

SMART2M Digital Platform as the Communication Channel for Academia - Industry Collaboration

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Abstract—This paper deals with the concept of digital platforms that serve as the online collaboration channel. We have created the SMART2M digital platform for innovations, <http://innovate.smart2m.eu/>, to facilitate the solution of challenges and different competitions that may be used by the academia, as well as the industry. The detailed description, accompanying content and specification will reinforce the concept of approving the solution, which can be a solution to homework in case of academia, or the actual product, technical solution or service in case of industry. Academia can reward the students with points for a successfully submitted solution, while organizations can offer monetary incentives or cooperation agreement for the winning ideas. Challenges are presented to a wide group of solvers as a public Call to solve problems - innovate. Users who represent potential solvers send ideas to the entities that published the problem. The final solutions are owned by the entity that announced the Call, or can be further negotiated with the applicants through the direct connection.

I. INTRODUCTION

There has been a trend of online learning for several years. The COVID-19 pandemic has led to an increase in the use of online education platforms [1, 2]. Today, there are wide possibilities to continue education on online platforms. This study is the analysis related to creating a digital business platform as a model for Education 4.0 [3] and towards a channel of communication between academia and industry. On this platform, teachers can set assignments for students, and the best solutions can be rewarded with points. The SMART2M platform, <http://innovate.smart2m.eu/>, is created out of the need to enable entities such as universities/colleges or companies to find innovative solutions outside their scope. Reducing the number of resources of one company as well as faster finding of innovative solutions represent the motivation for the creation of the platform. It is designed so that universities/colleges or companies can publish their own challenging problems at any time, while Solvers can submit their ideas to the problem, which can be a potential solution. In this way, scientists around the world can share their knowledge gained through many years of experience.

II. RELATED WORK

There are several examples of successful platforms for setting up and solving challenging problems. Petlja [4] as one of the examples of such platforms, gathers primarily individuals who want to learn more about programming. The platform is also used by educational institutions, so the platform provides an opportunity for teachers to test the knowledge of their students with the help of interesting problems. Innocentive [5] is a web platform which many companies use, i.e. public sector agencies, commercial enterprises or nonprofit organizations. Companies post their problems and give financial incentives for the best solution. Users which are registered can send their solutions. GeeksForGeeks [6] is a web platform where student or developers or scientists can find many solutions for the related problems. Additionally, they can send their solution for some challenges. Some challenges are aimed for practice, but many challenges are rewarding to solvers. Agorize [7] is an online platform that uses the SaaS solution to manage innovation and employment. On this web platform, one can find many challenges of different types. The reward for many challenges is money, but some have rewards like a trip, smart devices or internship offers. Herox [8] web platform is a popular platform for solving interesting problems. Companies or individual users can post challenges and Herox [8] team will solve. Usually, challenges run between 2 and 4 months, but companies can set any time limit. CodeJam [9] is a platform for algorithmic writing competitions. Competitors from all over the world apply and solve algorithmic tasks. This competition takes place in several rounds, usually 4 rounds. Shortlisted candidates (top 25) win cash prizes. Despite the great advantages of existing platforms, our proposed platform is the first that combines the needs of both academia and industry sector. It sets the basis of communication channel for academia - industry collaboration.

III. METHODOLOGY

First, it was necessary to create the concept of the platform itself and find adequate programming languages for its creation. Adequate users are identified, as well as the functions of each type of users. Users can approach the platform from any device, the design of the platform is responsive.

This platform was created by using Angular with programming languages HTML, TypeScript and CSS. Mentioned technology was used for the frontend of this platform. Angular is an open source frontend platform used to develop a client-side web application. The layout is defined using HTML and CSS technologies, and the programming language TypeScript is used for functionality [10]. Laravel is a PHP framework that contains the physical logic of the entire platform and the communication with the database [11]. Read, write, delete, and add operations to the database are considered physical logic. Operations that include checking the validity of the information entered by filling in the required forms, filtering and sorting data are provided in Laravel. The mentioned framework defines the backend platform. When registering new users or adding new data, the possibility of error is reduced by introducing data validation. In addition, users are provided with tabular access to data that can be sorted and filtered. Communication between frontend and backend is enabled via API. The described communication is shown in **Fig. 1**.

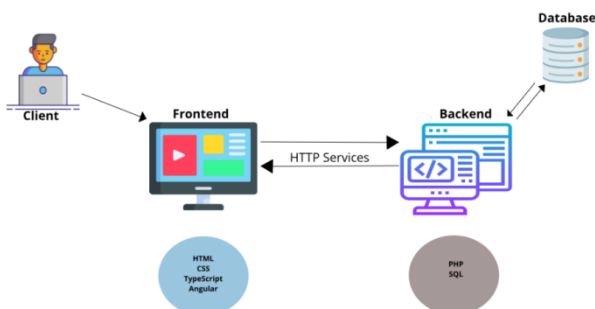


Figure 1 Platform architecture

A. Demonstration of the platform

Approach the platform is possible from any device and the first page that any user can see is Home. This page contains the latest Calls and instruction for use. From this page, user can go to the other pages using Quick links or buttons. Short and simple text attracts people to left their mark on our platform (**Fig. 2**).



Figure 2 Home page

Investor, Company, Research group can publish customized Calls for Innovative Solutions to Research Challenges. Solvers can apply with Innovative Solutions, from anywhere around the world: students, researchers, innovators, companies. Solver can be anybody who has an idea for solving the problem. For any user who isn't logged, full Call details are not displayed.

Registration and login contain forms in which users enter their information. User has to enter his verified email and password for login, but register form has more fields.

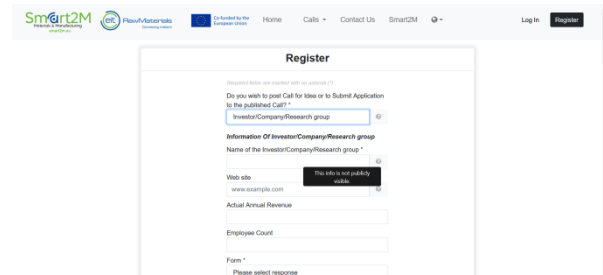


Figure 3 Registration

Fig. 3 show registration for companies, investors or research group. Firstly, you need to choose the type of user. Help in deciding on the type of user is hidden behind symbol "?". By hovering the mouse cursor over this symbol, you can see text like help.

By choosing Investor/ Company or Research group, the user must first enter company information and next his personal information. A company can enter its name without fear of competitors seeing its problems. Users of the platform don't know who is posting the Call.

Fig. 4 briefly show steps which company should follow. Next steps are creating challenge, reviewing ideas and for the end accepting the most optimal idea.

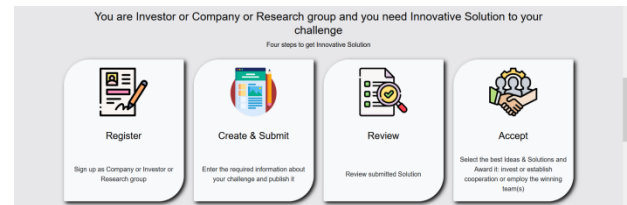


Figure 4 Steps for Companies

Solvers have to follow the steps in **Fig. 5**, four steps to send solution. After registration, solver reads the full description of the Challenge, create s an idea and submits it. If his idea is the most optimal, he wins.

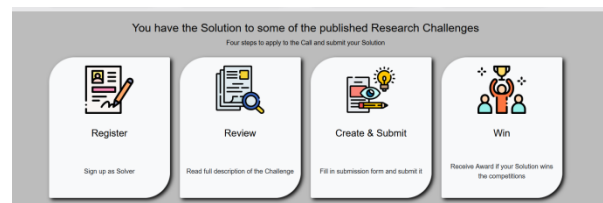


Figure 5 Steps for Solvers

By registration as a company, user gets possibility to add a company problem as a Call. The form for adding a new Call is located on page "My Content" (**Fig. 6**). First section contains all company Call (active, on hold, expired), in next section "Post new Call" user can fill form with fields and post Call, last is "Applicants".

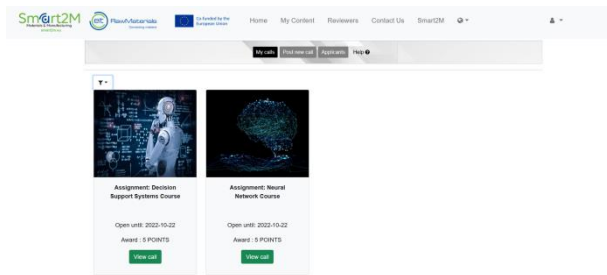


Figure 6 Page “My Content”

By registration as a company, user gets possibility to add a company problem as a Call. The form for adding a new Call is located on page “My Content” (Fig. 6). First section contains all company Call (active, on hold, expired), in next section “Post new Call” user can fill form with fields and post Call, last is “Applicants”.

Adding a Call is successfully if the fields are filled according to certain criteria (Fig. 7). While adding a Call, an award is necessary. Award can be money, points or cooperation agreement. Before sending a Call, all the details should be taken into account and public can see an abstract of your Call.

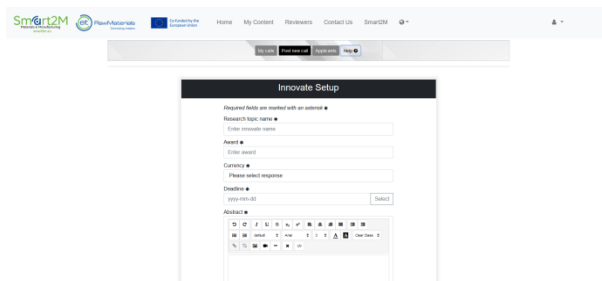


Figure 7 Post new Call

When the user posts a Call, its status is “on hold” because the platform SMART2M has users with the role “challenge approver”. Challenge approver is the user who has to read the full details of a Call and prevent hate speech and other inappropriate contents.

Section “Applicants” contains all solutions which arrived like ideas for company problems. Company representative can see information about the solvers, details of ideas and ideas' reviews. After reading reviews, a company (Investor or Research group) can accept idea or reject (Fig. 8). The platform SMART2M is available to educational institutions and by using it professors can test the knowledge of their students.

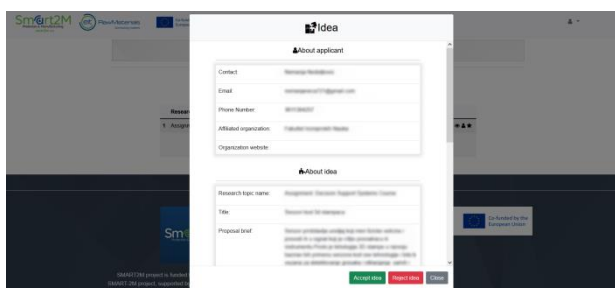


Figure 8 Details of idea

The word “reviews” has been mentioned in the previous paragraphs as an aid in deciding on the most optimal solution. Reviews are written by reviewers who are chosen by company, Investor or Research group. If people use the platform for a competition, reviews are objective because reviewers don't know personal information about solver. It possibly choose reviewers by adding their email address or select from list, for successfully send requirements to reviewers it is necessary to choose the name of the Call which has at least one idea.

A user who registers as a solver has an ability to read full details about the given challenge and submit a solution if he has an idea. In the section "Call" users can see all the challenges that have been posted and have an active status (Fig. 9).

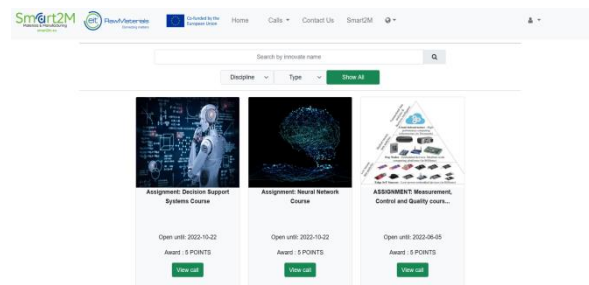


Figure 9 Calls

The button “Create idea” becomes visible when user read text about challenge. The user can send only one idea for some challenge, but can submit many ideas for different challenges. To submit an idea, it is necessary to fill in the fields in the form. Firstly, fields in section Contact details are filled with personal information about solver, if the information is incorrect, user can change it. When writing an idea proposal, it is necessary to describe the capabilities and project plan, and it is desirable to add an attachment (Fig. 10).

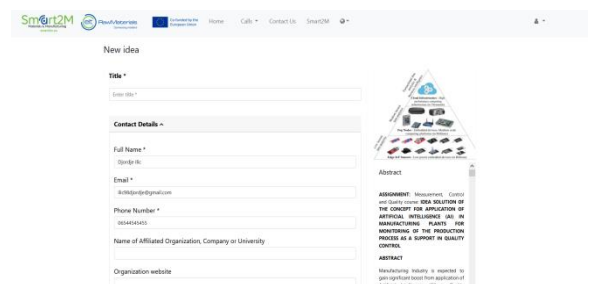


Figure 10 New idea

The user can browse Calls he has answered in the past, along with the ideas that he had submitted. The solver can see the status of all of his ideas (Fig. 11). When the company, investor or research group accepts an idea, the user who posed it will be notified via email.

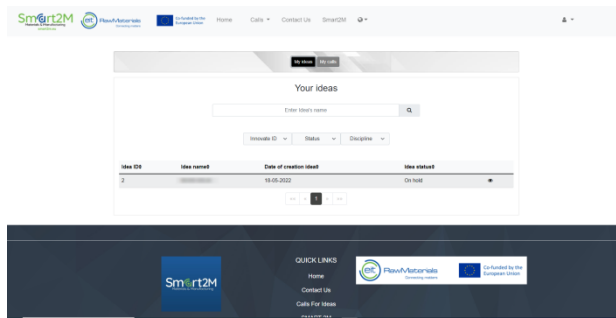


Figure 11 My Content

IV. CONCLUSIONS

SMART2M digital platform has been created to serve as the meeting place of different stakeholders of the innovation process. It is aimed to connect industry, companies and research groups with potential collaborators who can provide solution to the research problems that are posted online, visible to all research community across the world. It is the effective digital solution that can provide students with real case problems and offer them opportunity to engage in problem solving with companies, which can open up different further opportunities, such as internships, collaboration agreements and research contracts. SMART2M digital platform has proven to be the efficient method to speed up the problem solving and innovation deployment.

ACKNOWLEDGMENT

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