TECHNICALUNIVERSITY OF CLUJ-NAPOCA

ACTA TECHNICA NAPOCENSIS

Series: Applied Mathematics, Mechanics, and Engineering
Vol. 61, Issue IV, November, 2018

DEVELOPING AN INNOVATION AND TECHNOLOGY TRANSFER E-TOOL IN THE FIELD OF BIO-ECONOMY

Emilia CAMPEAN, Marcel BELDEAN, Mihai DRAGOMIR, Gabriel VLADUT

Abstract: *The way business is conducted, the way people live, work, socialize and meet have changed dramatically in the past quarter century, and more so in the past decade, due to the development of digital innovative solutions. From the internet to smartphones, from 3D printing to social media, technology is creating an environment that is interactive, integrated and available for everyone.*
The paper presents an online e-tool that will help create bridges between SMEs, research institutes and public authorities in the Danube area. Creating this platform for the development of innovative solutions facilitates the communication and collaboration of actors in the Danube Region, with multiplying effects in the field of bio-economy. The platform increases the possibilities of creating innovative products by making explicit the mechanisms through which the market in the bio-economy sector works, thus leading to the attainment of sustainable solutions for the Danube Region.
Key words: *innovation, technology transfer, bio-economy, Made in Danube project.*

1. INTRODUCTION

In 2012, the EU presented its Bio-economy Strategy having as main goal to obtain a more innovative, sustainable and efficient economy, while maintaining environmental protection and biodiversity [1]. This article exemplifies how the online environment can be used in the area of bio-economy, offering the opportunity of providing innovative products and services in the Danube Region.

Innovation and research are key areas where Europe needs to invest more and better, in order to strengthen its international competitiveness, and to create sustainable economic growth and employment. This requires greater investment in R & D and ensuring that research results are translated into innovative products or services.

Different platforms that improve international competitiveness, have been developed in the past decade. In 2008, the Enterprise Europe Network created a platform where research institutes, technology centers and chambers of commerce can search, based on a series of criteria defined by the user, different organizational profiles and events that might interest them [2]. Another platform dedicated for eco-innovation in the Danube area, where you can meet and obtain information about research and development institutes, public authorities, NGOs and companies is available at [3]. The site provides general information about the involved actors, giving also the possibility of searching companies by location, contacts, type, influence, involvement in supporting eco-innovation, source, tags, and webpage. The In-Part site [4] developed a matching platform where universities can present the activity and subjects in which they are interested, so that the companies can find research organizations that study their fields of concern. A technology transfer platform was also developed for the UK universities. The platform is available at [5].

The benefits of digital technologies were presented by David J. Teece, in his paper „Profiting from innovation in the digital economy: Enabling technologies, standards, and licensing models in the wireless world” [6]. Chihiro Watanabe presented in his paper [7], a digital solution for bio-economy, that will

improve the industry, both for the upstream and downstream perspectives of the forest bio-economy. Another integrated platform developed in the field of energy-climate was described by Patrícia Fortes in [8]. The platform offers solutions for changes in the energy industry, bringing face to face the industry change costs with the macroeconomic response.

2. BRIEF OVERVIEW OF THE INTERREG DTP "MADE IN DANUBE" PROJECT

The technology transfer tool package for bio-economy targets common problems for Agriculture, Forestry and Bio-energy within the Danube macro-region, for supporting SMEs in merging successfully into this trend. The project aims to boost the innovation capacity in the area and to generate some innovative products and services by making use of its own e-tool and supporting elements such as trainings, workshops, reports and policy documents [9].

The e-tool will improve the collaboration conditions between SMEs, public authorities and research institutes, providing an on-line instrument that will help them transform ideas into marketable products. The on-line medium offers the right environment for the meeting of the offers from research institutions and the needs of companies, encouraging the development of new innovative products, that will not only advance the bio-economy sector but will also support the other industries and services related with it [10].

The main outputs of the project that uphold bio-economy advancements to which the platform and its associated tools will contribute are technology requests, technology offers, innovation audits, innovative products and services, innovation partnerships, and bio-economy specific initiatives (under the name of Local Action Pilots) [11]. This platform is conceived as a meeting point of all project work packages [9].

Beside this project support role, the on-line tool (called Danube Transnational Innovation Cooperation - DTIC) can be used by any stakeholders during or after the project if:

- An organization wants to present a newly developed technology and is seeking partners in the Danube Region;
- A company wants to explain their needs for technology support and is seeking partners in the Danube Region;
- A problem related to bio-economy stakeholders must be solved or a project in the field should be initiated.

3. E-TOOL STRUCTURE DEVELOPMENT

In The e-tool is called the Danube Transnational Innovation Cooperation (DTIC) and is available at: http://www.muri.utcluj.ro/tin-etool/index.php?page=login. The platform bases its functionality on the data entered by each member of the project and other interested users, in order to provide new product support and innovation services.

The developed tool needed to contain different modules to be compatible with its users' expectations [11-12]:

- Profiles of the companies and research institutes;
- Database with their offers and requests;
- Matching algorithm based on the companies' needs and the research institutes' offers;
- Customized communication tool for use within the platform to support cooperation;
- Dissemination options needed for exchange of information between the project, its stakeholders and the general public.

The developed tool must consider a large scope of functional elements and constraints [12]:

- Technical aspects
  - ✓The platform was build using the latest trends in web programming (PHP OOP, PHP Namespace, jQuery JavaScript, Bootstrap Modal).
  - ✓The e-tool can be accessed from mobile devices, in this way having a better accessibility and responsiveness directed towards the users.

✓The portal can be accessed using any modern web browser with JavaScript enabled. It is tested to assure compatibility with all major web browsers having any of their versions released after 2016: Mozilla Firefox, Google Chrome, Microsoft Edge or Opera Browser.

- Functional aspects

✓The ability for users to create and use accounts
✓Administration of users and access levels
✓Filling in and submitting a profile
✓Grouping of partners with similar interests
✓Social media like notification system and security options (private, partners, public)
✓Geographic and database enabled visualization options
✓A bio-economy specific support framework including up to date information from EU sources and product promotion capabilities
✓A keyword-based search and matching algorithm to ensure users can find viable partners

The tool must provide an integrated solution that is easy to use for the target group, allows easy access to all facilities, can be managed and maintained over time by a wider category of users with varying degrees of IT expertise. The audience of this tool are project members and the target group (i.e. the final users/beneficiaries of the platform).

The online tool has 7 main menus which will be discussed in the next paragraphs, concerning the project specific deliverable [11]:

- My account
- Help and support
- Open access
- Bio-economy
- Project community
- Project tools
- Article integrations

3.1 Main functionality of the platform

After login, the user will be redirected to the Home page. The upper menu contains links to add a new profile for Research/Innovation/TT or Business/Public Authorities. For research organizations in order to fill in an organization profile, you must follow the diagram below. The same process applies for companies.

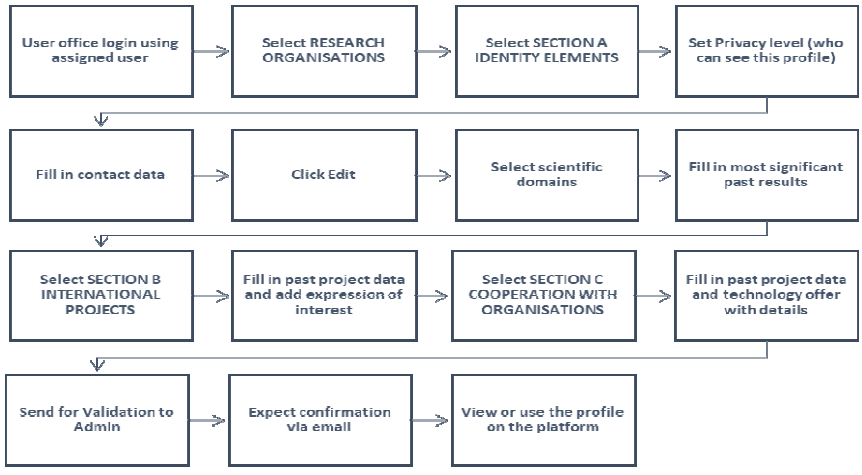

Fig. 1. Filling in a company profile [12]

As described in detail in the deliverable [12], the My account menu is needed to generate an accurate and as complete as possible mapping of the technology transfer and innovation potential and landscape in the area which is served by the project, the Danube Region. Each organization has to input concrete details reading its functioning, presence in the region and domains of activity and expertise. This is then complemented by a brief overview of the results and expectations for cooperation in the future, on two main directions, involvement in various large partnership projects (e.g. Interreg, Horizon 2020, etc.) or more direct and one-on-

one collaboration dedicated to specific problem-solution targeted improvements. The searching function and the matching algorithm use standardized keyword from well-known international classifications to establish connections.

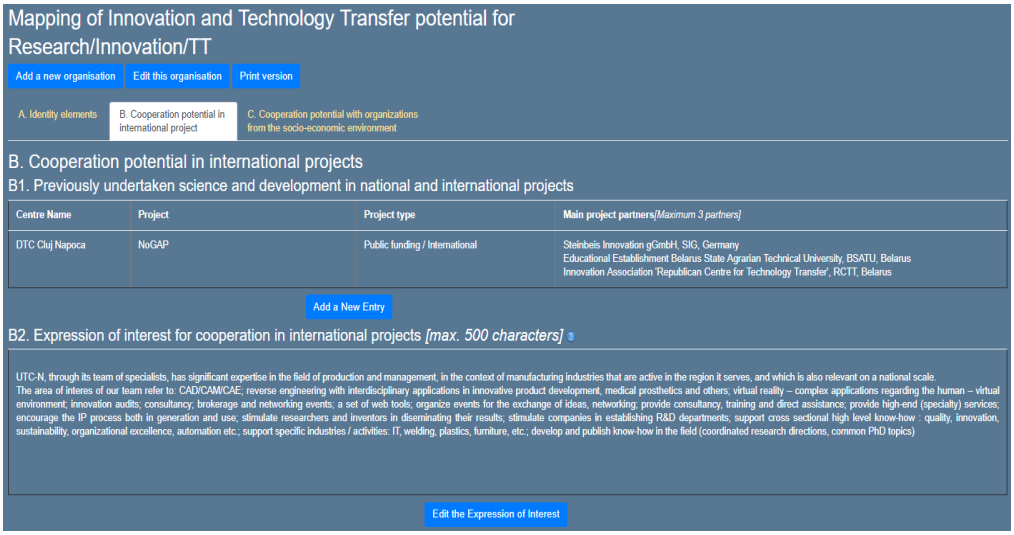

Fig. 2. Cooperation potential in international projects [11]

3.2 Complementary functionalities

The DTIC platform proposes a varied set of complementary tools to help the users have a seamless and effective experience while taking advantage of the main function presented above. Among these, we can mention [11]: the Project Community menu functions, the Conference Call system and the future Project Management System (currently under development). All these features serve the needs of the users of the platform while they need to communicate and work together within the identified opportunities. The community related functions help in establishing small teams of partners that decide to implement a project together, to share more information than they might with the general public or other users and that need to be in contact in a timely fashion. For this, the popular social media platforms of today provided inspiration in terms of software feature development.

The DTIC e-tool users can use the Conference page (menu entry in the Project Community section) to have peer2peer audio conferences and text chats about the topics related to their collaboration. This functionality is implemented on a dedicated server and uses state of the art communication protocols. It is not meant to compete with full-fledged systems and solutions for web conferencing, but to be available where the bio-economy creative idea might appear "on the spot" [13]. By combining these two major options and by adding the forecasted system for project monitoring and management, a small group of partners (even two entities collaborating directly) could become very effective at creating innovative bio-economy related products, services or project proposals. Considering that these functions are also available for mobile devices, the way people and organizations collaborate can change fast and in a significant way.

3.3 Additional tools

The innovation readiness and networking openness of SMEs and R&D institutes is expressed through two consecrated tools, the TO - Technology Offer and the TR - Technology Request which in this case are prepared to be employed in the field of bio-economy (Figure 4). By using these forms, the project team will be able to collect relevant information from the target group and facilitate innovative solution development.

The "Made in Danube" project uses online instances of the instruments which are faster to use, easier to share and more appealing to smaller companies or independent researchers or research groups.

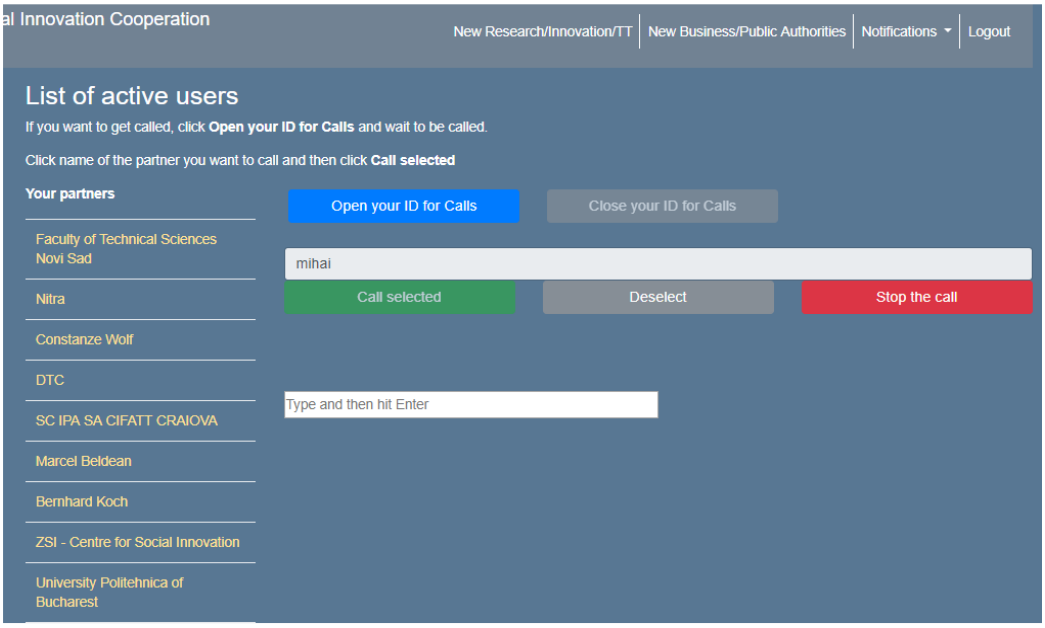

Fig. 3. The DTIC e-tool Conference page [11]

A brief, but concrete description of the needs or proposals for technology transfer and innovation support make the potential partners more visible and more trustworthy for future collaborations.

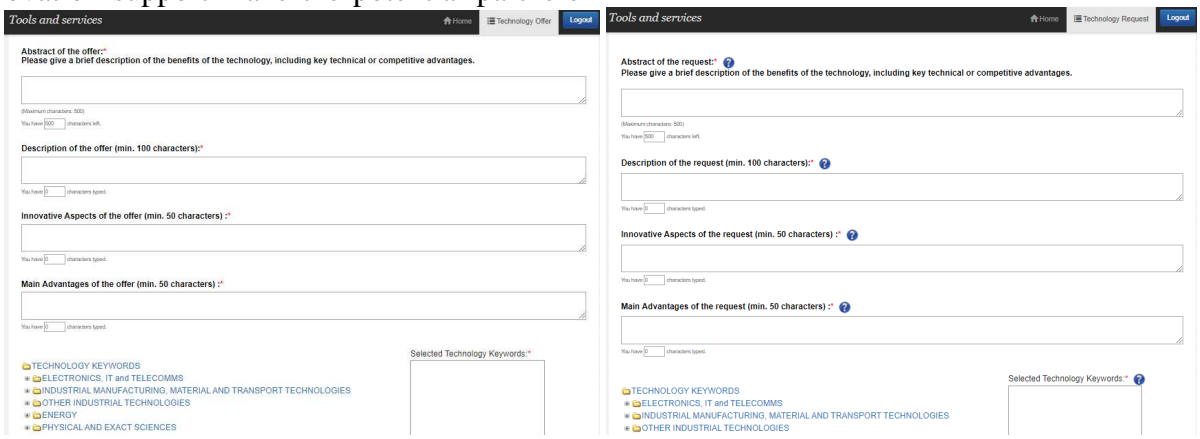

Fig. 4. Section "Fill in the form" of TO (left) and TR (right) [14]

The tools were developed by IPA Craiova and a link to them is provided within the DTIC platform. Also, IPA Craiova has product an Innovation audit form (not presented here due to space reasons) that is useful for assessing the overall capability and motivation of stakeholders for becoming involved in the project.

4. CONCLUSIONS

The resulting tool can have a significant impact upon the level and quality of transnational collaboration in innovation, research and technology transfer in the Danube Region and it could be exported as a good practice model to other EU regions. The platform contains broad access options and can be used by all types of users. Moreover, the information on the site is available at transnational level so that SMEs and research institutes will be supported and benefit from the project experience in various settings. Organizations can use these tools and benefit from them as concrete improvement tools, but they can also be further developed through future initiatives.

5. REFERENCES

[1] Directorate-General for Research and Innovation, *Review of the 2012 European bioeconomy strategy*, retrieved 01.06.2018 from https://ec.europa.eu/research/bioeconomy/pdf/review_of_2012_eu_bes.pdf, 2017.

[2] Enterprise Europe Network, *Partnering Opportunities*, retrieved 10.06.2018 from https://een.ec.europa.eu/tools/services/SearchCenter/Search/ProfileSimpleSearch?shid=32db25cb-726f-43b0-8b5f-7742d0935799.

[3] *Eco-innovation actors in the Danube Region*, retrieved 11.06.2018 from https://embed.kumu.io/40a24a68fdfa1882b75e85a179c8c244#eco-innovation-actors-in-the-danube-region.

[4] IN-PART, *Connecting Universities and Companies to drive innovation*, retrieved 11.06.2018 from https://in-part.com/.

[5] e-lucid, *A solution for Technology Transfer*, retrieved 12.06.2018 from https://www.e-lucid.com/technology-transfer-solution/.

[6] Teece, D. J., *Profiting from innovation in the digital economy: Enabling technologies, standards, and licensing models in the wireless world*, Research Policy, Volume 47, No. 8, pp. 1367-1387, 2018.

[7] Watanabe, C., Naveed, N., Neittaanmäki, P., *Digital solutions transform the forest-based bioeconomy into a digital platform industry - A suggestion for a disruptive business model in the digital economy,* Technology in Society, https://doi.org/10.1016/j.techsoc.2018.05.002, 2018.

[8] Fortes, P., Pereira, R., Pereira, A., Seixas, J., *Integrated technological-economic modeling platform for energy and climate policy analysis,* Energy, Volume 73, pp. 716-730, 2014.

[9] *Made in Danube project proposal*, Code DTP1-1-072-1.1, Interreg - Danube Transnational Programme, First Call for proposals, 2016.

[10] Steinbeis-Europa-Zentrum (SEZ), *Concept for Danube Technology Transfer Centres including a tool-kit on DTC creation and implementation*, Danube-INCO.NET project, retrieved 12.06.2018 from https://danube-inco.net/page/6/attach/2015-03-06_D5_8_Concept_Tool-kit_DTC_2nd_update.pdf.

[11] *Danube Transnational Innovation Cooperation e-Tool*, administered by TUCN, retrieved 17.06.2018 from http://www.muri.utcluj.ro/tin-etool/index.php?page=login.

[12] Dragomir, M., Beldean, M., *Made in Danube project*, Deliverable D4.2.1, e-Tool Adapted Structure, 2017.

[13] Dragomir, M., Câmpean, E., Beldean, M., *Made in Danube project*, Deliverable D4.2.3, e-Module Specific Communication tool, 2017.

[14] IPA Craiova, *Made in Danube project tools*, retrieved 17.06.2018 from http://www.ipacv.ro/made-in-danube/tools/tr/.

Dezvoltarea unui instrument electronic de transfer inovator in domeniul bio-econimiei

Rezumat: Modul în care se desfășoară activitatea în domeniul afacerilor, modul în care oamenii trăiesc, lucrează, socializează și se întâlnesc s-au schimbat dramatic în ultimul sfert de secol și mai mult, în ultimul deceniu, datorită dezvoltării soluțiilor inovatoare digitale. De la internet la smartphone-uri, de la tipărirea 3D la social media, tehnologia creează un mediu interactiv, integrat și disponibil pentru toată lumea. Lucrarea prezintă un instrument electronic online care va contribui la crearea de punți între IMM-uri, institute de cercetare și autorități publice din regiunea Dunării. Crearea acestei platforme pentru dezvoltarea de soluții inovatoare facilitează comunicarea și colaborarea actorilor din regiunea Dunării, cu efecte multiplicatoare în domeniul bioeconomiei. Platforma sporește posibilitățile de a crea produse inovatoare, făcând explicite mecanismele prin care funcționează piața din sectorul bio-economiei, conducând astfel la obținerea de soluții durabile pentru regiunea Dunării.

Emilia CAMPEAN, Lecturer, Ph.D. Eng, Technical University of Cluj-Napoca, Department of Industrial Design and Robotics, emilia.campean@muri.utcluj.ro, 103-105 No., Muncii Blvd., Cluj-Napoca.

Marcel BELDEAN, Ph.D. Eng, Technical University of Cluj-Napoca, Department of Industrial Design and Robotics, mbeldean@gmail.com, 103-105 No., Muncii Blvd., Cluj-Napoca.

Mihai DRAGOMIR, Associate Professor, Ph.D. Eng, Technical University of Cluj-Napoca, Department of Industrial Design and Robotics, mihai.dragomir@muri.utcluj.ro, 103-105 No., Muncii Blvd., Cluj-Napoca.

Gabriel VLADUT, Dr. Eng., SC IPA Craiova SA, office@ipacv.ro, 12 No., Stefan cel Mare Street, Craiova