Zbornik 21. mednarodne multikonference

INFORMACIJSKA DRUŽBA - IS 2018

Zvezek H

Proceedings of the 21st International Multiconference

INFORMATION SOCIETY - IS 2018

Volume H

Mednarodna konferenca o prenosu tehnologij

International Conference Of Transfer Of Technologies - ITTC

Uredili / Edited by
Špela Stres, Robert Blatnik, France Podobnik, Urška Mrgole

http://is.ijs.si

8.–12. oktober 2018 / 8–12 October 2018
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Ljubljana, oktober 2018

PREDGOVOR MULTIKONFERENCI INFORMACIJSKA DRUŽBA 2018

Multikonferenca Informacijska družba (http://is.ijs.si) je z enaindvajseto zaporedno prireditvijo osrednji srednjeevropski dogodek na področju informacijske družbe, računalništva in informatike. Letošnja prireditev se ponovno odvija na več lokacijah, osrednji dogodki pa so na Institutu »Jožef Stefan«.

Informacijska družba, znanje in umetna inteligenca so še naprej nosilni koncepti človeške civilizacije. Se bo neverjetna rast nadaljevala in nas ponesla v novo civilizacijsko obdobje ali pa se bo rast upočasnila in začela stagnirati? Bosta IKT in zlasti umetna inteligenca omogočila nadaljnji razcvet civilizacije ali pa bodo demografske, družbene, medčloveške in okoljske težave povzročile zadušitev rasti? Čedalje več pokazateljev kaže v oba ekstrema – da prehajamo v naslednje civilizacijsko obdobje, hkrati pa so notranji in zunanji konflikti sodobne družbe čedalje težje obvladljivi.

Letos smo v multikonferenco povezali 11 odličnih neodvisnih konferenc. Predstavljenih bo 215 predstavitev, povzetkov in referatov v okviru samostojnih konferenc in delavnic. Prireditev bodo spremljale okrogle mize in razprave ter posebni dogodki, kot je svečana podelitev nagrad. Izbrani prispevki bodo izšli tudi v posebni številki revije Informatica, ki se ponaša z 42-letno tradicijo odlične znanstvene revije.

Multikonferenco Informacijska družba 2018 sestavljajo naslednje samostojne konference:

- Slovenska konferenca o umetni inteligenci
- Kognitivna znanost
- Odkrivanje znanja in podatkovna skladišča – SiKDD
- Mednarodna konferenca o visokozmogljivi optimizaciji v industriji, HPOI
- Delavnica AS-IT-IC
- Soočanje z demografskimi izzivi
- Sodelovanje, programska oprema in storitve v informacijski družbi
- Delavnica za elektronsko in mobilno zdravje ter pametna mesta
- Vzgoja in izobraževanje v informacijski družbi
- 5. študentska računalniška konferenca
- Mednarodna konferenca o prenosu tehnologij (ITTC)

Soorganizatorji in podporniki konference so različne raziskovalne institucije in združenja, med njimi tudi ACM Slovenija, Slovensko društvo za umetno inteligenco (SLAIS), Slovensko društvo za kognitivne znanosti (DKZ) in druga slovenska nacionalna akademija, Inženirska akademija Slovenije (IAS). V imenu organizatorjev konference se zahvaljujemo združenjem in institucijam, še posebej pa udeležencem za njihove dragocene prispevke in priložnost, da z nami delijo svoje izkušnje o informacijski družbi. Zahvaljujemo se tudi recenzentom za njihovo pomoč pri recenziranju.

V letu 2018 bomo šestič podelili nagrado za življenjske dosežke v čast Donalda Michieja in Alana Turinga. Nagrado Michie-Turing za izjemen življenjski prispevek k razvoju in promociji informacijske družbe bo prejel prof. dr. Saša Divjak. Priznanje za dosežek leta bo pripadlo doc. dr. Marinki Žitnik. Že sedmič podeljujemo nagradi »informacijska limona« in »informacijska jagoda« za najbolj (ne)uspešne poteze v zvezi z informacijsko družbo. Limono letos prejme padanje državnih sredstev za raziskovalno dejavnost, jagodo pa Yaskawina tovarna robotov v Kočevju. Čestitke nagrajencem!

Mojca Ciglarič, predsednik programskega odbora

Matjaž Gams, predsednik organizacijskega odbora

FOREWORD - INFORMATION SOCIETY 2018

In its 21st year, the Information Society Multiconference (http://is.ijs.si) remains one of the leading conferences in Central Europe devoted to information society, computer science and informatics. In 2018, it is organized at various locations, with the main events taking place at the Jožef Stefan Institute.

Information society, knowledge and artificial intelligence continue to represent the central pillars of human civilization. Will the pace of progress of information society, knowledge and artificial intelligence continue, thus enabling unseen progress of human civilization, or will the progress stall and even stagnate? Will ICT and AI continue to foster human progress, or will the growth of human, demographic, social and environmental problems stall global progress? Both extremes seem to be playing out to a certain degree – we seem to be transitioning into the next civilization period, while the internal and external conflicts of the contemporary society seem to be on the rise.

The Multiconference runs in parallel sessions with 215 presentations of scientific papers at eleven conferences, many round tables, workshops and award ceremonies. Selected papers will be published in the Informatica journal, which boasts of its 42-year tradition of excellent research publishing.

The Information Society 2018 Multiconference consists of the following conferences:

- Slovenian Conference on Artificial Intelligence
- Cognitive Science
- Data Mining and Data Warehouses - SiKDD
- International Conference on High-Performance Optimization in Industry, HPOI
- AS-IT-IC Workshop
- Facing demographic challenges
- Collaboration, Software and Services in Information Society
- Workshop Electronic and Mobile Health and Smart Cities
- Education in Information Society
- 5th Student Computer Science Research Conference
- International Technology Transfer Conference (ITTC)

The Multiconference is co-organized and supported by several major research institutions and societies, among them ACM Slovenia, i.e. the Slovenian chapter of the ACM, Slovenian Artificial Intelligence Society (SLAIS), Slovenian Society for Cognitive Sciences (DKZ) and the second national engineering academy, the Slovenian Engineering Academy (IAS). On behalf of the conference organizers, we thank all the societies and institutions, and particularly all the participants for their valuable contribution and their interest in this event, and the reviewers for their thorough reviews.

For the sixth year, the award for life-long outstanding contributions will be presented in memory of Donald Michie and Alan Turing. The Michie-Turing award will be given to Prof. Saša Divjak for his life-long outstanding contribution to the development and promotion of information society in our country. In addition, an award for current achievements will be given to Assist. Prof. Marinka Žitnik. The information lemon goes to decreased national funding of research. The information strawberry is awarded to the Yaskawa robot factory in Kočevje. Congratulations!

Mojca Ciglarič, Programme Committee Chair

Matjaž Gams, Organizing Committee Chair

KONFERENČNI ODBORI
CONFERENCE COMMITTEES

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FOREWORD

Who are we and where do we go?

- The context of Technology Transfer in Slovenia -

All in all, we have been in the business for close to 15 years now.

Established in 1996, the Office of Technology Transfer was transformed in January 2011, based on the Knowledge and technology transfer sub-office, created in 2009. As an independent center, the Center for Technology Transfer and Innovation (CTT) continues its mission at the Jožef Stefan Institute. We assist at the process of technology and knowledge transfer from the JSI to industry, which includes licensing, spin-out creation, associated procedures for the protection of intellectual property and assisting the companies with finding suitable local and international research partners for contract and collaborative research. We also transfer knowledge from science to the school system and promote recognisability of JSI and science in general among young people and the wider population.

It has been a rough, difficult and bumpy road up until this very moment. It has taken many and more of personal sacrifices, it costed families and individuals dearly. It has been taking stand-downs in front of disinformed, malinformed or simply single minded, self-concerned and self-absorbed people ever since. All of that for the greater good and the progress of mankind.And this is not even a joke.

We have done so much. Only during the 2017 we have successfully finalized our training within the EU support system for progressive technology transfer offices »Progress-TT«, marketing of 8 JSI technologies, procedures for creation of a spin-out company, 64 identified RR topics. We organized the 10th and now already the 11th International Technology Transfer Conference – more than 100 visitors, competition of best innovation idea, international visit from Slovenia, EU countries, 60 B2R meetings. 2000 visitors during the Open Day at JSI, 60 school visits. We have been inducted by the JRC into the TTO Circle, the group of PROs most active in the field of knowledge and technology transfer (including the institutes Max Planck, Weitzman, Fraunhofer, VITO, VTT). Some of the best rated commercialization experts of European Commission. We are the only Easter-Europeans in the club, and most certainly the only ones with native slavic language.

In 2017, we faced several organisational, structural, and activity-related challenges, biggest of which were: (i) transformation of individual offices into a common space allowing improved interaction among coworkers; (ii) implementation of eTT, the electronic tool for managing technology transfer; (iii) preparation, negotiation, and successful application for establishing a Consortium of Technology Transfer (KTT), covering all largest Slovenian PROs, and lead by CTT. In addition, an electronic system for reporting KTT results was set up. On the Enterprise Europe Network, the Slovenian branch ow which is lead by CTT, administrative work was carried out in regards to a partner change. At the 10th International Conference on Technology Transfer, a ceremony for awarding best innovations was carried out along with the ceremony for the Multiconference Informational Society.

The conference itself is facing new issues every year as they come. For the ones, who have not forgotten that it had started with a disavowment from at the time the second in command at our Institute, by saying that whatever will have been done with the event, it would never become a JSI event. But clearly it has become much more than that a it has been going its own way ever since.

We at the CTT have been creating networks, spinout companies, transferring knowledge and building friendships. The ITTC shares its free spirit with anyone that wishes to get involved

and remains uncatchable for those who have the need to create it in their own image. It creates results, not political amiability. And ITTC has been an important tool in that respect ever since.

ITTC and CTT are mouldable all right – but do not follow the rules of politicians with little knowledge and interest over the complexity of the real world of research-industry collaboration. And do not follow the rules of the important scientists applying pressure in order to win in the political, not scientific battlefield. This is a crowd sourcing endeavour. It is for the not as of yet disillusioned people out there in science and economy, who would like to contribute to a better world, themselves included.

Špela Stres, Dr. Sc., Dipl. Phys., BA, Patent Attorney, LLM (Master of Laws in Intellectual Property)
Head, CTT - Center for Technology Transfer and Innovation
Member 10MG Technology Facilitation Mechanism, United Nations New York
Jožef Stefan Institute, Slovenia

INTRODUCTION AND AIM OF THE CONFERENCE

On behalf of the Organizing Committee it is our pleasure to share with you the Proceedings of the 11th International Technology Transfer Conference. The Conference took place in Ljubljana, Slovenia from 8 to 12 October 2018 [1]. The Conference has been organized by the Jožef Stefan Institute in cooperation with our esteemed partners: Slovenian Innovation Hub European Economic Interest Grouping - SIH EEIGRRA, RDA Koroška - Regional Development Agency for Koroška, d.o.o., Development Centre Novo mesto, University of Ljubljana, Faculty of Information studies in Novo mesto, Zasavje Regional Development Agency (RDA Zasavje), Development Centre Murska Sobota, Slovenian Business & Research Association, Chamber of Commerce and Industry of Slovenia, SPIRIT Slovenia - public agency, Association of Professionals for Technology Transfer of Slovenia, National Institute of Biology (NIB), Bio Base Europe Pilot Plant, Agricultural Institute of Slovenia, Regional Development Agency of the Ljubljana Urban Region, The Centre of Excellence for Integrated Approaches in Chemistry and Biology of Proteins (CIPKeBiP), Centre of Excellence in nanoscience and nanotechnology – Nanocenter, Ljubljana, The Chamber of Craft and Small Business of Slovenia, Development Agency of Savinjska Region, AREA Science Park, CO PoliMaT.

AIM OF THE CONFERENCE

The main aim of the Conference is to promote knowledge exchange between academia and industry, and to stimulate an entrepreneurial mentality among researchers, in order to strengthen the cooperation and transfer of innovations from research labs into industrial exploitation. The important role of the Conference is also promotion of recent findings, good practices, recommendations and opportunities in all aspects of technology transfer and innovation to the stakeholders of the Slovenian innovation ecosystem and partners from Europe [1].

In the past events, the ITTC hosted more than 2500 participants, including private investors, inventors, researchers, commercialization experts, start-up funders, industrial development experts, policy makers, governmental representatives, and other members of Slovenian innovation ecosystem. This year we have successfully organized tenth pitch competition to evaluate and award the entrepreneurial research teams with their inventive/innovative technologies with business proposition. The international evaluating commission evaluated their proposals and selected two winning teams with the biggest commercial potential of their technologies. Based on the decision of the evaluation commission, the 11.ITTC organizing committee awarded the winning teams with the monetary prize of 1.250 Euro to each of the teams.

CONFERENCE PRIZE FOR THE BEST INNOVATIONS IN 2018

The main objective of the Conference prize for innovation is to encourage commercialization of inventive/innovative technologies developed at public research organizations and to promote cooperation between research organizations and development groups in the economy. One of the main objectives is also promoting the entrepreneurship possibilities and good practices at the public research organizations. Many motivated researchers made their first steps towards the commercialization of their inventions also due to the participation in the past ITTC conferences. While planning the commercialization of their technologies the researchers are preparing their business model, making their market and state-of-the-art research and preparing their pitch presentation for presentation in front of an international expert panel in a pitch competition. However, they need support in the form of both

commercial assistance and financial resources to bridge the gap to the market and establish a start-up company or license out their technology. How shall they do it? The ITTC organizing committee helped them with three dedicated workshops and individual advisory support on how to prepare the pitch and check the business model variables [1].

The pitch competitions for the Prize for the best innovations / inventions in the last ten years resulted in spin-out company creation or technology licensing agreement in at least one new case per competition each year.

KEY STAKEHOLDERS

During the past years the Conference involved different key stakeholders in the innovation process. Public research organizations participated as knowledge providers, on the other hand technology parks participated as infrastructure providers. Different public agencies, private consultants, venture capital companies, business angels and other private investors, SMEs, international enterprises, private innovators are regular audience of the Conference.

TARGET AUDIENCE AND BENEFITS

The main target audience of the Conference are researchers, students and post-graduate students with entrepreneurial ambitions, established and future entrepreneurs, private innovators and representatives from governmental institutions and other policy-making organizations.

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Head, CTT - Center for Technology Transfer and Innovation
Member 10MG Technology Facilitation Mechanism, United Nations New York
Jožef Stefan Institute, Slovenia
Robert Blatnik, MsC, CLP, Center for technology transfer and innovation,
Jožef Stefan Institute, Slovenia
France Podobnik, Center for technology transfer and innovation,
Jožef Stefan Institute, Slovenia
Urška Mrgole, Center for technology transfer and innovation,
Jožef Stefan Institute, Slovenia

KONFERENCO ORGANIZIRA / CONFERENCE IS ORGANIZED BY

Jožef Stefan Institute

and co-organized by

KTT consortium, Slovenian Innovation Hub European Economic Interest Grouping - SIH EEIGRRA, RDA Koroška - Regional Development Agency for Koroška, d.o.o., Development Centre Novo mesto, University of Ljubljana, Faculty of Information studies in Novo mesto, Zasavje Regional Development Agency (RDA Zasavje), Development Centre Murska Sobota, Slovenian Business & Research Association, Chamber of Commerce and Industry of Slovenia, SPIRIT Slovenia - public agency, Association of Professionals for Technology Transfer of Slovenia, National Institute of Biology (NIB), Bio Base Europe Pilot Plant, Agricultural Institute of Slovenia, Regional Development Agency of the Ljubljana Urban Region, The Centre of Excellence for Integrated Approaches in Chemistry and Biology of Proteins (CIPKeBiP), Centre of Excellence in nanoscience and nanotechnology – Nanocenter, Ljubljana, The Chamber of Craft and Small Business of Slovenia, Development Agency of Savinjska Region, AREA Science Park, CO PoliMaT.

Jožef Stefan Institute
Ljubljana, Slovenija

KONZORCIJ ZA PRENOS TEHNOLOGIJ IZ JRO V GOSPODARSTVO

EVROPSKA UNIJA
EVROPSKI SKLAD ZA REGIONALNI RAZVOJ
NALOŽBA V VAŠO PRIHODNOST

REPUBLIKA SLOVENIJA
MINISTRSTVO ZA IZOBRAŽEVANJE, ZNANOST IN ŠPORT

Operacijo delno financira Evropska unija iz Evropskega sklada za regionalni razvoj ter Ministrstvo za izobraževanje, znanost in šport, Republika Slovenija. Operacija se izvaja v okviru Operativnega programa za izvajanje evropske kohezijske politike v obdobju 2014 - 2020, prednostne osi 1 Krepitev raziskav, tehnološkega razvoja in inovacij.

Slovensko inovacijsko stičišče
SIS EGIZ

RRAKOROŠKA
REGIONALNA RAZVOJNA AGENCIJA ZA KOROŠKO

Univerza v Ljubljani

razvojni center novo mesto, d.o.o.

Fakulteta za informacijske študije
Faculty of information studies

REGIONALNA RAZVOJNA AGENCIJA ZASAVJE

ORGANIZACIJSKI ODBOR / ORGANIZING COMMITTEE

Špela Stres, IJS

Robert Blatnik, IJS

Levin Pal, IJS

KONFERENCO SOFINANCIRAJO / CONFERENCE IS FUNDED BY

Institut »Jožef Stefan« and the following project: Consortium for Technology Transfer / KTT (2017-2022)

and co-funded by:

Enterprise Europe Network, and SIO 2018- 2019.

Jožef Stefan Institute
Ljubljana, Slovenija

Consortium for Technology Transfer / KTT (2017-2022)

EVROPSKA UNIJA
EVROPSKI SKLAD ZA REGIONALNI RAZVOJ
NALOŽBA V VAŠO PRIHODNOST

REPUBLIKA SLOVENIJA
MINISTRSTVO ZA IZOBRAŽEVANJE, ZNANOST IN ŠPORT

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Enterprise Europe Network

enterprise europe network
Business Support on Your Doorstep

European Commission

SIO 2018 – 2019

REPUBLIKA SLOVENIJA
MINISTRSTVO ZA GOSPODARSKI RAZVOJ IN TEHNOLOGIJO

SPIRIT SLOVENIJA
JAVNA AGENCIJA

I FEEL SLOVENIA

EVROPSKA UNIJA
EVROPSKI SKLAD ZA REGIONALNI RAZVOJ
NALOŽBA V VAŠO PRIHODNOST

CONFERENCE SESSIONS

The 11.ITTC conference consists of three important parts [1]:

- **The international brokerage event** – research to business with emphasis on collaboration of SMEs and technology Centers in KET areas.
- **The key note speech session** about KET collaboration between industry and research centers
- **The spin-out / scale up creation session:** selection of the best innovation with business proposition: pitch competition
- **The Workshop for technology transfer professionals** (closed event for TT professionals).

The logic of the conference goes as follows:
1. KTT part includes the B2R and the keynote speech sessions alongside with the Workshop for the TT professionals.
2. SIO part includes the spinout and scale up creation sesssion alongside with the pitches and Award committee.
The B2R part includes also in a smaller share an international matching opportunity. This opportunity arose from the fact that two separate Sector Group meetings have been organized in Ljubljana, Slovenia by JSI, the coordinator of the EEN project in Slovenia. Several participants of the Sector Group meetings agreed to participate at the B2R meeting session (in principle a national event connecting Slovenian researchers and Slovenian companies), also enhancing the level of discussions there.

In all relevant sections of the Conference particular attention was given to the fact that the consortium KTT and its goals need to be properly presented and advertised to the wider public and the industry.

In all relevant sections of the conference particular attention was given to the fact that the importance of work within the SIO project and the effort of community building has been emphasized to the wider public and the industry.

The Conference is organized in the following sessions:

8 - 10 October:

KET4Clean production Micro grants (50.000 Euro Grants for SME to buy services from EU Public Research Technology Centers).

International brokerage event – R2B meetings – motivating SMEs for KET collaboration with PROs

11 October:

Key note speeches:

Dr. Jon Wulff Petersen, director, Technology Transfer, Plougmann Vingtoft, Denmark

Brecht Vanlerberghe, head of R&D, Bio Base Europe Pilot Plant, Belgium

Spin-out creation: Best innovation with business proposition: pitch competition

Scale-up creation: SME Instrument - SMEs pitch their project proposals

12 October

Workshop for technology transfer professionals

11.ITTC awards ceremony – Prize award for pitch winners - the best innovation with commercial potential

International Brokerage Event: R2B (research-to-business) meetings

France Podobnik, Center for technology transfer and innovation, Jožef Stefan Institute

Robert Blatnik, MsC, CLP, Center for technology transfer and innovation, Jožef Stefan Institute

The International Brokerage Event - R2B Meetings – traditionally at the ITTC brings together representatives from science, research and business sector. Participants of the 11.ITTC met at beforehand organized and scheduled bilateral meetings. R2B (research-to-business) meetings have been proven to be an excellent opportunity for networking between researchers and companies. The researchers, participants of the Conference, have been able to present their activities, accomplishments and opportunities for collaboration. While discussing possible development solutions, inventions and commercially interesting technologies, the SMEs and researchers founded a number of future research cooperation and business synergies. More than 43 representatives of public research organizations, companies and other interested parties from 6 different countries attended at the 40 bilateral meetings in the 11.ITTC Conference. The researchers and SMEs which attended the R2B meetings have the opportunity and 11.ITTC organizers' assistance in promoting their innovations in the Enterprise Europe Network in the form of Technology/Business Offer and Requests and dedicated profiles for Partner searches in R&D projects. Innovations will be promoted via different channels (databases, thematic groups and events) in order to find needed commercial and technological partners and financial resources. Further Business to Research (B2Research) and Business 2 Business (B2B) sectors specific events will be organized by the Center for technology transfer and innovation at the Jožef Stefan Institute with the support of Enterprise Europe Network in order to enable a deeper interest from international companies for collaboration with the Slovenian economy and public research organizations [1], [2].

Key note lectures

Robert Blatnik, MsC, CLP, Center for technology transfer and innovation, Jožef Stefan Institute

Dr. Jon Wulff Petersen, director, Technology Transfer, Plougmann Vingtoft, Denmark

In the key note lecture, dr. Jon Wulff Petersen opened some of the important questions in technology transfer [1]. How to build up a technology platform at one – or a consortium of – universities? Should industry be involved early on? How do you attract industry interest when the platform has been established? What is the role of spin-outs? It is important to understand the difference between research and innovation. While the research provides new knowledge, the results of innovation are new products and services in the market. The challenge is how to do research and where to go with it to make most of the impact. The commercialization of innovation should and can efficiently be done only with the researchers which are motivated and able to do it. Not all of them will do it. The concept of two types of researchers (Mode 1 and Mode 2) is important to understand the value of multidisciplinary collaboration, enabling needs form the “out of the lab” world and how to consider the needs in order to create the innovation. While Mode 1 researchers are prone to do the research in the “inside lab world”, the Mode 2 researchers are in constant interaction with the outside world. Technology transfer is about helping the Mode 2 researchers to do the innovation. Industry should be involved, but how to match the needs of industry and priorities of the researchers. Some examples of priority lists for solving research challenges made by industry and researchers in Denmark showed that industry had completely different priorities as opposed to those the researchers thought are of most important. It takes a long time efforts to establish the trust and mutual understanding to enable the efficient collaboration between research and industry. Long term establishment of relations between researchers, industry and policy makers is a must for successful exploitation of knowledge to be brought into innovation. In this respect the technology transfer offices are in an important mission.

Brecht Vanlerberghe, head of R&D, Bio Base Europe Pilot Plant, Belgium

Brecht Vanlerberghe opened questions on how Key Enabling Technologies (KETs) could act as a basis for innovation [1]. How can KET Technology Centers (KET TCs) help modernising Europe’s industrial base, to shift to a greener economy, and drive the development of entirely new industries? How can KET TCs help bridge the European 'Valley of Death'? How to increase KETs-related manufacturing in the EU and how KET TCs and industry can collaborate better to increase the exploitation of the patents inside EU? The Bio Base Europe Pilot Plant has been presented as an example of good practice. Bio Base Europe Pilot Plant (BBEPP) is an open independent and multipurpose pilot facility which helps large and small companies, technology developers and academia to bring their bio based innovation from the lab to industrial scale, reducing financial risk and time to market. The bio based innovation requires a lot of infrastructure and dedicated industrial knowledge to progress in the technology readiness level. Bio Base Europe Pilot Plant is interesting example of innovation infrastructure with a not for profit business model for support of bio base innovation.

WORKSHOP: Spin-out creation

Robert Blatnik, MsC, CLP, Center for technology transfer and innovation, Jožef Stefan Institute

The workshop Spin-out creation is a final part of the competition of the research teams with their inventive / innovative projects from public research organizations [1]. Researchers and future entrepreneurs from public research organizations (PROs) applied with their projects to the public call for the best innovation in 2018 at PROs. The public call is rewarding researchers, the authors of the technologies, with the best value proposition. The aim of the public call is to promote the technology transfer from public research organizations via licensing and spin-out business development. The call is published each year (this year 10th time) and is open to authors of inventive or innovative technologies employed at PROs with an idea for commercialization. The authors have plans to develop innovative scientific-research ideas into viable business model. They presented their pitch with the proposals of innovation with business proposition to the international evaluation commission. The evaluation commission members evaluated the commercial potential of the innovative technologies, gave their feedback to the teams and selected the winners. A Special prize for INNOVATIONS FOR ECONOMY has been given to the winning teams. Two teams have been selected as the winning teams in the 11.ITTC conference:

the team

Damir Hamulič, Dolores Zimerl, dr. Peter Rodič, prof. dr. Ingrid Milošev from Department of physical and organicchemistry at Jožef Stefan Institute for their technology: KATRI - *Anti-fouling and corrosion protection top-coat: ''The future protection of the ships''*

and the team

Jani Bizjak, dr. Anton Gradišek and prof. dr. Matjaž Gams, from Department of intelligent systems at Jožef Stefan Institute for their technology: *TEE - The ultimate European assistant for the Elderly and the team.*

Pitch competition for the prize for innovations for economy

The five project teams - authors of the inventive/innovative technologies - presented their cases to the members of the evaluation commission. Each representative of the teams had exactly five minutes for the pitch presentation and seven minutes for answering the questions of the commission members.

Every application has been assessed by the members of the commission on the basis of predetermined assessment criteria. The commission members pre-assessed the written proposals of each team and made the first part of evaluation prior the pitch session. The second part of the final evaluation was made at the pitch competition. During the pitch session the commission members got the additional information about the proposed cases and selected the winners by the joint decision.

The commission members evaluated the proposals by using predetermined assessment criteria. We present the criteria of the assessment in Table 1.

Criteria lots	**Criterions**
1. Overall	Degree to which project aligns with market need
	Project's IPR situation
2. Product/application advantage	Unique benefits
	Meets customer needs better
	Value for money
3. Market attractiveness	Market size
	Market growth
	Favorable trends
4. Competitive situation	Degree of entry barriers
	Level of
	Manufacturing / processing synergies
5. Technology maturity	Technical gap
	Complexity
	Technical uncertainty
6. Risk versus return	Expected profitability (e.g. NPV)
	Return (e.g. IRR)
	Payback period
	Certainty of return / profit estimates
	Low cost & fast to do

Table 1: Assessment criteria for the evaluation of technology [3], [1]

The members of the evaluation commission at the 11.ITTC Conference are:

Dr. Jon Wulff Petersen, director, Technology Transfer, Plougmann Vingtoft, Denmark

Brecht Vanlerberghe, head of R&D, Bio Base Europe Pilot Plant, Belgium

Mag. Primož Kunaver, MBA, Direktor, Primum

Abstracts of the inventive/innovative technologies

Robert Blatnik, MsC, CLP, Center for technology transfer and innovation, Jožef Stefan Institute

In this section we present the abstract of the inventions / innovations, which were presented by the entrepreneurial research teams [1].

Title of the invention: TEE - The ultimate European assistant for the Elderly

Inventors: Jani Bizjak, dr. Anton Gradišek, prof. dr. Matjaž Gams.

Abstract: Many elderly are no longer comfortable living at home alone - they are afraid to get hurt, robbed or similar, with no one there to help them. The team has developed an innovative solution for this problem – an intelligent personal assistant that follows the users in a form of a wristwatch and helps them throughout the day. The main focus of the device is safety and security with automatic fall detection and activity monitoring, together more than 15 functions. The goal of the product is to effectively and safely replace a human carer with a virtual one at several areas of every day's life.

The target audience are people above 65 who are still living an active life. There are more than 100M elderly currently living in EU, majority of which fall under our primary target group. Secondly we see the potential of our product being used by guards, operators, adrenaline seekers, and also children.

The product was developed in scope of H2020 IN LIFE project, aimed at setting a new EU-wide standard for elder care. The supportive system among others includes a command module application, an optional call center, and in effect enables a new way of life – a better one. In average the system enables additional three-years of self-sustained living for the elderly. Would you support such a system for your elderly relatives? In addition to targeting the new standard EU system, the forthcoming modules that we are developing are dealing with chronical health problems like heart issues and other common diseases like diabetes and are going to be integrated into the product in the future.

The international evaluation commission selected the team as one of the two winning teams in the 11.ITTC prize.

Title of the invention: Reproducible, green and scalable process for PEM Fuel Cell PtCu alloy catalyst preparation-»The highway towards the hydrogen society«.

Inventors: Matija Gatalo, Matic Grom, Marjan Bele, Miran Gaberšček, Nejc Hodnik, Primož Jovanovič

Abstract: The team has developed a highly innovative, ecological and scalable process for platinum-copper catalyst preparation that can be used in hydrogen fuel cells. Fuel cells are expected to be the next market boom in energy conversion as they can convert hydrogen as a fuel and oxygen from the air into clean electricity – replacing conventional combustion engines in cars among also other various applications. Our catalyst is several folds more active than the alternatives currently on the market and thus uses much less of the expensive base raw material (platinum). This can have a substantial impact on the overall catalyst component price that is responsible for almost 50% of the total cost of the fuel cell system. We believe that, with our invention, an important economical barrier can be bridged to achieve faster hydrogen fuel cell market expansion. The global market size for fuel cells in 2016 has been estimated to be $3.2 billion and is currently limited to niche markets. However, exponential growth is expected in the next decade. The catalyst production is in a pilot stage, but the plans for the fully scalable production are already under way.

Title of the invention: Ankle helping boot for easy walking and rehabilitation

The inventor: Miha Dežman

Abstract: Walking disabilities appearing due to age, a stroke or accidents, greatly influence the people's lives that suffer from it. Even simple chores become ordeals, such as walking to the toilet, walking around the house or shopping for groceries. Patients then decrease their activity, which is unhealthy for them in the long term. While they seek medical help, the rehabilitation sessions are much too infrequent and therefore do not provide the best results. There is a need for a device with a potential for domestic use. The proposed device, called the passive ankle exoskeleton, can fill that gap. The device resembles a boot the user wears on both legs. During normal walking, the exoskeleton helps the user's leg muscles and makes their walking easier. The effort decrease is equivalent to the relief felt when one stops carrying a 5kg backpack. Due to its innovative use of elastic springs instead of heavy motors and big batteries, and its simple mechanical structure, the device is affordable and easy to manufacture, thus having a major advantage to other solutions. Due to its affordability and easy use, it is also appropriate for domestic use.

Title of the invention: KATRI - Anti-fouling and corrosion protection top-coat: ''The future protection of the ships''

The inventors: Damir Hamulič, Dolores Zimerl, dr. Peter Rodič, prof. dr. Ingrid Milošev

Abstract: The new line of new environmentally friendly anti-fouling paints free of copper or fluoro compounds for protection of boats and ships. The team has developed a new, biocides and metal free coatings with comparative characteristics as commercial anti-fouling paints but are cheaper and need less maintenance for boats. The new paint acts as a top-coat and has also excellent anti-corrosive properties. The team of inventors is looking for partners to enter the market and for technical cooperation.

The international evaluation commission selected the team as one of the two winning teams in the 11.ITTC prize.

Title of the invention: CF-Web: ClowdFlows Data and Text Analytics Marketplace on the Web

The inventors: dr. Martin Žnidaršič, dr. Janez Kranjc, mag. Darko Dujič, prof. dr. Nada Lavrač

Abstract: Intelligent data analysis became recognized as an important activity of almost any business. Services and solutions of this kind, though, do not come cheap and usually demand also significant investments of time by the end users. The team has developed an open source cloud based platform that supports the composition and execution of data and text processing workflows on the Web. The solution ClowdFlows has a user-friendly graphical interface that runs in any Web browser. ClowdFlows is easily managed in the browser by connecting processing components into an executable workflow that is executed in the cloud. Once constructed, the workflows can be shared, reused or extended. ClowdFlows Web Marketplace, which is the proposed business model, takes the idea of simplifying data analysis further – it serves as a marketplace of ready-made workflows and data/text processing components, enabling the developers to provide and charge for components or fully functional workflows for specific problems that can be reused by companies lacking the expertise and tools to perform the needed data analytics by themselves. The team plans for a mainly pay-per-use model, in which the end-user pays a pay-per-use fee to the developer, out of which a specified percentage remains to the ClowdFlows Web Marketplace platform. In a large and competitive market, ClowdFlows remains the only platform that allows development, execution and sharing of data analysis workflows purely online without a need for installation of client-side software.

WORKSHOP: Scale-up creation

Robert Blatnik, MsC, CLP, Center for technology transfer and innovation, Jožef Stefan Institute

Workshop Scale-up creation complements the Session spin-out creation with the pitch presentation of the SME which is pitching his innovation as part of the project proposal for applying to the SME Instrument. The same evaluation commission which evaluated the pitching teams in the Spin-out session gave valuable comments to the entrepreneur in order to further improve his proposal and thus enhance the chances of success.

Evaluation Commission:

Dr. Jon Wulff Petersen, director, Technology Transfer, Plougmann Vingtoft, Denmark

Brecht Vanlerberghe, head of R&D, Bio Base Europe Pilot Plant, Belgium

Mag. Primož Kunaver, MBA, Direktor, Primum

Moderator: mag. Robert Blatnik, Center for technology transfer and innovation, Jožef Stefan Institute

Workshop for technology transfer professionals

Robert Premk, Center for technology transfer and innovation, Jožef Stefan Institute

Gašper Juvančič, Center for technology transfer and innovation, Jožef Stefan Institute

The full day Workshop for technology transfer professionals was led by a well-known expert, director and senior consultant in TTO (part of Plougmann Vingtoft) Jon Wulff Petersen. The main aim of the workshop was to bring new knowledge about supporting the commercialization of research inventions at public research organizations.

Technology transfer (TT) includes all tasks and activities connected with how innovations and new technologies from academic, scientific and research institutions are applied in companies. In this setting TT officers connect both sides and in doing so, they interact with various groups (researchers, patent specialists, external project pilots, external mentors, investors). Since many TT offices lack resources, especially in terms of employees, system thinking is essential to overcome these obstacles. Communication is also crucial, since it creates team spirit, assures progress, creates transparency and above all, it creates commitment. TT officers need to make on a regular basis decisions which inventions should be returned to researchers and on which they should be actively working.

Petersen presented a case of a technology with accurate system to detect e-coli bacteria in a water and asked the participants, which five questions they need to ask to help them make a decision if the technology is promising enough to be implemented on a market. Participants split in two groups and after discussion following questions proved to be 'the right questions: (1) What problem does the technology solve?, (2) Who are the end-users?, (3) What end-users think about the technology?, (4) What legislation is valid for this technology?, and (5) Does this technology have any other uses/applications?

Experience showed that answers provide solid base to make a decision about approving or rejecting a technology. These questions can be integrated in a model of triangle separated in six segments and where specific value is added to them for evaluation: Application (3 points), Market (2 points), Competition (2 points), Human resources (1 point), Development time and cost (1 point) and Intellectual property rights and regulatory (1 point). Although in many cases first three segments proved to be crucial – technology with seven points seems appropriate for further work in a TT office, but when the achieved scoring is close to this value, a TT officer should make additional checks to 'not kill' the promising technology. Methods like NABC (Needs, Approach, Benefits, Competition), Grading and comparing' with M/I ratio (revenue/investment) can provide new insights.

When a technology is rejected, TT officer must ensure that this is a positive learning process for researcher(s) and TT office at the same time. Reasons should be explained, but in a way that it motivates and encourages researcher to continue with improving the technology or to search for other possibilities. Past examples in TTO show improvements in second and following generations of specific technology. Researchers also obtain valuable information when they communicate with non-scientific community and finding out about other research projects. Absence of arguments should be avoided.

When a technology is accepted by a TT office, there are in general two ways how to market it: by creating a company or with a license agreement. While first option is for those who are not risk-aversed, have dedicated team and sufficient financial assets, the second option allows you to stay focused on a research and development projects. Petersen recommends to approach rather smaller amount of companies and if possible, to establish a contact with company representatives who have authority to make decisions. Afterwards thorough communication between TT office and company follows to negotiate about all important points of future cooperation is expected and in the final instance, agreements is reached (optionally).

The lecture was very interesting, provided many insights and we learned about tools how to analyse technology, what steps should be taken. Our practice was also presented and some recommendations and tips were received.

BIOGRAPHY OF THE SPEAKERS AND MEMBERS OF THE EVALUATION COMMISSION

Jon Wulff Petersen, MSc Physics, PhD Semiconductor Physics, E-MBA, is Director, Technology Transfer, at the Plougmann Vingtoft, one of Scandinavia's leading consulting firms when it comes to strategic consulting, managing, protecting and commercializing of intellectual property rights (IPR). Jon is specialized in technology transfer, public-private innovation partnerships, technology roadmaps, technology scouting, and IP and technology valuation. His primary experience lies within the areas of cleantech, especially energy and environmental technologies (waste and water); micro- and nanotechnology, and electronics. Jon has headed the tto department since 2005, and has led a large number of assignments for Scandinavian companies and universities in Northern Europe. Previously Jon has been deputy director of Risø National Laboratory and director of the Micro- and Nanoelectronics Center (MIC) at DTU. In addition, Jon has an Executive MBA from SIMI.

Brecht Vanlerberghe is head of R&D at the Bio Base Europe Pilot Plant in Belgium. As Chief R&D Officer, Brecht coaches and supervises the consortia projects at the Bio Base Europe Pilot plant. He holds master degrees in applied bio engineering sciences and industrial management. Before he was responsible for product and process innovation in several international companies (AVEVE, Campina, FrieslandCampina, TEREOS) , first generation biorefineries based on milk or cereals, tubers, beet.

Primož Kunaver, MBA, works as an expert for technology transfer, financing of R&D projects and business consulting. He started his professional career as designer of sailing boats at the company Seaway, later worked in marketing at the company AM-BUS and worked as a project manager in the company ITEO Management Consulting. Currently he runs his own consulting company Primum d.o.o. and is permanently involved in the technology transfer activities of the Center for Technology Transfer and Innovation at the Jožef Stefan Institute. From 2000 – 2012 he has participated in more than 130 consulting or R&D projects. In the last 12 years he has participated in preparation of more than 50 national or EU R&D or related project proposals. He has developed several technological solutions in the area of aerodynamics with three granted national patents on his name. Primož is author or co-author of several professional articles or publications. He has been member of the selection boards of various national and EU innovation related contests and evaluator of R&D projects.

ABOUT THE ORGANIZER OF THE CONFERENCE

The Jožef Stefan Institute (JSI) is the leading Slovenian scientific research institute. JSI with more then 960 employees is covering a broad spectrum of basic and applied research in life sciences and engineering. The majority of research is in the areas of production and control technologies, communication and computer technologies, knowledge technologies, biotechnologies, new materials, environmental technologies, nanotechnologies, and nuclear engineering. The mission of the institute is the accumulation and dissemination of knowledge.

Center for Technology Transfer and Innovation at the Jožef Stefan Institute (CTT) is enabling and facilitating the transfer of knowledge and technology into domestic and foreign economy and to promote the JSI as a Centre of excellence for technological progress for all segments of society. The CTT mission is being realized mainly by the following key activities:

(1) the search for industrial partners and investors for licensing and the financing of spin-off / spin-out companies, establishing collaboration through licensing agreements and the establishment of spin-off / spin-out companies;

(2) active integration of economy and science with internationalization;

(3) raising awareness about, and support for, protection of intellectual property;

(4) support and assistance in applying to national and EU tenders;

(5) additionally, CTT takes care of education and popularization of science amongst young population.

CTT has a broad network of contacts with Slovenian enterprises. Yearly its experts give advice to over 100 SMEs in the field of technology transfer, intellectual property protection, internationalization, new product development, technology- and market assessment, innovation management and similar. CTT activities are driven by the desire to increase the visibility of the Jožef Stefan Institute, to raise companies' awareness of the Institute, and thereby encourage their cooperation with the Institute researchers.

In addition, the CTT is well connected to other national research organizations (universities and institutes), networking organizations (chambers, networks, clusters, technology parks, development agencies) and regional- and national government (municipalities, agencies, ministries). CTT is also a coordinator of Enterprise Europe Network in Slovenia and Slovenian Knowledge and technology transfer consortia (KTT). As a coordinator of National Technology Transfer Association CTT at JSI integrates the main three Slovenian National Universities and all Slovenian Institutes with the purpose of development activities of technology transfer and to contribute to the success of Slovenian economy. At the same time CTT activities are implemented with the goal to promote entrepreneurial mentality among researchers, as well as with sincere concern for the education and popularization of science among young people. In this respect the International Technology transfer conference has an important role of promoting the recent knowledge, good practices, recommendations to the policy makers and opportunities of the Slovenian technology transfer to the Slovenian innovation ecosystem.

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