iDEA LAB PLATFORM FOR STUDENT INNOVATION CONTEST - FIRST RESULTS IN THE APPLICATION

Zoran Anisic[1], Igor Fuerstner[2], Anja Orcik[1], Atila Nadj[2]
[1]University of Novi Sad, Faculty of Technical Sciences, Novi Sad, Republic of Serbia
[2]Subotica Tech – College of Applied Sciences, Subotica, Serbia

Abstract: *The paper will present the idea, structure and the first results in application of the innovation platform specially oriented toward students' contests. There is a significant number of professional platforms available on the web offering different kinds of tasks and creative challenges for task solvers offering monetary rewards for the best proposals. On the other side, there is a need for student contests in many engineering areas as the best way for learning how to solve some specific problems, preferably coming from industry. The paper will present the preliminary results of platform testing for two innovative tasks in the area of product improvement.*
Key Words: *Idea platform, Student contest, Open innovation, Crowdsourcing*

1. INTRODUCTION

Open innovation in the university-industry collaboration is considered as one of the most important elements in fostering innovation performance of one region. Therefore there are many initiatives that support these activities in different ways. The Tempus project "Fostering students' entrepreneurship and open innovation in university-industry collaboration - iDEA lab" (Ref. No. 544373-2013) aims to develop a physical and virtual environment for generating, developing and commercializing innovative students' ideas through relevant trainings, mentoring and technology put at their disposal. Following the entrepreneurial or open innovation route, it will foster the collaboration between universities and enterprises, advance employment potential of graduates from WBC and enhance the companies' innovativeness.

This paper focuses on the virtual segment of the iDEA lab. It presents the idea, structure and the first results in application of this innovation platform specially oriented toward student contests. Section 2 describes the iDEA lab platform concept, relating its elements to the existing literature and practice on open innovation and innovation contests. The structure of the iDEA lab platform is represented in Section 3, followed by Section 4, having the focus on the case study of innovation contests on the iDEA lab platform. Section 5 offers conclusions of this study and opens some questions for the future research and improvement of this platform.

2. IDEA LAB PLATFORM CONCEPT

The core idea behind iDEA lab project is to provoke students and young researchers to actively use their intellectual potential to generate innovative ideas. iDEA lab platform will be a knowledge repository and open innovation platform that will integrate all physical iDEA labs in the WBC region established through the project and will provide live events, lessons on specific subjects, online workshops, seminars, different multimedia contents, alumni and mentors sections. It will be the corner stone of the regional marketplace for ideas, as one of the iDEA lab project's results [1].

Considering that companies, especially SMEs, have limited resources to support their product development processes, their management has started to look for fresh ideas and competent individuals outside their borders. It is claimed that it is more effective to encourage a diverse group of people outside the company, or even the discipline, to seek innovative solutions [2]. Companies have started to distribute problem solving to larger groups of people, in order to mine collective intelligence, assess quality and process work in parallel [3]. These strong tendencies towards crowdsourcing follow the view that large groups of people are smarter and wiser than an elite few, no matter how brilliant they are. They are better at solving problems, fostering innovation, coming up with wise decisions, even predicting the future [4]. This open approach to product development offers a great opportunity for companies to access valuable knowledge from multiple sources (including small companies, universities and consumers) for the creation of innovations. This is the outside-in process whereby new ideas and technologies are acquired from partners and brought into the innovation pipeline [3].

As the world is getting more and more networked, companies are recognizing the power of the Internet as a powerful platform for collaborative innovation [5]. The Internet helps companies to gain more ideas for innovation, opening their innovation funnel through crowdsourcing and widening the scope for screening ideas [6]. Through the creation of virtual communities, it allows companies to tap into the social dimension of knowledge shared among groups of people with shared interests [5]. These communities consist of people, who

interact socially, a shared purpose, such as an interest, need, information exchange or service that provides, policies that guide social interactions, and computer systems, to support and mediate social interaction and facilitate a sense of togetherness.' [7]

In the search for knowledge within these communities that can deliver innovative products and services, innovation contests are being used for the acquisition of ideas, as a mechanism chosen by companies to perform open innovation [3]. They are a way to engage with external sources of knowledge (third parties, the "crowd"), such as individual entrepreneurs, students, experts and small firms, who are asked to submit interesting solutions for a particular contest challenge, that satisfy certain criteria within a defined timeframe [3]. Members of the crowd do not see, nor have rights to use the proposed solutions: the outputs are closed and owned by the sponsor [8], who offers the prize to contributors of the best solutions in return for the right to use and exploit them.

An innovation contest is defined as a/an (IT-based) competition of innovators who use their skills, experience, and creativity to provide a solution for a particular contest challenge defined by an organizer [9]. It is the invitation of a private or public organizer to a general public or a targeted group to submit contributions to a certain topic within a timeline, which are reviewed, selected and rewarded by established committees [10]. According to Boudreau and Lakhani (2013), innovation contests are the right choice when it is not obvious what combination of skills or even which technical approach will lead to the best solution for a problem. They are most effective when the problem is complex or novel and when it comes to design problems, where creativity is crucial [11].

3. STRUCTURE OF THE IDEA LAB PLATFORM

Existing open innovation platforms comprise crowdsourcing contests on corporate websites, initiated by companies themselves, platforms intermediaries, run by organizations that connect companies and solvers through innovation contests, as well as companies' (open) innovation management softwares. The iDEA lab platform represents an intermediary platform, in the form of the third party web-based innovation marketplace, which acts as a knowledge broker [12], allowing companies to access unbiased knowledge, and to gain insights into opportunities that lie beyond the companies' immediate field of view [13].

Following the analyses of twelve intermediary platforms (Innocentive, Idea Connection, Jovoto, Hypios, Ideaken, Innovation Exchange, Idea Bounty, Eyeka, Top Coder, Edison Nation, Atizo, Kaggle) and their basic aspects (type, interface, challenges, disciplines, sectors, research library, community and news), as well as the literature review on this topic, the structure of the iDEA lab platform has been developed (Table 1). The contest organizers on this platform are made up by an industry partner and an academic institution, targeting students as primary contributors.

Table 1. *Basic aspects of the intermediary platforms*

Innovation contest platforms	Type		Interfaces		Challenges				Disciplines				Sectors		Research library			Community			News	
	Contest organizers	Contest agents	Companies	Solvers	Idea / theoretical proposal	Concept solutions	Sourcing technologies	Research	Any	Data science	Digital products & services	Design	Corporations	Government & Non-profits	Articles & White-papers	Case studies & Best practices	Webinars	Open access to profiles	Open access to solutions	Forum	Blog	Newsletter
Innocentive	x		x	x	x	x			x				x	x	x	x	x	x		x	x	x
Idea Connection		x	x	x	x	x	x	x					x	x	x	x		x		x	x	x
Jovoto	x		x	x		x						x	x	x				x	x	x	x	x
Hypios	x		x	x	x	x		x	x				x		x					x		
Ideaken	x		x	x	x	x			x				x					x		x	x	x
Innovation Exchange	x		x	x	x				x				x	x				x		x		
Idea Bounty	x		x	x	x				x				x	x							x	x
Eyeka	x		x	x	x	x			x			x	x	x	x	x	x	x		x	x	x
Top Coder	x		x	x		x				x			x	x	x	x	x	x		x	x	x
Edison Nation	x		x	x	x	x			x				x	x	x	x		x		x	x	x
Atizo	x		x	x	x				x				x					x	x	x	x	x
Kaggle	x		x	x		x		x		x			x	x	x			x		x	x	x

Having in mind the classification for innovation platforms according to two key attributes – platform operator and platform purpose, iDEA lab platform can be described as a problem-oriented third party operator, which is focused on finding solutions for specific challenges and awarding the best proposal [14]. Additionally, contests that take place on this platform can be described according to the list of ten key design elements for innovation contests [9]. Concerning the media choice, these innovation contests are run online, with the possibility to become mixed in later stages when the valuable solutions are being improved through personal contacts among participants (students) and organizers (university professors and teaching assistants, with the support of partner company's representatives). The tasks are highly specific and call for elaborated concept solutions, within the time frame of six months (during summer or winter semesters). Motivation to contribute one's competences to an innovation contest is fostered by a reward system that is adapted, as much as possible, to the needs of the target group. The rewards are realized by monetary prize and social motivation, like positive feedback, reputation among relevant peers and self-realization. Community functionality is provided through the elements which foster interaction, like information exchange and topic related discussion on the platform or face-to-face during lessons or consultations. Evaluation of the submitted solutions is realized by the jury, consisted of the companies' representatives, as well as university professors, teaching assistants and researchers in the field.

In order to increase the efficiency of innovation contests, iDEA lab platform supports multiround contests, in which the first round is played with a large pool of contestants who make relatively little investment in the idea generation phase [15]. In the second round, after the submitted ideas are evaluated and the promising ones are selected, the limited pool of solvers work on the idea development and refinement in closer contacts with the contest organizers, focusing on the concept development. The following figure describes the process that is planned to be developed and established on iDEA lab platform (Fig. 1).
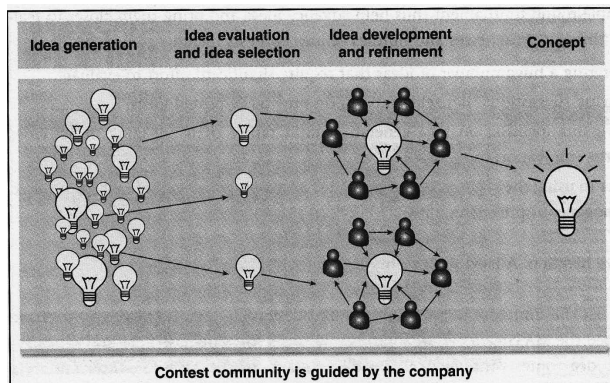

Fig. 1. *Innovation contest process on iDEA lab platform (adapted from [16])*

In each innovation contest the participants, i.e. companies or university laboratories, research centres, institutes as solution seekers, university as an intermediary, and students as problem solvers, all have their defined roles. Therefore, iDEA lab platform comprises these three crucial segments (Fig. 2) within the university environment, that allow solution seekers and problem solvers to fulfil their own assignments. As solution seekers, companies should propose a specific task to be solved and give a support for an interesting idea/product/project, and university laboratories, research centres, institutes, are supposed to invite students to join for a specific research project and to give an infrastructural & expert support for an interesting idea/product/project. Solution seekers should also provide a financial compensation for solvers in return for solutions in order to retain the IP rights to them [2]. The role of students is to solve tasks on a specific challenge/contest, to give their opinion/vote on a specific challenge, to propose a product/service idea, to propose a business model or some activity/idea.
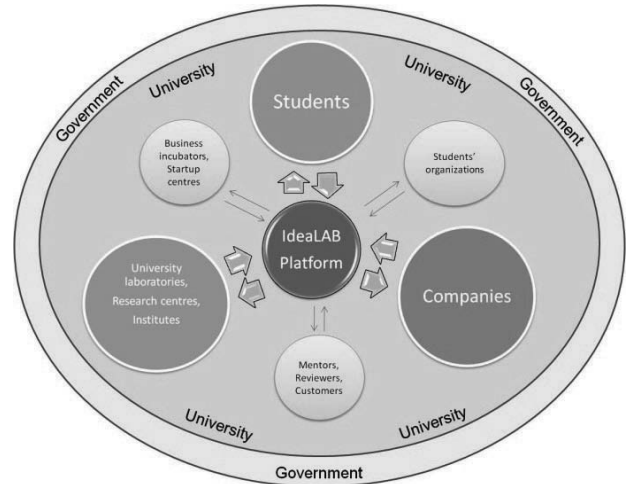

Fig. 2. *iDEA lab platform structure*

The incentive structure for participants needs to be attractive for the participants and appropriate for the company [6]. Since students invest considerable time and effort, a mixture of monetary (cash, scholarship, etc.) and non-monetary prizes (student job, internship, professional certificates, etc.) should be a successful stimulation for both intrinsically and extrinsically motivated students. Concerning the scope of innovation contests, there are two major strategic application areas distinguished - greater good and solutions for corporate challenges [17]. In student innovation contests, apart from finding the solutions for a company's problems, the development of students' skills and competences is another main objective of these contests and also represents a strong incentive for students. On the other hand, HEIs are also stimulated to tap into a talent pool of their student groups, and offer them research internships to foster ongoing research on these institutions.

4. IDEA LAB CASE STUDY

The developed platform prototype is tested in real environment to gain necessary insight into functionalities, usability, etc. Two projects were launched simultaneously. Both projects had a defined task with supporting documentation. The desired outcome for both projects was a functional prototype of a given subassembly on an existing product.

The existing product was a "Croozer Kid for 1 Bicycle Trailer", which is a product of the Zwei Plus Zwei GmbH (Fig. 3).

The first defined project dealt with modifications on the »Baggy wheel« connection to the trailer (Fig. 3-1), while the second project dealt with modifications on the »Handle bar« connection to the trailer (Fig. 3-2).

Fig. 3. *Croozer Kid for 1 Bicycle Trailer*

The functional requirements were defined in detail for both of the projects by the manufacturer. Some of the most important requirements were as follows:
• provide mounting on the trailer in one move,
• realize automatic locking,
• realize removing in at least two steps,
• provide access with average hand,
• disable all required degrees of freedom,
• enable all required movements.

The projects were accessible for third-year students of mechanical engineering at Subotica Tech – College of Applied Sciences in Subotica, Serbia and at Faculty of Technical Sciences in Novi Sad, Serbia, who registered at the platform as "Problem solvers". The user interface for the "Problem solver" is presented in Fig. 4.

Fig. 4. *User interface for the "Problem solver"*

After signing in, the students are able to choose the task they are interested in solving and have access to all information needed, such as (functional requirements, CAD drawings, other available analyses and calculations). Of course, they can communicate via the system messenger with the task administrator if they have additional questions.

The projects were set to be performed in three independent phases. In the first phase all registered students who wanted to participate in the project uploaded their ideas as 3D PDF models with comments. These were initial ideas that have not been designed in

detail. All uploads were analyzed and graded independently by a group of reviewers and the representative of the manufacturer. The analysis was performed based on the agreed criteria between the reviewers and the representatives of the manufacturer. It is important to provide fulfillment of the main requirement/function of the specific task in the students' proposals. So, reviewers have to check the fulfillment of the "basic criteria" and provide comments if there is some possible problem or the basic criteria are not provided. Fig. 5 presents parameters and the user interface for the analysis procedure at the Phase one for the project "Baggy wheel" connection to the trailer. An example of a student's idea uploaded in Phase one is presented in Fig. 6.
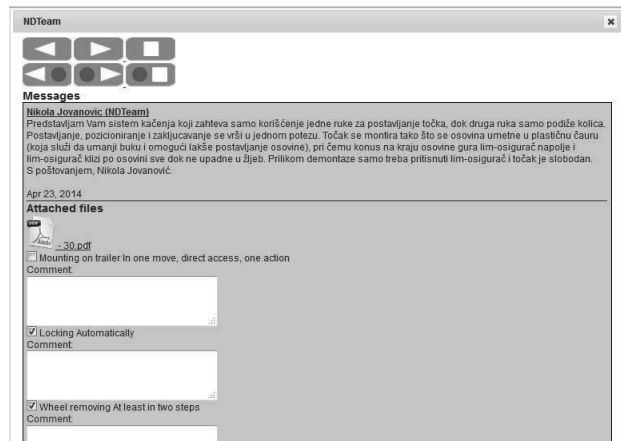

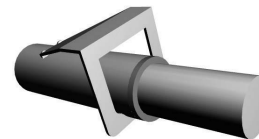Fig. 5. The user interface for the "Reviewer" for Phase one

Fig. 6. Example of one idea uploaded in phase one

The first phase is not eliminatory and all students have a chance to upload the improved solutions for the second phase, according to the received suggestions.

The second phase uploads were made also as 3D PDF models in the assembled and disassembled structure with comments. These improved uploads were done in more detail and with more specific suggestions regarding the functionality. Fig. 7 presents the list of uploads in Phase two for the project "Baggy wheel" connection to the trailer.

An example of how the same idea from Phase one (Fig. 6) is improved and uploaded in Phase two (Fig. 8).

Fig. 7. List of uploads in Phase two

All uploads in the phase two were also analyzed and graded independently by a group of reviewers and the representative of the manufacturer. The analysis started with checking for the fulfillment of all basic criteria from the first phase. They all have to be fulfilled or the proposal is eliminated. The criteria for the second phase are the so-called "quality criteria" for different functional requirements and uploaded solutions can be graded in scale from 1 to 5.
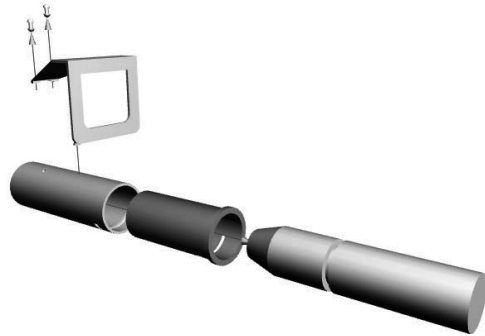

Fig. 8. *Example of one idea uploaded in phase two (exploded view)*

Fig. 9 presents a part of the parameters and the user interface for the "Reviewer" for the analysis procedure at phase two for the project "Baggy wheel" connection to the trailer. In Fig. 7, the green rows represent the ideas that fulfill the requirements defined by the project.
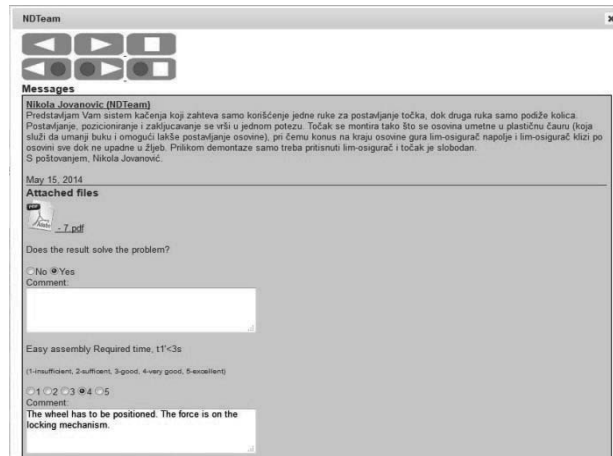

Fig. 9. *Part of the user interface for the "Reviewer" for Phase two*

After the phase two, all participants were invited to improve the best ideas from the phase two. The best ideas were opened to whole group of participants, so that everybody can have access to the chosen solutions. The third phase of the project included further improvements of ideas, with 3D sketches in more detail, taking into account the real measurements of the product and possibly, the used materials and technologies. Also, all functional requirements had to be taken into consideration. Fig. 10 shows the same idea presented in Fig. 6 and Fig. 8, now further developed.

The idea is to provide refinement of the solutions by community members. It means that somebody can upload a solution with a much better design and more optimized than the initial proposal that was selected in the second phase.
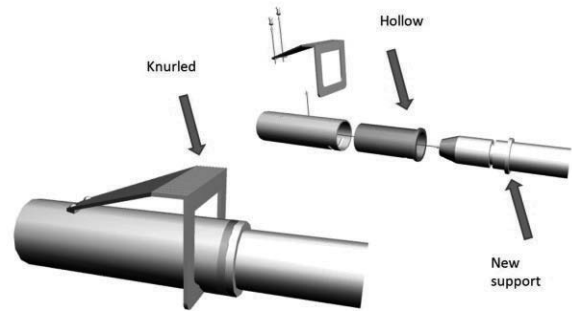

Fig. 10. *Example of one idea uploaded in Phase three (assembled and exploded view with comments regarding the improvements)*

According to the structure of the contest, a specific reward system was developed:
• *40 % of the prize fund, for all solutions that completely fulfilled functional requirements.* The idea is to respect all engineering solutions that fulfilled the given task.
• *40 % of the prize fund, for the best three solutions after the phase II, that have potential to be developed further.* This part of the reward is committed to the most inventive solutions.
• *20 % of the prize fund for the best solution after the phase III.* The last part of the reward is committed to the best solution, after community developed after improvement of the community members.

The experience resulting after the first application of the proposed reward system, provided positive feedback.

5. CONCLUSIONS

In comparison with internal product development, co-creation through innovation contests provides companies with the opportunity to increase the number of sources of new solutions, by embracing the competences and intelligence that are not present inside their borders. Companies should not necessarily engage their own resources to find the right employees, to incentivize and monitor their effort. They can benefit from involving a large number of innovators in their product development processes. Through a student innovation contest, Zwei plus Zwei GmbH created a pool of potential solutions, it will select the best one and award its contributors for the effort and performance.

Since students are identified as a powerful source of innovative solutions and it is shown that there is a great potential for the cooperation between universities and industry in this sector, there should be a specialized platform to support this kind of collaboration, as is iDEA lab platform. There are some crucial issues that have to be taken into account for the further development of this platform. This platform has to be simple and intuitive for all parties involved in innovation contests. The motivation mechanisms (incentives) have to be well-developed for each challenge to attract students, who should be educated to become open innovation ambassadors through their experience gained in these innovation contests. There are already group problem solving and entrepreneurial idea development tasks that are included in existing courses at universities, as well as different contests organized for student population. In order to develop iDEA lab further, they should be

connected to this platform. However, there is lack of the experience for a specific challenge deadlines, reviewing criteria and respond/reaction of the "crowd" (students). These are some open questions that need answering, in addition to intellectual property issue, concerning rights among different partners, as well as sustainability issue of iDEA lab platform.

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CORRESPONDENCE

Zoran Anisic, Ph.D.
Full Professor
University of Novi Sad
Faculty of Technical Sciences
Novi Sad, Serbia
anisic@uns.ac.rs

Igor Fuerstner, Ph.D.
Subotica Tech – College of Applied Sciences, Subotica, Serbia
ifurst@vts.su.ac.rs

Anja Orcik, M.Sc.
Doctoral candidate
University of Novi Sad
Faculty of Technical Sciences
Novi Sad, Serbia
a.orcik@uns.ac.rs

Atila Nadj, B.Sc.
Subotica Tech – College of Applied Sciences, Subotica, Serbia
nadj@vts.su.ac.rs