution for a centre usually cooperates with one or more research institutions, organisations or enterprises in respect of the establishment, operation and funding of the centre and thus form a CoE consortium.

Norway has certain advantages that can be utilized to promote knowledge development at regional level. The subsidiary goals are the following: Increase the R&D activity of SME; Improve the reception capacities of SME; Strengthen the economic competitiveness of SME; Strengthen the knowledge of new technology adopted by the SME; Strengthen the links and communication between R&D institutes and SME Support technology transfer from universities and technical colleges; Increase the knowledge of the TT-process and the methodology. The main strategy of the project is the involvement of the competence mediators who work as innovation carriers between SMEs and Research Institutes within a framework, which takes advantage of a proactive approach to transferring innovation. A representative example is the particular BP which has been designed to convince SME that R&D is a better and more profitable way of doing innovation. The Project Management involved the hire of staff as competence brokers in different geographical areas with a good background on science and applied research.

<http://www.cmr.no/>

### **SWOT ANALYSIS**

#### **Strengths:**

- A national project with strong regional focus;
- Extremely wide project experience background - biotechnology, energy, environment, medicine, polar research, social sciences and large scale programs;
- Short decision times to assign funding;
- The initiative can exploit the experience coming from a similar former initiative (TEFT program) and the presence of valid instruments deriving from projects of the Research Council of Norway, over the last 12 years (in particular the Centers for Research-based Innovation and the Centers of Excellence);
- 24 contracts signed from 2005-2007 with a total funding of €250 million from government sources, €200 million from SMEs (in kind) and €200 million from SMEs (cash);
- SMEs & research institutions are proactively encouraged to work together (in R&D);
- It uses a transparent technological transfer (TT) process implementation, based on a series of so-called “success factors”.

### **Weaknesses:**

- Web site do not provide information regarding applied financial mechanism;
- After 3 years of operation, despite the thorough collection of relevant information, little or no common accessible feedback information is yet accessible as to assess the true impact and effect of it;
- BP seems unsuitable for encouraging innovation through large-scale projects between or even with large companies and corporations;
- No availability of feedback information useful to assess the true impact and effect of the Best Practice.

### **Opportunities:**

- Ideal for linking with different project partners working on multispectral project pattern;
- Further benefits (such as promotion and dissemination) may be achieved with the introduction of the network within joint EU-funded projects;
- In certain areas, like construction and building, there is a high economic activity and the presence of SMEs is very favorable.

### **Threats:**

- Possibilities to support extremely large variety of projects may lead to lack of competence in some cases;
- The focus is shifted to a narrower spectrum of industries or fields;
- The whole venture is potentially vulnerable to the brokers' capacity and on the available networking activities.

## 12. FNBU - EuroGPS SafeDrive

EuroGPS SafeDrive is a GPS-based vehicle speed monitoring alerting system with a state-of-the-art centralized POI management, automatic Web-based POI database distribution and update into the plug-and-play GPS devices. It was developed by ICOM Ltd., which is a leading Bulgarian technology provider specialized in the field of telematic, ITS, and LBS for the corporate and consumer markets.

By further enhancing its current products offerings, EuroGPS introduces the EuroGPS eVehicle - next-generation platform, consisting of modular and extensible hardware, firmware and software modules, which enable a flexible staged approach to the implementation of a full spectrum of vehicle-centered location-enhanced applications and location-based services both in the eCall core service – this is the initial service, which includes the following: platform (combined with B-call value-added services as Road user charging) that will support:

- integration of the existing product EuroGPS TollCollect within the EuroGPS Fleet management, Asset management, and Driver Management eVehicle platform;
- integration of the existing product line EuroGPS Stolen vehicle recovery SmartTracker within the EuroGPS eVehicle platform;
- integration of the existing product line EuroGPS Fuel-consumption SmartTracker within the EuroGPS eVehicle platform;
- monitoring the integration of the existing product line EuroGPS PAYD rental, leasing, and SmartTracker within the EuroGPS eVehicle platform;
- insurance through the integration of the existing product line Speed camera EuroGPS SmartTracker within the EuroGPS eVehicle platform;
- tracking - through the integration of the existing product EuroGPS SafeDrive Digital Tachograf, Eco routing, Remote within the EuroGPS eVehicle platform;
- diagnostics and maintenance
- Driver Profiling
- Active car safety;
- Roadside Location-based marketing and assistance,
- Local search and recovery,
- Parking search / booking

<http://www.safe-drive.eu>

<http://www.eurogps.eu>

## **SWOT ANALYSIS**

### **Strengths:**

- Lengthy experience (8 years) in terms of collaboration in the framework of a team working on the development of the product;
- Broad range of know-how which guarantees the development of a complex product like a GPS-based vehicle speed monitoring and alerting system;
- The project was founded by private (50%) and public (50%) bodies;
- Leading Bulgarian technology provider and biggest Bulgarian manufacturer of GPS-based devices;
- Company has established strong business partnerships worldwide;
- Easy to customize the system for any other market;
- Resulting end product is designed to operate anywhere in the world (no geographical limitations).

### **Weaknesses:**

- No plan for penetration to larger markets including GIS systems as proposed;
- Legal impediments of using some functionalities in different countries (POI's for radar control);
- Limited marketing capacity;
- Not sufficiently developed distribution network.

### **Opportunities:**

- Technology advancement can be achieved by expanding system capabilities and by including system integration with larger GIS;
- Market enhancement by incorporating more countries and wider functionalities on the device;
- As this device is low-cost and easy to use it has an opportunity to take a big part of a share in the market;
- Accelerated growth predicted for the location-based services.

### **Threats:**

- No plan for implementing partnerships through vital contracts;
- In the market there are many similar products offered by global companies;
- Major ratio of the market in SEE Region is under control of public sector leading to complicated purchase procedures.

## 13. ECOPLUS - Mobile Asset Management Platform

The system called Geospatial Inventory of Telekom Austria represents a complete, efficient and extensive mapping of all electrical installations (infrastructure like network, real estate, customer, etc.) in an IT system with spatial correlation. The information for installations is provided in a standardized form and can be retrieved via a desktop or web application. In some circumstances it is necessary to retrieve this information via a mobile phone, smart phone or a PDA, which refers especially for outdoor staff like maintenance technician or customer service. The challenge of this project is to gather and provide information out of the GSPI system via well-defined web services and web applications to a mobile device. In the project a prototype was developed to make use of the Network Information System assisted mobile support fault management in telecommunications. In order to use the application, the field staff agent will navigate with the web browser of the mobile device to a specific URL. Then, he authenticates with username, password and security token and goes to a very simple constructed website, where he can retrieve pending failures and navigate to the switchboard or use the search box to look for a specific switchboard. The search function also allows the use of wildcards. The results provide a preliminary overview of the found control points and their most important attributes. By clicking on the link, the full details of switching points are displayed. The new platform not only relieves the indoor services, but it also would improve the overall service, e.g. faster processing, higher quality of service, etc.

[www.fotec.at](http://www.fotec.at)

### SWOT ANALYSIS

#### Strengths:

- Innovative idea for implementing efficiently a Geospatial Inventory system on a mobile device;
- Ability to monitor key physical components for every network operator.
- Creation of added value through combination of local services and flexibility of action in the field;
- The resulting device can be easily used to any geographical region due to its generic concept of operation;
- The system joins the technical and financial domain;
- The platform can be integrated with modern technologies like WCF - Windows Communication Foundation and ASP.Net.

#### Weaknesses:

- Lack of comparison with similar products;
- Lack of information about the system pricing;

- It is not clear what protocol is used for communication between the management systems and the managed devices;
- The procedures for quality control, validation and verification are not described. The report mentions a tool (ch. 6.2) but does not describe the criteria taken into account;
- The estimation of the potential benefits is not mentioned;
- Continuity is only outlined in general terms;
- There is a lack of mechanism that will guarantee the presence of the device in the market (lacks clear definition of the intended body of users);
- No business plan for entering the market;
- The time schedule of the system development is not presented;
- Functionality of this platform is not proved in practice (functional model exists, but prototype is under evaluation).

### **Opportunities:**

- The extension of the system to other countries is possible due to the used technologies;
- All new mobile communication devices can be integrated in the proposed system (platform);
- Suitable partnerships may offer a good opportunity for a solid marketable product;
- Geospatial technologies combined with incident management can be a powerful springboard to accommodate more applications.

### **Threats:**

- Lack of a strategy for widening the system market;
- Lack of solid guarantee for advancement due to the lack of specific qualifications of the development team;
- During the platform construction, until it becomes marketable, new communication technologies appear. The platform should be adaptable to the new technologies.

## 14. UOK – MikroElektronika

The MikroElektronika firm is one of the leaders on the market in Serbia for development boards for 8, 16 and 32 bits microcontrollers, compilers, peripherals as ADC, DAC, interfaces RS485, CAN et Ethernet, for displays (LCD, GLCD, TFT, IrDA, LIN, Zigbee) as well for MP3, motion sensors, digital potentiometers, radio identification, drivers for stepper motor. The firm's programmers create firmware for microcontrollers in C, Pascal and BASIC as well as in Delphi and C++ for Windows operational system. The company has distributors in over 38 countries over the world – Europe, India, Brazil, Russia, Middle East. Additionally, the firm has published several articles in some of the most popular electronic magazines in several languages, which are available free for download.

One of the recent projects of the company focused on releasing new line of compact, mobile, light and easy to connect multimedia board for PIC microcontrollers with incorporated TFT display with touch screen, audio codec and storage peripherals. The firm's production facilities are equipped with true hole and surface mounting device assembly technology. Around 98% of the parts are exported in more than 25 countries. The firm sells around 300 products annually and has annual income of approximately 2 million Euros.

<http://www.mikroe.com>

### SWOT ANALYSIS

#### Strengths:

- The company offers a wide range of development tools, compilers and books for a range of microcontroller families (PIC, dsPIC, AVR, 8051, ARM, PSoC). The company is equipped with true hole and SMD assembly technology equipment.
- The company also produces a wide range of peripherals;
- High quality SMD components are used, along on 4-layer PCB which guarantees low noise and low induction from external sources;
- The production is exported in a lot of countries. Export oriented company (98% of monthly production);
- Efficient management structure in the company;
- Partnership with well-known companies such as Microchip, Atmel, Cypress and NXP is very important factor in extension of the existing market and will guarantee long-lasting sustainability and financial stability of MikroElektronika company;
- Financial mechanism applied in transformation of research into innovation is private funding.

### **Weaknesses:**

- The relation between the project coordinator University of Kragujevac and the company;
- MikroElektronika is not clear;
- Development tool market is limited – not a consumer market;
- Only Nebojša Matić invested the private capital in the MikroElektronika company.

### **Opportunities:**

- Future development and production of modern and useful products is awaited;
- Strategic partnership with leading companies in the field such as Microchip, Cypress Semiconductors, Sony;
- Low age of the team makes it possible to stay in touch with recent technological advancements;
- Vast majority of customers are from USA and Europe, followed by India, Brazil, Russia, Middle East and the rest of the world (over 38 countries). Products are low-cost and are therefore meant for users from all economic categories.

### **Threats:**

- The hard competition over the world could be dangerous for the company;
- Market evolution from the PC market to the smart phone market may also influence the market that the company is active;
- Unpredictable evolution on electronically components price after unpredictable disasters.

## **15. RDF-RWG - PFAU-Program for the financial support of start-ups from Universities in North Rhine-Westphalia (NRW)**

In the modernisation of any economy small and medium-sized technology-based and know-how-based enterprises have particular importance. The promotion of start-up activities from universities and R&D institutes is an instrument that speeds up technology transfer from the scientific to the business community. The main promotion goal is to develop innovative products, processes and service ideas into a marketable product or service by using existing state-of-the-art facilities at the universities and R&D centers (laboratories, equipment, and ICT infrastructure). The PFAU-Program for the financial support of start-ups from Universities in North Rhine-Westphalia targets graduates from universities and researchers whose last university degree (diploma or PhD) was completed at the latest three years prior to application. With a population of 18.1 million inhabitants and a labor market of 8.3 million employees, the North-Rhine Westphalia enjoys an excellent R&D infrastructure consisting of 63 technology parks and centers, 59 universities and technical colleges, 55 research institutes and 31 technology transfer agencies. However, the problem there is that a very small number of innovative firms are launched every year and less than 0.5% of all university graduates set-up a business on their own.

Subsequently, the promotional measures are expected to motivate graduates (up to three years after graduation or PhD) to consider starting a business on their own as a serious option (besides academic career or working in a firm). These measures, together with the great achievements of new technology and university research, triggered the state interest to invest in coupling scientific knowledge from university research with marketable products. This will help to develop innovative ideas into full valued products and processes by using state-of-the-art infrastructure and facilities at the universities and R&D centers. Other goals are related to the promotion of R&D by turning innovative ideas into marketable products, processes or services.

<http://www.zenit.de>

### **SWOT ANALYSIS**

#### **Strengths:**

- Innovative financial mechanism;
- Promote transformation from idea/research to product/business;
- Induce new healthy start-ups companies into North Rhine-Westphalia economy;
- Amazing social result. For a period of ten years the program created 1500 new work places and among them 750 for people with university degree;
- Ready for use state of the art equipment (universities technical base);
- Long term established Level of trust among enterprises;
- Established synergy between Academics and Business.

### **Weaknesses:**

- Lack of day to day control mechanism;
- Despite all the efforts the program was not promoted enough and did not have as wide spread as initially planned;
- Less or no information on the project in the leading institution website;
- Missing public available dissemination and results exploitation.

### **Opportunities:**

- Program transferability is just amazing it could be transferred to the whole SEE region;
- Smooth transition of aggregated knowledge into successful business (start-ups and newly established SMEs);
- Increase the number of competitive sustainable jobs and the overall competitiveness of the industry;
- Launching suitable development programs in accordance with market needs.

### **Threats:**

- Some Professors consider their academic activities as a primary goal and they do not promote their students to make startup companies;
- There is possible to human capital deficit;
- There is hard to predict model of timely availability of human and technical resources.

## **16. OEAW - Foundation of Spin-Off Company from Research Group at University**

Key success factors of this good practice are the way of preserving the relationship between the company and the university to jointly pursue the research and product lines, the stable financing with own capital and the mutual benefits for both parties. The Spin-Off Company was founded by a Research Group at Vienna University of Technology in a niche-market for design and development of embedded systems for industrial electronics and similar conservative markets, and focused also on the transformation of research results into end-products. The research group has been active in digital as well as analog FPGA (Field Programmable Gate Array) design, PCB (Printed Circuit Board) design, and embedded software development. Very important for the foundation of the company was the broad orientation of the research group in terms of application areas and the holistic system design.

Since the founders of the spin-off company had a very restrictive investment policy only based on own funds (see section 8), external initiatives influenced the contextual environment of this best practice rather marginally. Nevertheless, in the described case this shift of personnel did not weaken the research activities at the university on topics relevant for both parties, and thus, did not burden the relationship between the company and the university, due to the size of the research group and they continued the cooperation after the spin-off creation. An important characteristic of almost a decade long success is the continuation and open communication within the partnership between the university and the company that allows talking freely about common goals, but also to discuss and accept the inherently different goals of the two partners. Industrial research centers are used if very specific knowledge is required.

<http://www.oregano.at/ger/index.html>

### **SWOT ANALYSIS**

#### **Strengths:**

- An example how a good university team could transform to a successful business unit;
- Own funding provide company independence;
- The university background – more than 10 years experience (served as a door opener, which is an important factor for a spin-off initial establishment) and a highly successful research team that formed the incubator for the company heads and key staff that moved from the research team to the company;
- Customers are brought from the non-profit to the profit organization with professional support; bond to the university to some extent guarantees quality and continued service;
- It covers the niche-market for design and development of embedded systems for industrial electronics and similar markets;

- Mid-term projects with industrial partners gained the company financial stability and stable earnings and parallel to those along research cooperation with the university has been conducted to push technical development of core competencies.

### **Weaknesses:**

- However the conservative investment policy and initial lack of spin-of funding programs in Austria resulted in relatively small growth;
- Partnership with the university might be considered as advantage but has also a negative effect since the company still depends from it;
- A small player in the market;
- An inefficient marketing strategy led to a rather stagnant development on IP-Core;
- The access to a market that allows long term customer relations and development is an important pre-requisite for the success;
- The good practice may not be possible throughout SEE. Universities may be interested to do the projects themselves, additional funding is not available, there are no proper ecosystems for the development of such spin-offs.

### **Opportunities:**

- If more capital is invested the company may have much wider success. Since it looks like that the knowledge is not a problem it may induce itself in other business areas related to embedded systems and industrial informatics;
- The market potential of the technology is rated high;
- To go for large size contracts, the spin-offs can rely on collaboration with the university;
- The targeted niche market exists in many countries of the SEE area and still shows high potential in the future.

### **Threats:**

- The marketing plans and decisions for the future are poor;
- Small spin-offs are fragile, dependent on their major customers;
- Spin-offs benefit from the state support which may not be stable.

## 17. UOM - NORDITE Program

NORDITE program for funding of research in the area of embedded systems is issued on behalf of VINNOVA Sweden, the Research Council of Norway and Tekes, Finland. The program aims to promote increased co-operative research in the fields of technology development for shortwave radio, wireless sensors, short range wireless networks and RFID or MEMS utilizing RF technology and to assist Swedish, Norwegian and Finnish research institutes and companies to further develop and demonstrate their technical expertise in that area. The program was running from 2005 to 2010. It addressed industry, research institutions and universities and was implemented in a form of two calls for proposals for funding of joint projects of industrial and academic partners from at least two, preferably three countries. All results from the research projects were made publicly available on open project web sites. In the first part of the NORDITE program, out of 23 proposals six projects were funded: Wireless sensor and actuator networks for measurement and control, RFID project, Wireless Interference-limited High-throughput Access Technologies and Applications, RF MEMS Steerable Antennas for Automotive Radar and Future Wireless Applications, Cross-Layer Optimization in Short-Range Wireless Sensor Networks and Printed RFID project. In the second part (NORDITE2), some projects have been prolonged and some new added.

[www.tekes.fi](http://www.tekes.fi)

[www.vinnova.se](http://www.vinnova.se)

[www.forskningsradet.no](http://www.forskningsradet.no)

### SWOT ANALYSIS

#### Strengths:

- Ensure robust progress and research development;
- The projects was presented and discussed on reputable forums;
- Innovation and technology development in high-demand areas like wireless sensors and short range wireless networks strengthens economic development opportunities;
- Participation of Scandinavian industry in the R&D process will expose commercial value of novel ideas in the field of wireless networking and sensor technology;
- The long duration (5 years) of the project guarantees safe penetration of innovation in Scandinavian industry and strong partnerships with research institutions;
- The presence of leading research institutions and national funding organizations;
- The program is addressed to industry, research institutions and universities;
- The program consolidates technological and economic development of Scandinavian countries.

### **Weaknesses:**

- In the paper there are any concrete results of the program;
- There is a lack of business plan for the transfer of novel ideas from research institutions into the electronics industry;
- How was consensus reached between two participating independent companies (competitive thoughts, competitive advantage would be lost if 2 companies launch the same innovation) joining the project? Was there some extra bonus behind there?

### **Opportunities:**

- Competitive advantage over other European countries through this program;
- The focus to state-of-the art technologies like short-range wireless networks and wireless sensors can create a considerable thrust to productive university-industry collaborations;
- Yearly conferences can be used as a vehicle to elaborate on successful partnerships between industry and academia.

### **Threats:**

- There is not much information about the experience gained from the program;
- There is no strategic planning for creating high technology clusters with the aim for market penetration;
- Critical mass in terms of partners and resources should be guaranteed, otherwise many fruitful ideas can fail to reach the markets.

## **18. UOK - Virtual Manufacturing Support for Enterprises in Serbia**

Virtual Manufacturing Support for Enterprises in Serbia was implemented within EDEP program “Support to Enterprise Development and Entrepreneurship Program” with realization period from December 2006 to September 2007.

Partners in the realization of this project were:

- Mechanical Engineering Faculty, University of Kragujevac, Project Leader, one of the most distinguished and the most prestigious educational institutions in the field of technical sciences, modern scientific-educational institution
- Faculty of Technical Science – University of Novi Sad – Novi Sad (FTN) , with experience in a number of international projects such as: TEMPUS, FP6, Bilateral projects etc.
- Regional Economic Development Agency for Sumadija and Pomoravlje Ltd, Kragujevac (REDASP), with intensive experience in developing and providing supporting services to SME sector in the region.

Overall project objectives were:

- To contribute to Serbian enterprises efficiency, quality, and technology potential and overall competitiveness, both national and international by: Stimulating establishment of permanent linkage of R&D institutions and enterprises; Introducing routine of financial participation and implementation of innovations.
- Significant reduction of time and costs in the development of new and improvement of existing products and technological processes in domestic companies by introducing innovative technologies.
- Virtual manufacturing system, which represents integrated computer-based model for product design and manufacture process simulation, as well as rapid manufacture of prototypes and reverse engineering, is applied.

[www.wbc-vmnet.rs](http://www.wbc-vmnet.rs)

[www.ctc.kg.ac.rs](http://www.ctc.kg.ac.rs)

### **SWOT ANALYSIS**

#### **Strengths:**

- Excellent background as a prerequisite for a successful outline of project road – map;
- Well-defined Project objectives, Project management and structure;
- Multipurpose results – introduce quality, timely and inexpensive development cycles as well as aggregation of knowledge and experience;

- The introduction of innovative technologies led to a significant reduction of time and costs in the development of new products;
- Introduce mechanism for cooperation between Academics and Industry;
- The Center for Virtual Manufacturing has received the wide acceptance of many large companies and SMEs from all over the Serbia;
- Marketing and commercialization of R&D results.

### **Weakness:**

- Lack of a clear description of the activities in the education project segment (fields of education, feedbacks from SMEs about their needs etc.);
- Low level of awareness for impact of the offered concept on economic growth and competitiveness among general public, policy-makers and many enterprises;
- The lack of effective linkages between knowledge institutions (HE and R&D) and industry;
- There is no systematic collection mechanism for indenting the training needs of small business;
- Environment “hostile” to innovation (e.g. weak innovation demand and support, low public R&D expenditure, low number of specialized staff etc.);
- Exclusively publicly funded.

### **Opportunities:**

- The project stimulate establishment of permanent linkage of R&D institutions and enterprises;
- Twenty enterprises in Central Serbia and Vojvodina (10 SME) used CeVIP services in innovative development of product and processes and optimization of existing ones, during the project implementation, were involved;
- Improving the level of services that support informativeness of SMEs;
- More stable political system in the last decade.

### **Threats:**

- Lack of local institutional support;
- Lack of Financial Resources;
- Hard to predict model of timely availability of human and technical resources.

## 19. ISI – UltraSOC

UltraSoc Technologies (UST) was founded in 2006 as a spin-out from the University of Kent and became a joint spin-out with the University of Essex to exploit the research carried out by Professor Klaus McDonald-Maier with Dr Andrew Hopkins and their team.

The development of the technology platform builds upon EPSRC (Engineering and Physical Sciences Research Council) funded research work undertaken by Dr McDonald-Maier and his group at the University of Kent as well as funding from the South East Proof of Concept Fund. UltraDebug™ is being designed to offer advanced source-level debugging with superior trace and trigger facilities. It is detailed operation and interactions at the most critical points in time and for extended profiling durations. Finally, the development of the technology platform to a licensable product is assisted by an investment of £2million provided by Octopus Ventures. Afterwards, the company tried to make its business plan and technology known to the market by participating into various competitions which resulted in attracting private investors. Though still in early development, the first industrial Multiprocessor SOCs have been already used in embedded systems for advanced entertainment and communication platforms and can be found in a set of devices, such as cell phones or portable multimedia players. The company claims that when completing UltraDebug will provide superior, application-level, debugging facilities, enabling the embedded systems industry to create more advanced and reliable products in markets such as automotive and consumer devices. The company tried to publicize its technology and business plan by participating into several competitions. This attracted private investors and finally, UST raised £400,000 of equity investment from the South East Seed Fund, managed by Finance South East, and the Icení Seedcorn Fund.

<http://ultrasoc.com>

### SWOT ANALYSIS

#### Strengths:

- High flexibility of the product;
- Product classified as a cutting edge technology;
- Product has large universal applicability;
- Well-defined and structured business plan in terms of funding and innovation promotion;
- Stable business and university interaction in the process of innovation;
- The funding mechanism is much diversified. The project was initially funded by a public body and, after that, has gained various funds deriving from prizes and awards of the competitions in which it took part and that allowed to attract private investors. In this way the company managed successfully to shift its funding source from government to private sector;
- 3 large investors.

### **Weaknesses:**

- Limited Internalization capacities;
- No information provided for the system integration with another tools for embedded systems design;
- Company still seems more oriented to development of the product and cooperation with University experts then to the market;
- Insufficient information provided by the web site.

### **Opportunities:**

- The absence of efficient alternative solutions in the area of debugging multicore SoCs, let the expectations remain high;
- Emerging markets of SEE Region;
- Increasing level of automation and implementation of embedded systems in economies of SEE.

### **Threats:**

- Semiconductor vendors are conservative;
- The project must keep in step with the SoC developments;
- Final buyers are oriented to established producers offering complete solution.

## **20.FNBU - IMS-BAS embedded systems**

This best practice presents Innovative technology solutions for the formation of high-quality castings using the methods of casting and low pressure casting of gas pressure in the IMS at the Bulgarian Academy of Sciences (BAS).

The complex approach for producing castings of high-quality covers: prediction of the product quality and process parameters by modeling; alloy and melt quality control; smooth filling of the mold cavity; fast cooling for achieving fine grain structure; controllable directional crystallization; elimination of non-metal inclusions and porosity; control of the whole process, reproducibility of process parameters and product quality.

The structure of the project includes:

- Engineering team;
- Management department;
- Quality control department;
- Marketing department;
- Implementation department,
- Team for CAD-CAM Design, for simulation of the process of casting formation and for the optimization of the process of casting formation and casting quality.

The research activity, in particular, comprises studies of the crystallization processes, structures and properties of new metal and non-metal materials, counter-pressure casting of ferrous and non-ferrous metals and alloys included, plastic working and welding processes, physics, physical chemistry and heat treatment of new alloys, amorphous and microcrystalline metals and alloys, ecological technologies, machines and equipment for the production of the new materials and products thereof.

[www.ims.bas.bg](http://www.ims.bas.bg)

### **SWOT ANALYSIS**

#### **Strengths:**

- An innovative industrial process is presented build on top of engineering inventions from the Bulgarian Academy of Sciences;
- The BP is a result of evolution for a long period of time that guarantees its testing and evaluation;
- The BP is already of wide use;
- Reduction of metal and energetic consumption, in accordance with the environmental standards;
- Prediction of the product quality and process parameters by modeling;
- More reliable production and achievement of small waste of the end production;

- Innovation of an already widely diffused technology, in fact the gas counter-pressure casting method is used in more than 25 countries where there are more than 660 machines working.

### **Weaknesses:**

- The BP presentation has to be seriously improved: list of clients announced but not shown, some text is still in Bulgarian, photos of certificates and awards have to be removed, the whole project team not only the main partner should be presented in chapter 7;
- IMS-BAS has the distribution rights of MAGMASoft for Bulgaria. It is not clear if there are any IP rights associated with the BP methodology and services;
- No evaluation and feedback mechanisms have been foreseen;
- A marketing strategy has not been developed.

### **Opportunities:**

- The BP addresses different sectors of economy that provide a competitive advantage for Europe like aerospace and automobile industries;
- The system already proved to be a successful product being used in various applications in different countries;
- The current trend of the market provides good opportunities, since non-ferrous alloys are very required and are increasingly replacing ferrous alloys (steel and cast iron) in many applications (above all in the automotive sector);
- The potential industrial partners are many, in fact the producers of parts for automobiles (main potential partners) are very much diffused and, moreover, they are increasing the use of non ferrous metals (mainly aluminum).

### **Threats:**

- Economic crisis poses a threat to the methodology presented by the BP. Its applicability in specific sectors of economy relevant to manufacturing makes the overall methodology prone to the problems that the manufacturing sector experiences in times of turmoil;
- There is a strong dependence of the sector from the trend of the end markets. In fact if some of the outlet sectors of the non ferrous alloys (i.e. automotive, building, electronics) present quite good prospective, others (engineering, chemical) do not foresee great increments in their use of aluminum, copper, zinc etc.

## **21. ONPU – Innovation technological centre of St. Petersburg state electro technical institute, St. Petersburg, Russia**

The Technology Park of St. Petersburg State Electro Technical University "LETI" (TPEU) was established at 1991 with purpose to create favorable conditions for development, and activity of small firms, for acceleration of industrial development of scientific research and design works, inventions and discoveries made by scientists, teachers, postgraduates and students of LETI, and for creation of competitive technologies, products and services on a commercial basis.

The TPEU activities are concerned in the following areas.

- Involve in the process of creating and disseminating scientific and technological products of scientific staff.
- Creation of new jobs for the scientific and engineering personnel in the field of knowledge-intensive business – the number of employees is 360 persons.
- Transfer of technology from the university to the industrial sector.
- Raise the funds for the development of innovation.
- Promote of international scientific cooperation and technology transfer.
- Develop education and training of entrepreneurs in the field of economics, management and marketing.
- To form of territorial innovation system, focused on the effective use of scientific and technological potential of the region.

TPEU provides a range of services for the universities' research teams on the creation and promotion of competitive scientific and technological products. Between 2003 and 2010 four international projects are realized and one continues until 2012. At present the TPEU includes:

- 45 small firms working in the field of knowledge-intensive business and innovative business support, for example with small-scale production of x-ray radiographic equipment for industrial and medical diagnostics, of measuring systems and of magnetic resonance equipment for scientific research, monitoring technology, and biomedical applications.
- Scientific and Production Centre (SPC) which carries out functions of business incubator.
- Innovative Technology Centre (ITC).

The sustainability of the BP is provided by state financial support and a broad partnership with Russian foreign organizations. TPEU actively cooperates with companies and technology parks in England, Finland, Germany and China.

<http://www.eltech.ru/english/index.htm>

<http://www.eltech.ru>

## **SWOT ANALYSIS**

### **Strengths:**

- Presentation of a successful intermediary organization for the promotion of the liaison between academia and entrepreneurial world;
- A model engaging researchers in the development of new firms (spin-offs) and the exploitation of their research results is enforced;
- Good example for partnership between government, university and industry;
- One of the most successful Technology Parks in whole Russia and such as recognized in Region;
- Big experience in this field (exists more than 20 years);
- Established strong relationships with authorities and government, founders and foundations for support small innovative enterprises.

### **Weaknesses:**

- As an intermediary organization between academia and enterprises its success relies on the establishment of a strong liaison between the two worlds that might have quite different attitude towards research and innovation issues;
- Public money are involved and play the role of attracting potential researchers and university staff towards generating a common culture;
- Lack of serious system customers with long-term contracts;
- Low level of entrepreneur's culture in the University community.

### **Opportunities:**

- LETI has shown a strong resistance to times of change from a communist to a market economy which exhibits that it serves a mature need;
- Strong ties to University and strong support from public administrations present an opportunity for the development of innovative products and services out of research results;
- For the period from 2005, strong state police support. Innovations are a part of state development strategy in the Russia;
- Positive last years trend in the new law and taxes regulations for entrepreneurs (as SME's and individual entrepreneurs).

### **Threats:**

- Strong liaison with University inventions has a drawback when researchers leave the University for the free market or go abroad;
- There is a serious trend in last years of young professional immigration to another country for not only working, but for his projects realization.

## 22. ONPU - “Slalen” innovation centre

Innovative center SLALEN - is a public non-profit organization specializing in innovation management and technology transfer, IPR protection, evaluation and promotion of innovations, established in 2006 with the support of Co. Ltd Domstroy, Dnipropetrovs’k. The main aim of **IC SLALEN** – is to attract funding for innovative ideas, engineering and to take them to internal and external market. **IC SLALEN** uses in their work approach, based on supporting the chain “theorist – researcher-practitioner – researcher-engineer – technologist-production worker – marketing – seller” and at the same time luring in this process administration, press, bank and auxiliary manufacture. **IC SLALEN** combines perspective technologies and inventions with people, companies and banks which has money and are ready to invest in the development.

The main objectives of the IC SLALEN are:

- Promotion technologies in the market. International partners provide the ability to use the searching system via Internet to promote developments of Ukrainian scientists and inventors in the world market of innovative products;
- Search for an investor is one of the most important aspects. IC SLALEN joins advanced technology and inventions with the people and banks that have money and are ready to invest them into the development process;
- Creation of Ukrainian innovation portfolio;
- Uniting an inventor and investor;
- Developing mechanism for financing innovative projects and technology. Transfer into the industry;
- Popularization of innovations in Ukraine.

IC SLALEN co-operates with universities, academies, research institutes and inventors from all Ukraine in different fields of science and techniques.

[www.innocentr.com](http://www.innocentr.com)

### SWOT ANALYSIS

#### Strengths:

- The BP presents an innovation support framework that enables the generation of new enterprises out of private financing mechanisms while offering services to support this as well as other innovation relevant services such as intellectual property right management, IT services, and marketing services;
- IC SLALEN co-operates with universities, academies, research institutes and inventors from all Ukraine;
- Attraction of different types of private financing like business angels, investor funds, and venture capitalists;

- Support of spin off companies throughout their development life cycle;
- IC SLALLEN establishes effective conduction of all functions in the chain “theorist – researcher-practitioner – researcher-engineer – technologist-production worker – marketing – seller - consumer”, in terms of small budgets which is typical factor for Ukraine;
- Well-defined target groups: investors, incubators, licensees, technology partners;
- Flexible management, which works on the basis of outsourcing, using external experts.

### **Weaknesses:**

- Lack of state support;
- Lack of appropriate resources, human and infrastructure, that are needed for its scope of activities;
- Dependence of external experts for different issues;
- Current results are not described;
- Strong orientation to external conditions for SLALLEN business model (taxes optimization for employee – if registered as ‘entrepreneur’, tax level can be minimal, no need FTE’s on the regular base). Less this conditions from national tax policies can be destroy financial model of SLALLEN Company.

### **Opportunities:**

- IC SLALLEN was established in accordance with the innovation policy of Ukraine;
- IC SLALLEN is one of the first privet innovation centers in Ukraine;
- Offers services that are needed in the Ukrainian market and for which competition is limited;
- Is in line with national policies against intellectual property right piracy.

### **Threats:**

- Lack of serious investment on innovation by large firms.
- There are permanent changes in legislation concerning investments in Ukraine.
- New propositions on the market from the new consulting and TT-companies.

## **23. UOK - Vlatacom Document Reader–Handheld**

A handheld, battery operated, rugged zed device was developed by Vlatacom and offered to the market for verification of travel and personal documents, reading of biometric data and identification of persons holding these documents. The device includes the specialized optical scanner for e-Passport full page scanning with white, infrared and ultraviolet illumination, suitable for integration in such handheld device. It is the first on the market and is a great innovation in the field of biometric verification devices. The main use of the device is in public safety sector, mainly for border control management in buses, trains, at airports, and similar environment valid worldwide. The device will be very useful considering the increasing mobility of people and the present lifestyle. Similar existing devices on the market do not satisfy the needs of end-users, in terms of functionality and performance. In most cases, the equipment for the border control including the handheld document readers is procured within the public tender procedures. The government authorities responsible for border control, immigration control, and similar, are usually entitled for procurement of these equipments. The project was started and has been run with company's own resources and finances. The intellectual property rights related with the innovations were officially protected through the national and international registrations.

<http://vlatacom.com/>

### **SWOT ANALYSIS**

#### **Strengths:**

- The product has unique characteristics among similar devices;
- First reader of this type scanning with unique white, infrared and ultraviolet illumination;
- New optical scanning technology;
- The system can be used in many domains;
- The company is a turn-key solution provider in the field;
- Well planned and structured project implementation;
- The project has been run in line with international standards.

#### **Weaknesses:**

- No device's characteristics: only declaration that functionalities and performance not seen on the market;
- No details on which biomedical data are registered;
- No information if the mentioned possibility of person's data reading is realized;
- The BP describes the development of a product that was based exclusively on the company's economical resources. This policy cannot be adopted easily;
- The promotion activities of the new system are not presented (mentioned);

- The designers do not take into account the integration of different software technologies.

### **Opportunities:**

- The extension (use) of the system to other countries is possible;
- The product would expand the company's target market;
- The results of the project can be easily reused for other similar projects;
- Growing interest for these solutions.

### **Threats:**

- Possible contradictions with legislations in different countries;
- The platform should be adaptable to the new technologies;
- The removal of certain initial requirements in order to meet the defined time-schedule may affect the quality of the final product.

## **24. BICT - Inland AIS System Implementation**

The implementation of the AIS network on the Croatian section of the rivers Danube and Drava started in March 2006 and ended in March 2008. It was carried out by CRUP Ltd. and was 90% co-funded by the European Union in the frame of INTERREG IIIA Slovenia-Hungary-Croatia Neighborhood Program and other 10% was ensured by local funding.

Through the use of innovative IT that contribute to faster, efficient and more reliable information flow between relevant authorities (Customs, Border Police, Water Police and Calamity abatement services), as well as private companies working in inland navigation sector (ports, freight forwarders, fleet operators, etc. ), the AIS network implementation contributed to the improvement of the cross-border transport networks. In particular, it ensured simplifying cross-border procedures, increase of navigation safety, much faster reactions in calamity cases, better integration of inland navigation into modern transport networks, availability of ship, crew and cargo information, thus leading to increased use of IT systems, sustainable transport development, modal shift of cargo from road to inland waterways and protection of the environment.

Target groups of the project were public authorities dealing with the inland waterway transport, navigation safety and environmental protection, as well as the private sector involved in inland navigation such as ports, freight forwarders, fleet operators etc. The main objectives of the implementation of inland AIS network were improvement of cross-border mobility and accessibility in the border region on the Danube and Drava rivers waterways and the development of accessible information and communication technology that will have a future use in the social and economic life of the defined area.

[www.crup.hr](http://www.crup.hr)

### **SWOT ANALYSIS**

#### **Strengths:**

- Information and communication technologies (ICT) are efficiently used to implement an IT network that offers waterway transport services;
- The implemented service network enhances economic competitiveness of commercial enterprises in the inland waterway transportation services;
- The main industrial partner implemented AIS systems in a wider geographical area (Serbia, Slovakia and France);
- The AIS system has a definitive impact in the region as it provides local authorities with state-of –the-art monitoring system concerning waterway transport;
- The BS shows the system integration solution that has already had transnational applications;
- The BP shows improvement of safety and security of public infrastructures;

- Development and implementation of AIS network in Croatia was carried out in compliance with the EU transport policy. In addition, it was developed in cooperation with other EU countries.

### **Weaknesses:**

- Some countries may not have the administrative and engineering potential to implement such system in their national borders;
- Continuity is not presented in a definitive way;
- It is not clear from the BP how the system is implemented;
- There is a lack of business plan for the exploitation of the AIS network.

### **Opportunities:**

- To integrate system with most available GPS, GIS and Google-like applications to provide end product for more and more end customers;
- The large range of target groups guarantees a variety of customers (public authorities as well as private sector);
- The AIS network can evolve into a generic service network to accommodate for more applications;
- The examples show that the system has a transnational potential and being applied in several European countries. It can be used for Europe wide integration of water traffic systems.

### **Threats:**

- There is Google Earth services competition in European level;
- There is a lack of a business plan for entering the market;
- Coordination and promotion activities on the government base are needed for the successful spread of the system.

## **25. IEA - BASILICATA INNOVAZIONE**

BASILICATA INNOVAZIONE Italy, Basilicata Region, Potenza Basilicata Innovazione was developed due to an accord between the regional government and AREA Science Park, the science and technology park of Trieste, signed in June 2009 with the aim of providing the regional territory with a permanent body to give services and instruments to sustain the enterprises competitiveness and to valorize the research.

The main services offered by BASILICATA INNOVAZIONE Italy include:

- Information about patents and documents;
- Use of an innovative instrument of Business Intelligence that allows to evaluate the potential market of the product/service object of the idea;
- Studies and analyses about the state of the art of technologies and markets;
- Studies targeted to evaluate the financial-economic reliability of the future partners;
- Analysis of the needing and of the innovation gap;
- Analysis of the business efficiency (through benchmarking tools);
- Definition of the innovation path, planning the innovation project;
- Solutions for the innovation of the product (materials, techniques etc.);
- Training workshops;
- Assistance in the creation of an enterprise, etc.

Basilicata Innovazione offers an integrate system of activities and services for the development of the technological innovation and the valorization of research for entrepreneurs and researchers, to support them in all the phases of the innovation process.

<http://www.basilicatainnovazione.it/>

### **SWOT ANALYSIS**

#### **Strengths:**

- It provides a complete set of services;
- Administrative capacitance for managing large scale projects;
- Improved service for protection of intellectual property;
- Collaboration with important international actors;
- Specialized staff
- All the players in the R&D area are involved. (Academia, government and industry.) It gives an excellent access point to innovation to all of them;
- Existence of excellent research institutes in the region.

### **Weaknesses:**

- The proposed model is in a startup phase;
- Project uses only public funds;
- Project web site in provide only information on Italian.

### **Opportunities:**

- To implement the proposed model in larger regional level;
- The region has room for economic development;
- Creation of new enterprises;
- Diffusion of knowledge;
- Diffuse an innovation culture in the regional territory.

### **Threats:**

- Not well described interaction model with another already created funds for regional development and advancement;
- Possible concurrence with another interactive tools and administrative bodies that provide the same services;
- Even though there is a positive feedback from the stakeholders, the amount of their future financial contribution is not defined or certain.

## **26. ECOPLUS - Energy Harvesting for Mobile Eco-Efficient Wireless Sensor Networks**

Within the national funded FIT IT Embedded Systems project ECO-SENSOR, the project partners from Austria (Profactor, Pöttinger, University of Linz, Exler Elektronikentwicklung) break up the critical dependency of remote wireless sensor networks from traditional battery technology. Based on the concepts of retrieving electrical energy from vibrating machinery and enabling ultra-low power wireless transmission of arbitrary sensor information, the design of this embedded modular base unit opens a variety of technological challenges going far beyond the state-of-the-art. Since ECO-SENSORS are energy-autonomous, no additional energy has to be provided for both, sensing operation and wireless transmission. The ECO-SENSOR project enables the reliable integration of dense wireless sensor networks for optimal condition monitoring and process control, accelerates engineering and integration times by totally eliminating wiring efforts, increases operational machine safety, dramatically reduces machine break-downs and maintenance costs and allows for accessing sensors in otherwise not reachable areas.

The resulting prototype was able to supply the WTU and the sensor during working conditions. Projects at the international level will be initiated in the near future and will lead to consistent development of the base technology with respect to requirements from different applications.

[www.profactor.at](http://www.profactor.at)

### **SWOT ANALYSIS**

#### **Strengths:**

- A new, innovative base technology for next-generation energy-autonomous wireless sensor networks was developed (reliable process control and condition monitoring in future mobile agricultural farming machines);
- Innovative mechatronic decision - A full demonstrator consisting of the elements Mechanical Energy Conversion Unit (MECU), Electric Harvesting Unit (EHU), WTU (Wireless Transmission Unit) as well as Base Stations has been developed and tested within field -tests (Poettinger);
- Many relevant publications/one patent;
- Project partners have gained large experience in leading national and European funded research projects (FIT-IT ES MESACTIF, FIT-IT ES VIBE-LESS, FP6 IP DECOS, etc);
- Research team with punctually defined responsibilities;
- Product enables reduction of environmental pollution.

#### **Weaknesses:**

- The project is still on the research stage;

- Lack of co-financing description;
- There is not a clear vision about the potential market;
- There are no market experts involved directly in the project;
- Usage of the product is limited to special environment (which produces vibrations necessary for product's functioning).

### **Opportunities:**

- Innovative product which can be used in various applications (steel industry, agricultural machinery, combustion engines, etc.);
- Development team consists of different profiles of experts (professional electronic developers, technology transfer experts, industrial end users). This is an opportunity that the product can meet all requirements at the end of its development lifecycle;
- Possibility for reaching commercial market acceptable price by using standard electronic elements during the industrialization phase of the product's life cycle process.

### **Threats:**

- There is not a vision about the proper product price on the market;
- The producer isn't able to perform the expected technological enhancements;
- The product is applicable only as a power source for limited set of devices with very low electric power demand.

## **27. TUCN - TrackGPS Business**

TrackGPS Business is a vehicle tracking system developed by AROBS Transylvania Software in Romania, which helps thousands of fleet owners to drive down operating costs and increase earnings. It offers live vehicle tracking, fleet maintenance and risk management information to fleet operators of all sizes. Over 500 companies with vehicle fleets in Romania benefited of reduced costs and increased productivity and over 9,000 vehicles of all types are being monitored at the moment. The system uses the most advanced tool for fleet maintenance cost control: real-time GPS tracking and GPRS data transfer as well reports and vector maps which offer information about vehicles' location on the map, covered distances, number and duration of every stop. It gives a full range of detailed reports: daily activity report, speed report, digital tachograph and vehicle history report (tire and oil change, service). The possibility of generating consumption reports guarantees a better fleet control. TrackGPS Business is a WEB-based vehicle tracking software which can be accessed from any computer or PDA with Internet connection. It has an easy, intuitive interface which requires minimum PC knowledge. Almost all of the cities around the world have to face the increased rates and the daily congestions. Fleet tracking and management software helps the organization of more efficient and also safer vehicle traffic. Guiding the vehicle fleets reduces the transportation costs. The guiding system reduces the driver's knowledge requirements related to city/town map. This allows shorter driver accommodation with the changes in infrastructure.

[www.arobs.com](http://www.arobs.com)

### **SWOT ANALYSIS**

#### **Strengths:**

- The system ensures reduction of fuel consumption and gives contribution for environment;
- The company (AROBS Transylvania Software) which developed TrackGPS is among the top dynamic technology companies from Central Europe;
- The company's international relations assist in advertising the product;
- The solution already experiences commercial success. It is installed in Austria and Germany and is sold or leased to many multinational companies;
- The company income for the current income covers the expenses for the development, maintenance and future improvement;
- Measurable results of the project (Reduced fuel expenses by 10-20m reduced operational costs of the fleet by 15-25%).

#### **Weaknesses:**

- It is not explained how the system can be used on the national language in different countries;
- The mentioned quantity of reduced operational costs is not confirmed.

- The price of system use isn't given;
- Mainly focused on the local national market;
- There are related products on market globally, so there will probably be competition on international markets.

### **Opportunities:**

- Developed system can be used in other countries;
- The increase of road traffic safety is one of EU's primary concerns;
- The number of vehicles is increasing, so efficient management solutions are required;
- It would be possible to transfer the similar idea also to other areas, e.g., marine vessels, etc. There may even be an idea of renting it to tourists.

### **Threats:**

- It is possible a hacker's penetration in the system;
- There are big international players in the same area;
- Since the project is extremely complex and diverse, its verification and validation must have been a big challenge.

## **28. JSI - Vacuum pressure control at the plasma annealing and cleaning machine**

This best practice presents the research and the development of the system for vacuum pressure control for plasma annealing and cleaning machines produced by an Austrian company. These machines are used in the process of production of wire and related metal products (metal strips, etc.). The machines simultaneously clean, anneal and cover wire surface in one single wire pass by using plasma. Vacuum pressure in plasma reactor is an important process parameter, which must be held within tolerances in order to guarantee stable plasma operation and wire quality. A control system is needed, which keeps pressure in tolerances by controlling the operation of vacuum pump and vacuum valve. The goal is to achieve low pressure deviation from the set point and fast response to the various kinds of process disturbances. In the project, software tools (programming blocks, configuration tools) and documentation are developed, which will significantly simplify the implementation of the predictive control to different kinds of closed loop control problems including vacuum pressure control of plasma machines. The project results are transferable, since the platform is designed to be applied to different kinds of technological processes.

<http://dsc.ijs.si/en/>

### **SWOT ANALYSIS**

#### **Strengths:**

- The BP presents a platform enabling the application of predictive control technique for the optimization of engineering / industrial processes;
- Predictive control is more effective than other techniques for the optimization of processes;
- Developed platform presents software tools that help overcome the difficulties presented for the application of predictive control for the optimization of manufacturing processes;
- The range of applications of this platform is wide;
- The BP summarizes an 6th EU FW project;
- The developed tools were applied in the plasma machines of an Austrian company;
- The developer's team upgrades his experience and research level.

#### **Weaknesses:**

- It is not clear from the BP what would be the overhead for the application of the predictive control technique to other use cases even with the developed platform. This could provide an estimation of the relevant cost;
- The business that the BP addresses is also not detailed: the potential market is not estimated, the competition by other platforms is not given, the advantages of

this solution against current practice is not given so that a potential industrial end user can decide on the application of this method based on some quantitative data;

- There are any details for the results of the developed software;
- It is not clear if the developed software has advantages in comparison with existing ones.

### **Opportunities:**

- The range of processes that this platform could be applicable is quite big;
- The developed platform can be useful for different other users;
- The developers of the platform could use it as base of future new areas of application.

### **Threats:**

- The overhead for the application of this technique might be quite significant;
- Depending on the industrial / manufacturing sector the periods of economic turmoil makes industrial end users reluctant to invest and to try new ideas in their production processes;
- The modifications of the developed predictive control could be complex and difficult to realize.

## **29. ECOPLUS - Frozen Food Temperature Monitoring during Transportation and Storage**

Frozen Food Temperature Monitoring during Transportation and Storage presents a best practice in maintaining high quality of transported foods. As of January 1st 2010 the owner of a catering or gastronomy company has the obligation to record the temperature of his short-life food products during transportation and storage without a gap and has to keep the recordings for more than a year. The challenge was to develop a concept and a functional model which retrieves temperature readings from temperature sensors in refrigerating plants, analyze the recordings for eventual abnormalities to generate an alarm and archive the recordings in a database for a continuous report. The industrial partner of Fotec owns some branches of school buffets in which it is not possible to lay electric cables from a centralized temperature recording system to the temperature sensors themselves. Therefore, the company which... developed a concept and a functional model which retrieves temperature readings from temperature sensors in refrigerating plants, analyze the recordings for eventual abnormalities to generate an alarm and archive the recordings in a database for a continuous report to keep the recordings for more than one year. The temperature recordings are stored in a central database via the internet for all branches of a customer. The user has the ability to configure threshold values for each temperature sensor and regarding to this generates notifications per SMS or e-Mail to immediately notify himself, a guarantor and/or a maintenance technician. In addition, the user can generate a complete record which includes all events and/or temperature readings. For these cases, it is possible to use temperature sensors with internal storage capabilities and an USB connector. This system is norm conform with: DIN EN 12830, DIN EN 13485, DIN EN 13486. The involved company benefits from significant results, in terms of quality of products, new products and technologies.

[www.fotec.at](http://www.fotec.at)

### **SWOT ANALYSIS**

#### **Strengths:**

- Focused end user system is a key factor for larger market adoption;
- Provides a flexible solution to a problem in relation to the temperature of short-life food products -catering business;
- The system implement standards DIN EN 12830, DIN EN 13485 and DIN EN 13486, which catering and gastronomy companies have to obey. It records the temperature of their short-life food products;
- The device commercial application is proofed possible;
- The results of the project are easily transferable;
- The short-term high demand for such solutions is supported by the new food national law (January 1st 2010) in catering businesses, which obligates the recording and storing of food temperature.

### **Weaknesses:**

- Not very well explanation of service compatibility with another similar products;
- Web site of the project contains information regarding another projects, that seems to be a little bit confusing;
- The development process has not been well documented;
- No quality control has been followed through out in all phases of the project;
- Due to its structure, the project creates little demand for new projects on this area;
- The problem arises when a fridge is out of reception range. In this case sensors with internal storage capabilities are used and later user has to transfer all readings into the database via USB connector;
- The device has not reached the market. Not a clear time schedule of the commercialization of the device;
- The development process has not been well documented.

### **Opportunities:**

- To extend to larger EU market;
- The particular project idea can be used in different fields of transportation as a commercial device targeting specific needs;
- With the implementation of this system the company benefited in terms of quality of products, new products and technologies. There is a follow up product development in discussion.

### **Threats:**

- Some problems concerning specific national regulations and certification procedures for the end user usage equipment is missing;
- The outcome may not reach the market;
- The system is developed in order to obey standards. In case they change, the system will have to be redesigned.

## **30. TUCN - Rehabilitation of a Network of Water Wells for Capturing Raw Water - Automation System for Monitoring and Command**

This best practice describes a successful implementation of a project resulting from the collaboration between local authorities and governmental authorities in Romania. The funding of the project was supported by EU grants and co-financed by the local authorities from Satu Mare. The R&D team was a consortium of 3 partners (SME) from Romania and Hungary.

The objective of the project was to extend the infrastructure regarding the drinking water, due to the population growth that was not anticipated when the existing infrastructure was first developed. The approach was to rehabilitate the water wells network for water collecting and to create a system for the monitoring and control of the whole process, with the purpose of increasing the capacity of delivering the raw water to the Station for the Treatment of Drinking Water, which delivers drinking water to the city and to the surrounding smaller towns.

As a result of the successful implementation of the project were ensured a minimum flow of 1200 m<sup>3</sup>/h and a substantial improvement of water quality delivered to the Treatment Station, by reducing the suspensions in the water.

The project was initiated due to the necessity of developing the infrastructure regarding the drinking water and the used water of the Satu Mare city and its neighborhood. This, in turn, was needed because of the population growth, and also because of the economical development of the region. The local authorities have observed that the existing infrastructure was no longer able to sustain the number of private and public consumers, and they have decided to initiate a program for developing this infrastructure.

The R&D team was a consortium of 3 partners (SME) from Romania and Hungary.

[www.technosam.ro](http://www.technosam.ro)

### **SWOT ANALYSIS**

#### **Strengths:**

- Solution of actual problem with social influence - The project is a successful example of how to enhance social infrastructures (i.e., water provision) based on consortiums, which include both private and public sector (local and government authorities) and RDI;
- The project responds, in terms of the synthesis of the consortium, to a priority, which has been denoted in the national research plan of the particular country;
- The project engages partners from neighbor countries (Romania, Hungary) in order to design and solve a shared problem;
- Environmentally- friendly idea and project implementation, which incorporates automation system;

- Well-defined financial mechanism - The project was funded by the European Union (89%) through the ISPA financing program, and by the Local Council and the County Council of Satu Mare (11%).
- Project implementation creates market niches for value added activities;
- The project involves a promising field to invest, in accordance with European and international tendency and national necessities;
- There are current Project results - the assurance of a minimum flow of 1200 m<sup>3</sup>/h and a substantial improvement of water quality delivered to the Treatment Station, by reducing the suspensions in the water.

### **Weakness:**

- The solution can be transposed to other cities if they do not have yet a proper system for water capturing or have wells;
- Project maintenance depends on the collection the water delivery taxes collected from the population and from the economical agents;
- The good practice can not be easily directly transferred to other areas, except for several partial solutions.

### **Opportunities:**

- Flexible technological approach, given possibility to be adapted to different cities - SCADA system for remote monitoring and control is a component of the project that can be easily adapted to other projects for efficient water capturing; it can be applied in any other town or city in the country;
- The impact of this project will be an increasing the number of workplaces in the area and, consequently, raising the life level of the population, which made this solution attractive for other cities;
- Good sustainability - After ending the funding of the project, the costs for functioning and maintenance of the waterfront collecting will be supported from the water delivery taxes;
- The company developing the project is actively seeking for similar projects, considering Romania's policy regarding the infrastructure for drinking water and wastewater.

### **Threats:**

- Project idea involves significant resources, market failure is possible;
- The co-financing is small and the project ideas and solutions depend directly on European funding to be initiated;
- The project failure would have severe consequences on the population and economy of the region because it is of essential importance for the people in the area.

### **III. INNOVATION SUPPORT STRUCTURES AND EMBEDDED SYSTEMS PRODUCTION**

The analysis of the 30 best practices shows that they could be split into two major groups:

- The first one includes the BPs of governmental and non-governmental structures and organizations oriented toward supporting innovations in the field of embedded systems and industrial informatics named Innovation Support Structures.
- The second one comprises of different projects for implementation of industrial informatics and companies for production of embedded systems named Embedded Systems Production.

This categorization is shown in the following table.

<b><u>Innovation Support Structures</u></b>	<b><u>Embedded Systems Production</u></b>
1. Technopol_ECOPLUS	4. Syrinix_ISI
2. Technoseed_IEA	8. Cardio&Brain_JSI
3. Finland_TIVIT_UoM	10. KIBERsik_JSI
5. Regional Innovation_INNOPOLE_ISI	12. EuroGPS_FNBU
6. Sirma_BICT	13. Mobile Asset_ECOPLUS
7. Intelesens Limited_Sensor Technology_ISI	14. MikroElektronika_UoK
9. CORALIA_ISI	19. UltraSOC_ISI
11. Competence and Inovation_RDF_RWG	20. IMS_Innovative technology_FNBU
15. PFAU_RDF_RWG	23. Vlatacom_UoK
16. Foundation_OEAW	24. Inland AIS_BICT
17. NORDITE_UoM	26. Energy Harvesting_ECOPLUS
18. Virtual Manufacturing_UoK	27. TrackGPS_TUCN
21. Innovation technological centre of St. Petersburg state electrotechnical institute, St. Petersburg, Russia_ONPU	28. Vacuum pressure_JSI
25. Basilicata_IEA	29. Frozen Food_ECOPLUS
22. "Slalen" innovation centre_ONPU	30. Rehabilitation_TUCN

## **IV. SWOT Analysis**

A SWOT analysis is a subjective assessment of data. In this chapter the common weaknesses of the selected 30 best practices among the 100 good ones are analyzed. In order to make any kind of analysis we need to consider the fact that those 30 best practices are quite different from one another. However, we may group them in two large domains – Project/Product oriented and Organizations that promote and support activities in the area. Based on those criteria, the best practices were split into two groups. In order to make our analysis more precise, it should be noted that 4 best practices could be placed in either of the two groups.

### **STRENGTHS**

#### **Strengths of Innovation Support Structures**

As stated above, the 30 best practices are divided into two types of domains:

- Innovation Support Structures – these are practices that explain different R&D and project management and support structures of companies, associations and universities. Their primary purpose is the aggregation and concentration of high-end know-how, leading professionals and production companies that will support the development of large-scale national and international projects in the field of embedded systems.
- Embedded Systems Production – this group of best practices includes examples of various companies that design and manufacture specific embedded systems, industrial informatics applications or the entire production process automation, monitoring and control. The scope of examples covers: manufacturing systems in the heavy industry, environment monitoring and ecology, wearable medical and sports devices, data login applications, different types of navigation and position control equipment, etc.

Typically, most of the practices from the first group are successful performance of R&D activities. Many of these practices represent entities and organizations working in close cooperation with nationally-known universities and associations. Some programs provide information on the long-term activity in the field of embedded systems and industrial informatics: Competence Brokering Linking SME Needs to Research Opportunities, TECHNO SEED, Finland's Strategic Centers for Science, Technology and Innovation, CORALIA Clusters Initiative, PFAU-Program for the financial support of start -ups from Universities in North Rhine-Westphalia etc.

About half of the practices covered in the group of **Innovation Support Structures** highlight the involvement of a large number of employees (over 20-30), some organizations engage more than 500 employees in associated partners. In practice, all of these practices actively cooperate with universities, thus creating conditions for continuous improvement of their staff, as well as recruitment of new staff. Over 40% of research teams have specific responsibilities. Many of the organizations develop another major activity which may be of interest for many small and large scale companies in the sector of industrial informatics.

The R&D process exposes the commercial value of novel ideas. Larger organizations cooperate with several technological institutions, whereas at least some cooperation exists at each one of them with specialized laboratories and companies that manufacture embedded systems.

Some of the organizations try to impose a new business model with the dominant participation of universities and scientific organizations, by simply looking for long-term projects with clearly explained financial mechanisms and well-described development policy for a long period of time (20 years). All these data show a properly selected and time-adaptive R&D policy with developmental potential and creation of innovative business-oriented products and services. The combination of institutional, university and business participants is a guarantee for establishing stable business models that are able to apply for funding under the larger European and national programs. It is interesting to mention that some practices have partnerships with organizations with between 10 - 100 employees.

All projects have the perfect on-line portfolio, which would facilitate the promotion of their business and make it easier to find partners in the implementation of larger cooperative projects. Most of these organizations have certificates of quality control and contacts with institutions and laboratories to verify compliance and ensure high quality of end production and management processes inside the organization.

## **Strengths of Embedded Systems Production**

The group of best practices that describes the design and manufacturing of end products or services uses diverse business models and financing mechanisms. Most of the best practices mention a large amount of private investments. Some practices, however, combine good business policy and close cooperation with universities and scientific institutions: Syrinix, Cardio & Brain Signals, IMS-BAS embedded systems. The diversity of applications and projects varies greatly, from small embedded systems for personal use such as Cardio & Brain Signals, to highly scalable enterprise applications such as IMS-BAS embedded systems, Inland AIS System Implementation, TrackGPS Business and EuroGPS SafeDrive.

Most of the companies use their own operating staff dealing with the development, implementation and marketing of final products. Some of the presented examples show well-acquired business models. Most of the companies and joint ventures already have customers in more than one EU country. The selected best practices show the system integration solutions that have already had transnational applications. Over 50% of the solutions described comply with the recommendations for reduced power consumption i.e. are green devices. We can conclude that most of the projects use equal amounts of public and private funding. The majority of funds to which these practices have had access were used for training and development. Some of the applications and products indicate potential for the development of applications and a wide range of services that can be developed and implemented in this sector. The range of applications includes: medical systems, production transportation monitoring, large scale industrial systems, navigation devices, different ecology applications, etc. Almost all companies in the region use the manufacturing base located in their countries. This shows the potential of individual economies in the field of embedded systems and the production of specific and unique industrial informatics solutions. Typically, most of the practices that are closely integrated with universities and academies have been present on the market for more than 10 years.

## **WEAKNESSES**

The weakness part of the SWOT analysis has been conducted in a way to find a pattern that can be avoided by any beneficiary of the project and its outputs. Each of the two groups was analyzed and some common weaknesses were found. Those could be further grouped as follows:

- **Financial** – Lack of funding diversification is the most common weakness of most of the best practices. In both cases, organizations supporting a specific business area or development of real products/projects, a strong dependence on one major source of funding could be noticed. The funding usually is provided by the government, an EU funding agency or another way of public funding. Since research and innovation cannot be carried out without funding, the funding diversification could be considered as the biggest weakness of most of the selected best practices.
- **Political** – Taking into account that the financing of best practices strongly depends on governmental or EU funding, the dependency on the current political situation in the local country or on the EU administration can be outlined as a second common weakness. Unfortunately, only a few of the selected best practices have a wide market success, not only locally, but also in other countries, and are independent of the local political situation.
- **Organizational** – Many best practices have organizational weaknesses. Under this category could be listed the lack of premises, technical facilities, equipment, as well as the heavy dependence on other organizations (e.g. Universities, investors, partners, etc.).
- **Marketing** – Another common weakness is the marketing approach of best practices. Their products usually suffer from a lack of a plan for entering the market, insufficient visibility and disputable international recognition. Only some of the products/projects have reached the market at all, and even fewer have gone beyond the prototype phase and have reached any market success. The fact that many of the best practices are promoted by clusters or other business support organizations also shows that the latter do not perform well enough. Therefore, most of the best practices have, unfortunately, limited appreciation and recognition at European level and are even less recognized worldwide.
- **Social** – Only a few of the best practices have created new jobs and have an impact on the labor market. In fact, some of the best practices are struggling to survive the financial crisis, which influences also the new jobs offers.

## **Innovation Support Structures**

In the first place as a common weakness that applies only to Innovation Support Structures is the weaknesses related to process/program management. BPs in this group are usually clusters, centers of excellence or programs. In order to be successful, all of them need to collaborate with many other stakeholders from their specific sector and to be able to handle

a large volume of requests coming from different sources. The most common weakness, subsequently, is the lack of capacity of these organizations to work in such conditions. Another common weakness is the lack of enough networking activities in the field of the organization. In fact, many of the BPs have limited dramatically the number of activities and events during the last year. A common weakness is the lack of international transfer of locally gained knowledge. Several of the programmes achieved good results at home, however, they did not take advantage of the opportunity to transfer the local experience at international level. As a weakness unique for that group can be pointed out the lack of information about the patent rights of the promoted products / organizations / projects. Another such weakness is the lack of multilingual information on the web page of TECHNOSEED. Here is the place to mention that most of the BPs use the web space very well and there is plenty of information about them there.

### **Embedded Systems Production**

The first common weakness of embedded systems production is the fact that most of the products in that group are in a trial period or have not reached the market yet. This is quite common for most of the product/project BPs. It seems that most of them do not have clear plans for entering markets and have not invested enough in that direction. Another weakness typical of most of the products/projects in this group is the fact that product/project parameters were not described correctly or the description was quite limited. In general, some of the BPs has to put more effort in the direction of product documentation and presentation. This could be highlighted as the most important weakness from a technical point of view. Without proper documentation or presentation nothing could be successful in the open market. Another unique weakness of this group is the lack of comparison between the product and similar products. Nowadays, the strong open market competition among different products/projects requires a clear understanding of their competitive advantages compared to other products in the respective area. Without such a comparison entering any market will be difficult. Some of the BPs seem to have a very small number of employees and in general it seems that there is a lack of qualified personnel in the area. Almost none of the BPs can claim that they have more than 100-150 qualified team members and researchers.

In conclusion we may say that despite the relatively large number of weaknesses, most of them are quite common to most BPs. These weaknesses could be well defined and corrected in the future. The unique weaknesses are in particularly important for the BP itself and also for other companies working in the area. Hopefully, the project outputs will be used to good ends and for eliminating such weaknesses in the near future.

## OPPORTUNITIES

**Innovation Support Structures** are practices that aim at facilitating the transfer of know-how, knowledge and skills in the area of industrial electronics and embedded systems. These activities are generally oriented towards raising the level of enterprises, especially SMEs.

The successful implementation of these projects requires establishing well-balanced R&D teams, feedback from enterprises, including the Academy-University segment in the process, proper network, etc.

The scope of the project is of particular importance - what impact it has on the region and its relationship to the national strategy and the EU strategy.

A general overview of the 15 practices within this subgroup shows that regarding opportunities, the projects satisfy the above mentioned requirements.

The selected practices in general indicate a strategic alignment within the EU framework, the relevant country strategy, as well as alignment with the strategy of the relevant region.

The best practices Technopol Program Wiener Neustadt Center for Modern Industrial Technologies, Finland's Strategic Centers for Science, INNOPOLE Regional Innovation Pole of the Region of Western Greece and NORDITE Program are developed in accordance with the EU strategy.

The projects Innovation technological center of St. Petersburg state electro-technical institute, St. Petersburg, Russia and Slalen innovation centre cover segments of the relevant national strategy.

The best practices Technopol Program Wiener Neustadt Center for Modern Industrial Technologies, INNOPOLE Regional Innovation Pole of the Region of Western Greece and Basilicata innovazione have a strong impact on the regional development.

Many practices have created a solid base for high-tech development and intensified local industry in the relevant region (Technopol Program Wiener Neustadt Center for Modern Industrial Technologies; TECHNO SEED; INNOPOLE Regional Innovation Pole of the Region of Western Greece; CORALIA Clusters Initiative; Virtual Manufacturing Support for Enterprises in Serbia).

Many practices show an establishment of permanent linkage between R&D institutions and enterprises. A strong relationship is in place between Universities, R&D organizations, and companies to further exploit the potential for creating innovative products in the fields of interest. In addition, a smooth transition of aggregated knowledge into successful businesses could be noticed (start-ups and newly established SMEs). (e.g. Technopol Program Wiener Neustadt Center for Modern Industrial Technologies; IEA - TECHNO SEED; INNOPOLE Regional Innovation Pole of the Region of Western Greece; ISI - Intelesens Limited Sensor Technology & Devices; PFAU-Program for the financial support of start-ups from Universities in North Rhine-Westphalia (NRW); OEAW - Foundation of Spin-Off Company from Research Group at University; NORDITE Program; Virtual Manufacturing Support for Enterprises in Serbia, Competence Brokering Linking SME Needs to Research Opportunities, Innovation technological centre of St. Petersburg state electro technical institute, St. Petersburg, Russia, Slalen innovation centre).

Some practices provided an opportunity for transfer outside the specific region (Technopol Program Wiener Neustadt Center for Modern Industrial Technologies; INNOPOLE Regional Innovation Pole of the Region of Western Greece; Basilicata innovazione).

Four practices suggest a possible transfer in SEE region and participation in EU international projects (Sirma Yung Spirit; Foundation of Spin-Off Company from Research Group at University; PFAU-Program for the financial support of start-ups from Universities in North Rhine-Westphalia (NRW); NORDITE Program).

There are some specific opportunities such as:

- Improving the level of services that support awareness of SMEs (Virtual Manufacturing Support for Enterprises in Serbia);
- TECHNO SEED has a partnership with the ACHIEVE network which assembles about 20 European incubators specialized in ICT. This network is funded by the European Community and is coordinated by the Cambridge University;
- Good opportunities due to the investment of Sirma Young Spirit in young active entrepreneurs in the field of Information Technologies (IT) and their initial support with the necessary seed fund (Sirma Young Spirit -Early Stage Financing);
- In certain areas such as building and construction, there is a high economic activity and the presence of SMEs is very favorable (Competence Brokering Linking SME Needs to Research Opportunities);
- Developing of more efficiently monitored health care in hospitals and home settings (Intelesens Limited Sensor Technology & Devices (ST&D)).

In conclusion, all examined practices offer great opportunities for technology transfer, regional development and exchange of know-how.

**Embedded systems subgroup.** The practices presented in this subgroup aimed at creating innovative products and target-oriented systems in the **Embedded systems** area.

The successful output of these projects requires establishment of well-structured R&D teams, a clear funding, appropriate area of operation, innovative approach (covering the above listed requirements in the general case is more or less described in the Strengths of reviews), as well as the availability of a market niche, applications in various fields, ability for incorporation into larger systems, etc.

A general overview of the 15 practices within this subgroup suggests that regarding opportunities, the projects satisfy the above- mentioned requirements.

The reviewed practices in general indicate the opportunity for application in various fields (Syrinx; Cardio & Brain Signals - Signal conditioning system for physiological signals; KIBERSik– Electricity Peak Shedding System for energy efficiency in industry; Mobile Asset Management Platform; IMS-BAS embedded systems; Vlatacom Document Reader–Handheld; Inland AIS System Implementation; Energy Harvesting for Mobile Eco-Efficient Wireless Sensor Networks; Track GPS Business; Vacuum pressure control at the plasma annealing and cleaning machine; Frozen Food Temperature Monitoring during Transportation and Storage).

Many practices show that their products have a potential market (Syrinx; Cardio & Brain Signals - Signal conditioning system for physiological signals; KIBERSik– Electricity Peak Shedding System for energy efficiency in industry; EuroGPS SafeDrive; Mobile Asset Management Platform; UltraSOC; IMS-BAS embedded systems; Inland AIS System Implementation; Energy Harvesting for Mobile Eco-Efficient Wireless Sensor Networks; Frozen Food Temperature Monitoring during Transportation and Storage; )

Some practices demonstrate opportunity for incorporation into larger systems (Syrinx, Cardio & Brain Signals - Signal conditioning system for physiological signals; EuroGPS SafeDrive; Inland AIS System Implementation; Energy Harvesting for Mobile Eco-Efficient Wireless Sensor Networks; Track GPS Business; Rehabilitation of a Network of Water Wells for Capturing Raw Water).

Two practices have a strategic partnership with leading companies in the field (MikroElektronika; IMS-BAS embedded systems).

There are some specific opportunities such as:

- Future development and production of modern and useful products is expected (MikroElektronika);
- Syrinx technology enables very important savings of water distribution system. Up to 30% of water is nowadays lost due to water leakage (Syrinx);
- New medical products and systems could be developed on the base of existing devices (Cardio & Brain Signals - Signal conditioning system for physiological signals);
- An increasing level of automation and implementation of embedded systems in SEE economies (UltraSOC);
- The device is necessary in many critical places for fast and secure verification of documents and persons (Vlatacom Document Reader–Handheld);
- The impact of the project will be an increase in the number of workplaces in the area and, consequently, raising the standard of living of the population, which made this solution attractive for other cities (Rehabilitation of a Network of Water Wells for Capturing Raw Water).

In conclusion, all examined practices offer innovative products with good market prospects and opportunities for application in various fields.

## **THREATS**

### **Threats for Innovation Support Structures**

#### **Financial limitations**

17 threats in total were identified by the reviewers, summarized as follows:

- Lack of financial resources;
- Public funding will be affected by the financial crisis;
- Possible country stagnation, and uncertain future sources of funding;
- Insufficient funds to finish the BP;
- A great part of the financing of the project depends on government and EU funding;
- Possible lack of financial resources for the future development of the BP;
- Lack of clear description of the financial mechanism which would support the activities of the already developed structures;
- Lack of local institutional support;
- The amount of future financial contribution of the stakeholders is not defined or certain;
- Poorly defined interaction model with other existing funds for regional development and advancement.

#### **Competition problems**

The reviewers cited 8 threats, summarized as follow:

- International competition;
- Competition from big players;
- Uncertain competitiveness and advancing of the companies, created by the BPs;
- More attractive proposals from other regions or countries;
- Potential vulnerability of the whole venture due to its dependency on the brokers' capacity and on the available networking activities;
- Possible difficulties in the mass production of the developed products;
- Human capital deficit;
- Possible concurrence with other interactive tools and administrative bodies that provide the same services;
- Need for better cross border cooperation.

### **Market demands**

All 5 threats are: global market uncertainty, poor marketing plans and decisions in the future, non-acceptance in the market), small spin-off companies are fragile, dependent on their major customers, and can easily disappear in case of a crisis, no strategic planning for creating high technology clusters with the aim of market penetration.

### **Legislative effects**

All 3 threats are: new government regulations, substantial governmental support and coordination is required, which is the national policy concerning the relations between academia and the enterprise sector and whether this policy impose barriers in the future.

### **Human capital problems**

There are 5 threats: critical mass in terms of partners and resources should be guaranteed, the friendly environment at university may disappear, and the diffusion policy of the innovation culture in the regional territory may not be capable of overcoming the arisen obstacles, the small size of the company cumpers in the competition with much larger market players.

### **Others**

The reduced role of basic research can undermine the basis for future development, the possibilities to support an extremely large variety of projects may lead to lack of competence in some cases, too many different views can cause diversions from the strategic line, university authorities do not consider it important to promote to students' efforts to create startup companies.

## **Threats to Embedded Systems Production**

### **Financial limitations**

The reviewers mentioned 7 different threats concerning the financial support of BPs, which can be summarized as follows: today's economic crisis, significant financing resources are needed for BP realization, insufficient financial funds for opportunities realization, BP involves capital investments that can be overlooked, the particular project ideas and solutions depend directly on European funding to be initiated, not clearly defined issues about the requested funding for the future commercialization of the BP.

### **Market limitations**

18 threats in total are pointed out by the reviewers, summarized as: possible market failure, applicability of the product and the market demand are limited, despite a huge market potential, some vendors are very conservative, the device may not reach the market, large players in the market, lack of a strategy for widening the BP market, without considerable marketing and promotion efforts the results of the BP can never be transformed into a

product, there is a lack of a business plan to entering the market, there is not a vision about the proper product price on the market, Google Earth services competition on an European level, industrial partners should consider enhancing the range of services in order to enhance market penetration.

### **Recession problems**

Only 3 remarks by the reviewers: recession leads to limited resources for company development and to the decrease in demand in emerging markets in the SEE region. In some cases a problem may arise - users' employees would want to boycott the use of tracking device in order to prevent them from being tracked.

### **BP realization**

Here 5 threats are mentioned which are summarized as follows: the verification and validation of the BP must have been a big challenge, the modifications of the developed BP control could be complex and difficult to realize, no plan for implementing partnerships through vital contracts, the developed BP can become obsolete, unreliable or insufficient, there are possible contradictions between legislation in different countries, the potential unauthorized access to the system by hackers.