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ACCELERATION OF INNOVATIONS AND ENTREPRENEURSHIP AT UNIVERSITY ENVIRONMENT

USP TECHNICOM Association is a platform that should serve researchers, students, academic staff and business subjects for the development of joint workplaces and for setting up new hi-tech start-ups. The initiative to support entrepreneurial skills of university community (preferably but not exclusively), students and staff with innovative ideas was transformed into real project of creating services for supporting start-ups, young SMEs, innovators and acceleration of the ideas from research into commerce.

Key words: *Technological innovation, Technology transfer, Acceleration, USP TECHNICOM, Europe, Companies, Entrepreneurship.*

University Science Park TECHNICOM for innovative applications supported by knowledge technologies (USP), is being sequentially created by the project under the Operational Programme Research and Development (OP R&D) and it is co-financed from Structural Funds guaranteed by the European Commission. The Technical University of Košice (TUKE) is the project coordinator and Pavol Jozef Šafárik University in Košice (UPJŠ) and Prešov University (PU in Prešov) are involved as partners in this project [July; 2013 – November; 2016].

There is currently no entity which could be described as a science and technology park in the territory of Eastern Slovakia. International experience proves that the existence of science and technology parks brings obvious benefits – they form a platform that brings together excellent education, research and innovation [1]. Slovakia needs this type of infrastructure in terms of its economic and social development and also in relation to the fact that the effectiveness of technology transfer (TT) in Slovakia is clearly insufficient [2].

Key inputs for the preparation of the project plan to establish the university science park as the active R&D association, was the creation of the University Centre for Innovation, Technology Transfer and Intellectual Property Protection (UCITT) at the TUKE [3]. The mission of the UCITT is to create a relevant virtual environment at the university that will permanently support R&D in terms of cooperation between scientists and practice, and to ensure efficient transfer of knowledge, products and technologies into society and economy.

Mission of the USP TECHNICOM ASSOCIATION

The project mission is to creating USP TECHNICOM as an active Association of tree local USPs at the framework of the consortium of three partners universities The USP TECHNICOM Association (USP) is designed in

full compliance with European science, technology and innovation policy currently declared particularly in Europe 2020 Strategy [4]. The results of the project will contribute to enhanced cooperation between research teams at inter-regional and international level, in terms of the declared intention of shaping the EU as the 'Innovation Union' [5].

The strategic objective of the project is to "build USP TECHNICOM Association as an internationally recognized centre of research and technology transfer in the field of innovative applications supported by knowledge technologies" [6].

The strategy of forming a project for the creation of USP TECHNICOM was therefore based on the following three aspects:

1. Flexible collaboration with top domestic and international research, which guarantees a permanent 'repository' of innovative initiatives, projects and products used by USP both for targeted applied R&D and for potential acceleration of innovative entrepreneurship.

2. Effective platform for (targeted) applied R&D, which supports both the academic institutions and centres, as well as joint R&D centres based on mutually effective collaboration between the academic and commercial or public institutions.

3. Effective portfolio of business services focused on an efficient business transfer of R&D products and services into practice and to initiate progressive acceleration of innovative entrepreneurship based on professionally-selected R&D output.

The aim is to create an environment and conditions for the development of creative scientific work and effective research and development collaboration between the public and commercial sector at a level comparable with those in countries with high innovation impact [6].

To fulfil the adopted strategic objective of "establishing USP TECHNICOM as an internationally recognized centre for research and technology transfer", three specific aims (SA) of the project were formulated:

SA 1: Organizational and managerial facilitation of the establishment and operation of USP TECHNICOM Association on the bases of high-quality science management.

SA 2: Building the physical and functional infrastructure of the park as a sophisticated science and technology entity.

SA 3: State-of-the-art applied research and development in the following five selected scientific disciplines:

1. Information and communication technologies,
2. Electrical engineering, automation and control systems,
3. Mechanical engineering,
4. Civil engineering (construction, transport, geodesy), and
5. Environmental engineering (mining, metallurgy, water management),

where the R&D solutions also take into account the corresponding social and human dimensions.

The concept USP TECHNICOM Association was gradually created through the integration of long-term strategies for the advancement of R&D and cooperation of the project consortium universities with industries. The starting point was designing the value chain model of USP TECHNICOM Association (USP), which sets the USP processes and its internal (within the consortium) and external relations. The relations to the internal and external environment specify the territory covered by USP.

APPROACH TO FORMATION OF USP SERVICES

The one of basic approach follow from successful and sustainable utilization of resources generated by the 7th appropriated research centres of excellence (CoE) on the grounds of selecting on the project consortium universities considering to the five scientific disciplines preferred by the project (SA 3). The CoEs were a major incentives for the integration and sustainable development of R&D in the USP mission.

The success and the expected impact of the project are built on the concept, whose key strategy is based on the premise that *"cutting-edge research in the consortium is able to identify and implement so-called pilot projects that will generate outputs, products and tests with a clear impact, applicable in social and economic practice"*[6]. Seven research centres of excellence are indirectly (contractually) connected to the project implementation through a specialized selection of 36 pilot projects (PP) of targeted applied R&D with a guaranteed impact of their solutions in practice.

Pilot projects are one of the three components (so called virtual component) of the **Platform for 'targeted' Applied Research and Development (PAR&D)**. The Platform will facilitate the technology and operation for the productive section in the structure of the USP being created (see Fig. 1).

The **first component** is, with respect to its origin, named **'flexible'** or **'virtual'** part of PAR&D. There are institutions, laboratories which have common projects with USP (e.g. main part of the Pilot projects).

The **second component**, so-called **'associated'** PAR&D unit is created by the infrastructure of corresponding contractually cooperating applied R&D centres of excellence. For example, at TUKE, thanks to the successful implementation of projects under the Operational Programme of the R&D and relevant projects funded by APVV agency, there have been, or are being, established three centres of excellence for applied research, which will form the "associated" unit of PA R&D:

1. KC ZATIPS (Competency Centre for Knowledge Technologies Aimed at Innovation of Production Systems in Industries and Services)

2. VUKONZE Centre (Research Centre for Efficient Integration of Renewable Energy Sources)

3. VRP ZaSS (Development and implementation institute for extracting and processing of raw materials)

These centres already guarantee active cooperation with 20 companies operating in fields supported by the project. Seven other R&D departments/centres at UPJŠ and PU in Prešov are oriented similarly, albeit they function on a smaller scale.

The **third component** of PAR&D is formed by unallocated (free) space (see Fig. 3) and provides USP's own 'business' services which in relation to PAR&D support:

- conducting activities, projects and contracts supporting specific R&D, engineering of innovation and technology transfer (e.g. prototypes)
- consulting and advisory services in the field of technology transfer and innovation,
- events and business acceleration services and corresponding services related to human resources development, which fall within the competence of USP.

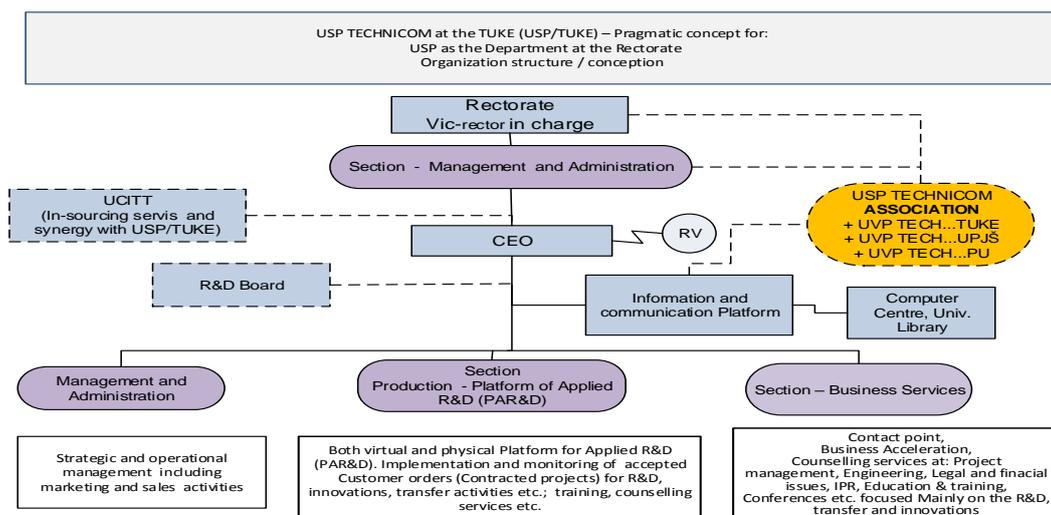


Fig. 1. Concept for organisation and control structure of a Local USP

From the perspective of the generic model which facilitates the sustainability of the USP mission, the **zone** of key importance is aimed at ensuring knowledge transfer processes and outcomes of R&D into practice. **The Section – “Business services”** fulfilling one of the primary mission goals of USP is to support the **development of projects or business activities based on the use of knowledge, products and ideas gained in research activities.**

This concerns primarily securing contracts for R&D as well as ‘orders’ associated with opening new pilot projects, joint R&D departments and engineering facilitation of the transfer of knowledge and products into practice.

In this case, these will be orders made (traded) through contracted research and development that can be funded from public and commercial sources. Similarly, activities of joint R&D workplaces between academic and commercial, or public institutions can be ensured.

From business point of view, it is a **comprehensive service called ‘Business Acceleration’**, which provides professional advice, training and consultation in all business aspects of the transfer process and entrepreneurship training (supported by real business models or plans). The acceleration process (pre-incubation) is guaranteed by the “Startup” Centre ((established at the TUKE) formation and incubation process for selected subjects is contractually covered by the ‘TUKE business incubator’.

Generally, the USP TECHNICOM Association will undertake the following functions:

- To ensure open services for a wide-ranging, efficient and mutually beneficial R&D cooperation between relevant departments of the USP, workplaces of partner universities and institutes of the Slovak Academy of Sciences (SAS), or with other partner institutions and organizations of social and economic praxis,
- To promote, accelerate and ensure the incubation process of small and medium-sized hi-tech enterprises or “start-ups” and “spin-offs” based on the relevant results of R&D conducted within research and innovation activities of USP TECHNICOM,
- To become the first point of contact for companies interested in cooperation with R&D teams from USP departments or with research centres of excellence from partner universities, SAS institutes and other parties of USP TECHNICOM partner portfolio,
- To provide advisory services, education, training and expertise in applied research, development and innovation plans and projects.

IV. TUKE STARTUP CENTRE

In 2014 there was a milestone in the area of start-up related activities in the Eastern Slovakia region. “TUKE Startup Centre” was built in the TUKE campus, in the Centre for Technological Innovations got name (Fig.1).



Figure 1. Premises of the Technology Innovation Centre PK10 with offices reserved for some of the start-up companies operating within TUKE Startup Centre

TUKE Startup Centre was established in 2014 to promote entrepreneurial activities at academic ground as a result of the Technical University of Košice initiative. TUKE Startup Centre is an organizational structure, developed in the University Centre of Innovation, Technology Transfer and Intellectual Property Protection (UCITT) with regional scope. Its mission also meets one of the objectives of the University Science Park TECHNICOM.

The aim of TUKE Startup centre is to create motivating environment in the Košice and Prešov regions that will help not only students, but also all the people of the region with innovative potential to develop in different areas of operation. The major idea is to "start" the process that would encourage people to implement their innovative ideas and would help turn ideas into commercially useful product or service. The TUKE is to support strongly the ambition of TUKE Startup Centre participants by expert consultancy as well as its excellent research infrastructure.

Three innovative ideas contests, one in 2014 and two in 2015 have been organized. The contest with title "Have you got an idea? Present your START-UP!" met this objective and at the same time it was the first successful action of the TUKE Startup centre. These ideas have the potential for a future start-up, or have already arisen under existing start-ups.

Till end of march 2016 there 36 candidates were enrolled in all three contests. After presenting their ideas the committee decided about placing them into the TUKE Startup centre. There were already 19 innovative ideas supported by having 6-months pre-incubation period in the TUKE Startup centre and recently there are 5 new teams placed into the TUKE Startup centre (Table 1).

Selected subjects of TUKE Startup Centre are provided on contractual basis with the following:

- Favourable conditions for the physical location of the start-up on the premises of TUKE Startup centre,
- Expert and mentor support of the project intent by professional TUKE sites and partner institutions,
- Support in utilizing specialized institutions, laboratories and other facilities of TUKE for implementing project plans,
- Support in obtaining partners from commercial environment, in searching for potential investors and the creation of a business plan.

Due to placement in the TUKE Startup centre the participants are able to use:

- office space for work on the project intention (idea) free of charge for 6 months,
- Internet connection and calls within the TUKE network free of charge,
- meeting room of UCITT and dayroom of TUKE Startup centre,
- expert consultancy on the implementation of the project intention,
- assistance in use of equipment of particular TUKE sites.

Table 1. Participants in the TUKE Startup Centre
Participants in the TUKE Startup Centre

Supported start-ups according to contests		
1st start-up contest		
1.	App@Eat	Software for restaurants and visitors, from which both sides benefit.
2.	Apt Elements	Design and development of innovative and practical products for web, mobile and embedded platforms.
3.	Galileo	Development of modular hardware designed for all industries working with high-quality and multi-channel audio.
4.	getFarmer*	Development of web and mobile applications to make locally grown foods from small farms accessible to people.
5.	GRID*	Web service for fast and easy analysis and visualization of data from various sources.
6.	SchoolTab	The mobile application designed for educational organizations interested in using the tablet as a tool in learning process.
7.	Virtual TUKE tour	The creation of so-called virtual tours, i.e. panoramic images that show 360 ° / 180 ° of space as if the visitor was directly placed in a position with the possibility of vision in any direction using specialized techniques.
2nd start-up contest		
1.	Blink	The development of wireless flash that will make photos full of life, color and natural skin tones.
2.	CEELABS *	HW a SW solutions in the field of information collection and management of SmartGrid networks.
3.	CropTek *	Smart hydroponic, fully autonomous, highly scalable systems connected to the cloud for home as well as corporate, indoor and outdoor food production.
4.	EFEOS *	Enabling sharing events using streaming devices with connection to the Internet (e.g. Smartphone, Google Glasses, Dron, IPcam or classic camera).
5.	Fixer *	System to eliminate errors caused by human factor at work on a production line.
6.	Gruveo*	Free online video platform for making calls over the Internet with a focus on ease as never before.
7.	Vizualizačky.sk	The development of a tool for interactive interior designing in the environment of dynamic visualization.
3rd start-up contest		
1.	Chargebrella	A unique umbrella that can produce electric energy from heat.
2.	Emomime	The Future of Point-of-Purchase Advertising by replacing static mannequins with a digital human that lures people inside the shop using constantly improving Artificial Intelligence.
3.	HoneyLOG	HoneyLOG (honeypot logs) deals with IT security using traps to attract attackers, help to find out information and detect them (also zero-day attacks). It not only analysis data but also plan to create system for prediction & recommendation.
4.	Fitliner	Professional fitness training using web camera wherever the user is can get guidance from the trainers.
5.	VARIM	Automatic food preparing device targeted to individual user and mass production (canteens, hospitals etc.)

*Selected for incubation phase

The advantage of the TUKE Startup centre is the connection of quality infrastructure with mentoring support. Mentors not only are experienced in Slovak academic and commercial sector, but through projects financed by European funds and European commercial environment they are able to develop in full manner the potential of the particular idea and translate the results of operations in the TUKE Startup centre into economic practice.

TUKE Startup centre has launched their own website informing on important activities [7].

V. SUCCESSES AND RESULTS OF START-UPS SUPPORTED BY TUKE STARTUP CENTRE

The initiative of TUKE and UCITT – creation of TUKE Startup centre – was not a greenfield project. Entities operating in the framework of TUKE whose efforts grew into forming a start-up have already gained rich and remarkable achievements in this area as well as experience at international level.

Start/up EFEOS included in the TUKE Startup Centre in 2014 and placed into pre-incubation period recorded the following achievements at start-up scene during 2014:

- victory in the national semi-finals of TELEKOM INNOVATION CONTEST (Bratislava 05/2014),
- participation in the world finals of TELEKOM INNOVATION CONTEST (Krakow 06/2014) and inclusion in the TOP10 of 326 enrolled start-ups from around the world,
- participation in the international conference ICOS 2014 (Dubai 08/2014),
- participation in international competition of V4-Startups in the Netherlands (Rotterdam 09/2014),
- world semi-finals of Creative Business Cup 2014 (Copenhagen 11/2014) and inclusion in the TOP16 of 4,000 enrolled start-ups from around the world.

The selected start-ups definitely have to assume some business potential which is necessary to develop further thanks to support from the TUKE Startup centre.

This has also been confirmed by performance of the start-up CropTek in 2014:

- August 2014 - founding CropTek start-up
- October 2014 - selection for the shortlist of the Start/up Awards 2014 competition
- November 2014 – victory in the StartupAwards.sk 2014 in category Society
- negotiations with a potential investor (Russian company Technics Android)

- obtaining investment of € 250,000 from Neulogy Ventures. This investment will help strengthen business development and international operations.

The aim of the Technical University of Košice and UCITT, under which TUKE Startup Centre belongs, is to constantly improve the quality of services in support of start-ups and innovative ideas. This has also been proven by the Grant Agreement with the Slovak Business Agency (SBA) for the organization of competitions "Got an idea?"

Technical University of Kosice through UCITT also participated in the tender issued by SBA on acquisition of over-limit contract entitled: Programme to support start-ups and Schemes for start-ups (de minimis aid scheme) - Partners. If successful, TUKE will get substantial funding to provide (between the years 2015 to 2017) expert information, advisory, training and educational activities in the area, to organize other start-up events, offer individual mentoring and professional services in further promotion of start-ups.

Approach to the creating of TUKE Incubator

The effort of the **USP projects'** research workers and UCITT team at TUKE is continuous improvement of support for start-ups and follow-up incubation services for successful graduates of pre-incubation. This is evidenced by the contract of a cooperation with SAAB (Sweden), under which our research team has an opportunity to develop long-term cooperation strategy of incubation process with one of the best on Sweden incubator LEAD created at the University of Linköping.

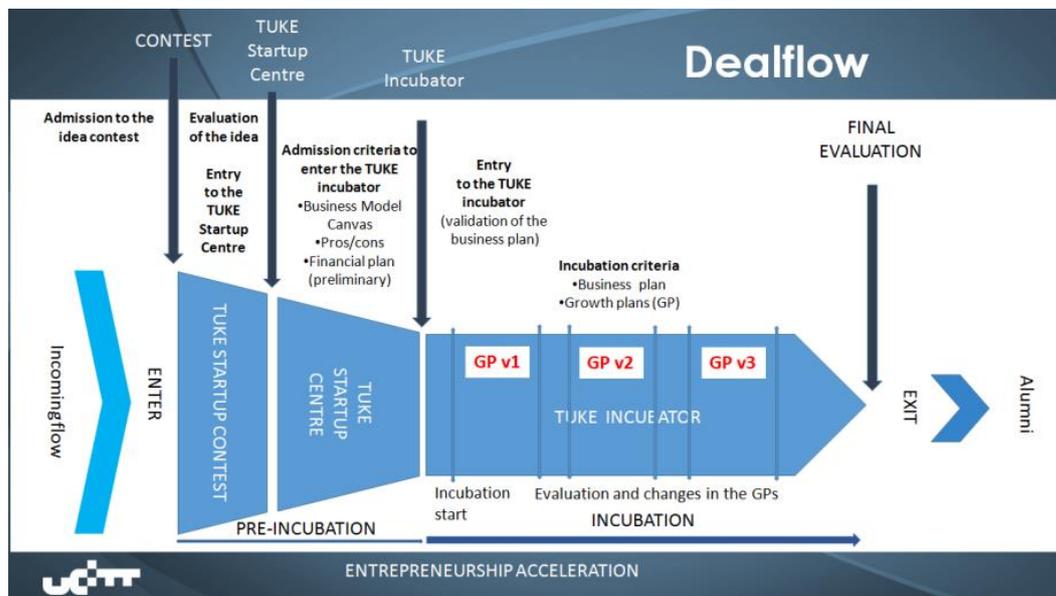


Figure 3. Model of business innovation acceleration at TUKE adapted with the accordance to LEAD model [8].

The outcome of this cooperation was shaping and processing of "workflow" model (Fig. 3), the process of ensuring the acceleration of innovation business, which on one hand, uses approaches and methodologies elaborated within the project USP, on the other hand it takes into account the experience gained by the Swedish partners from the incubator LEAD [8].

VI. CONCLUSION

The goal of Technical university of Košice and its project partners' Universities is to create an environment that will inspire, motivate and encourage young people in innovative thinking about further development of their lives and careers. In the paper the authors tried to briefly present the current trends in the development of solutions to address the "acceleration of innovation business" with regard to the TUKE conditions and mission within the project USP Indicated approaches are gradually created to establish a comprehensive system of acceleration and incubation of innovative business based on efficient forms of transfer of research results into practice.

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