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The Open Innovation Exchange Platform

Experiences of implementing a business community engagement platform for channeling IP development and collaboration with local businesses

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***Abstract*—The Open Innovation Exchange Program (OpEx) is an online market place for Business Community Engagement, which encourages collaboration on innovative products and services. Individual participants are able to set their dissemination level keeping their Intellectual Property safe, while still enabling collaborations between Coventry University academics and businesses. The project will implement the web-based market place and also integrate immersive virtual technologies where appropriate. The platform is currently being rolled out across Coventry University, the Times Higher Education award winning 'Entrepreneurial University of the Year of 2011. This paper describes the experiences of implementing the marketplace for business community engagement in Coventry. It shows preliminary studies on the use of different technologies, describes the development of the platform and describes a preliminary evaluation of its effectiveness and how it can support Open Innovation and foster IP creation.**

Keywords: Open innovation, OpEx, online platform.

I. THE OPEN INNOVATION EXCHANGE

Innovation is often considered to be one of the key drivers of economic growth. Universities and other Higher Education institutes have vast knowledge bases; however they often work on fairly theoretical levels. Partnerships with companies can be very beneficial for parties, fostering innovation and helping both the company and the institution economically. However there is a clear cultural difference between the Higher Education and corporate worlds.

Coventry University is a recent winner of the title entrepreneurial university of the year (2011) and one of the most successful universities in the UK at engaging with businesses, as well as commercializing its own IP. However the process is quite unstructured, there is no single point of entry for academics, students or local businesses with a viable idea. Finding relevant collaborators within the university can be problematic and often happens on the strength of personal relationships. For a Small to Medium Enterprise (SME) looking to form new links with the university, there is a comprehensive CUCV database of staff members CV's, although this is not set up for the purpose of finding potential project collaborators. The Open Innovation Exchange Program (OpEx) at Coventry University thus has established an online market place for Business Community Engagement and it creates a single point of entry for parties with a viable idea. The IP Services team is currently preparing to adopt the OpEx platform for their support offering. The platform also includes tools for finding relevant potential collaborators, either within the university or at companies the university is already collaborating with. The rest of this paper is organized as follows. Section II introduces the concept of Open Innovation, which underlies the OpEx platform and the process at Coventry. Section III introduces the platform, starting with a small scale survey of attitudes to different technologies, followed by a detailed explanation of the platform and particular challenges faced. Section IV presents experiences of using the platform in a preliminary study, leading to a preliminary evaluation. Section V outlines how the platform is going to be used at the university going forward and how this will benefit both the university and businesses as well as how a similar approach could be adapted in other institutions.

II. OPEN INNOVATION

The OpEx project is being taken forward against a background of widespread theoretical and practical considerations, which suggest that firms develop processes to ensure a flow of information and knowledge outside of their traditional boundaries. This constructs and reinforces the need to open up the innovation process outside for new paths to innovation [1]. The term open innovation has since then come to be associated in the context of inter- and intra-organisational technology transfer as a source of new innovations to the development of products and services and for establishing the necessary conditions for sustaining competitive advantages [2].

To cope with the increasingly competitive environment, firms invest in innovative activities through technology transfer. Nevertheless, the predominant model to create value through internal R&D may not be sufficient for addressing greater technological complexities. Shifting from in-house R&D structures to an open R&D structure may be seen as an open system where the focus in on external sources of knowledge through licensing, partnerships and technology agreements [2]. Chesbrough defined open innovation as a model in which firms commercialise external ideas by deploying outside (as well as inside) pathways to the market [1].

Fundamentally, open innovation suggests that the benefits firms gain from internal R&D activities have declined and subsequently firms now spend little on R&D. Knowledge and expertise is drawn from a wide range of external resources. It is perceived that the erosion in the strategic advantage of internal R&D might be related to dynamic markets, short product life cycles, increased mobility of knowledge workers and the role of university research in establishing collaborations with industry.

Open innovation practices involve actual implementation of specific strategies, and processes that firms deploy for creating value through internal and external collaborations. This requires firms to make informed decisions about: internal and external collaborations, type of external actors (i.e. universities, suppliers, customers, competitors etc.) which may have the competencies and skills for contributing to a firm's innovation requirements or to further improve innovations that the firm has already developed. The complexity of the nature of these collaborations includes: aspects of time (e.g. temporary periods of developing a project), different groups of organizations that have different roles within the project from different departments (from R&D to logistics, production, human resources etc).

Published research on the effectiveness of open innovation approaches includes inconclusive, mixed, or negative results. Nevertheless the overarching conclusion is that there is a sufficient body of evidence to demonstrate significant gains in comparison with traditional innovation approaches.

For example, [3] conducted an interview-based study for exploring firms' motives in adopting open innovation. The authors found that firms were positive to adopt open innovation strategies for external technology acquisition as a means to develop and maintain growth. It was perceived that important entrepreneurial values such as revenues and growth are the most essential motives of enterprises to practice open innovation. Bruneel et al. [4] investigated the impact of open innovation on national systems of innovation and concluded that a number of benefits can be derived from applying open innovation on national systems including: increase of effectiveness; network diversification and reinforcing the importance of co-creating value. Vehmans [5] argues that the adoption of the open innovation model can benefit firms to develop a culture for knowledge sharing, building a trustful environment, and a constructive use of technology.

The basic focus of the OpEx project is to create an online marketplace that will work as an intermediate platform for allowing connections to be created and maintained between firms and universities for the purpose of commonly pursuing an innovation project. However, in order to have access to state-of-the-art technological innovations that are informed through scientific research, firms need to establish collaborations with public research institutions and universities. The process of approaching scientific outcomes as a means of acquiring technological innovation is known as university-industry collaborations [6], [7]. According to a meta-analysis of university-industry collaborations (e.g. [6]) in various themes of open innovation, there are very few, if any, studies that explore the theme of university-industry partnerships omitting to analyse the benefits of such relationships as well as the mechanisms through which companies could obtain competitive advantage from utilizing open innovation based on relationships with universities.

Certain types of strategic partnerships and alliances are being formed for university-industry collaborations. For example in the pharmaceutical sector, outsourcing or sponsorship is no longer seen as the appropriate types for open innovation collaboration [3]. The objective is seen as not only to transfer results from academia to industry but also to establish innovation and multidimensional networks that foster the creation of complementary skills, collaborative knowledge creation and learning integration [3]. Rewards and novel risk models are currently implemented for achieving a conceptual and practical change from individual cookbook approaches to resolving a problem to collaborative support through a dialogic process between university staff and industry managers [4]. An example of a risk sharing approach is the development of consortia between industry and academia supported by public funding (e.g. EU and/or national funds). One example is the current 7th Research Framework Program of the European Union (FP7) which aims to promote and encourage the creation of links between industry and academia as part of collaborating towards a common goal by solving research tasks and sharing a budget to particular research programs. From a national perspective, the US National Research Council recommended that the National Science Foundation, responsible for supporting scientific research, offers funds in diverse scientific areas as a key step to motivate research organisations and industry to collaborate for developing complex innovations that will resolve major scientific, social and economic challenges [6].

It is clear that the process of co-creating and sharing information and ideas for transferring and commercializing technology creates the need to consider intellectual assets. Some basic Intellectual Property (IP) rules need to be established for enabling open innovation [6], particularly for

creating and sustaining collaborations between industry and universities. Henkel [6] argues that adopting principles within the *open science* context or *free revealing* would encourage firms to rethink their processes and practices on IP in order to exploit collaboratively the benefits of sharing and co-creating value. Dalmarco et al. [8] use a multiple case study approach to investigate IP processes in relation to technology transfer processes in Universities in Brazil. Caution should be given to the collaboration with universities as sometimes universities have unrealistic expectations about the commercial potential of academic research which may cause to overvaluing IP [4]. This mainly occurs because universities do not share the same mentality with most of the firms with regards to sharing and publishing intellectual assets. Similarly [8] found that IP issues may prevent firms to collaborate with universities because of inefficient management of IP issues. To facilitate the process of IP management, OpEx provides disclosure mechanisms for the user/proposer to decide how IP will be shared and managed in the context of a proposed project.

An interesting and viable approach for enacting open innovation is to disclose university-industry collaborations via open innovation platforms on the Web. In these online platforms, online communities may be created where external experts can contribute in resolving predefined innovation problems or challenges. Firms seeking external solutions for their own products create and maintain some of these platforms (e.g. Global Innovation Jams by IBM or Unilever's open innovation submission portal, while others such as InnoCentive, the European Open Innovation, NineSigma etc. act as innovation intermediaries and virtual brokers for firms. Through an open innovation platform therefore, firms and universities can be brought together for co-creating ideas and projects. Other general tools that can provide access to scientists, researchers and the general public to improve a product or service are online toolkits. These toolkits are Internet based instruments, which support users in transferring and applying their needs into new product concepts [9]. The aim of these toolkits is to enable non-specialist users to design customizable products, which match the firm's requirements. A less frequent tool for creating university-industry interactions for open innovation is virtual worlds. The integration of scientists and managers into virtual worlds as virtual characters, may allow capitalizing on their innovative potential and knowledge. Hilgers [10] introduced the concept of *avatar-based innovation* to represent a first attempt to take advantage of virtual worlds for open innovation.

The OpEx overarching architecture is web-based rather than a virtual world. It seems that a web-based tool is most prevalent for articulating a problem [10] across the open innovation community; as well as for encompassing different tools and resources for searching partners and for establishing a reliable innovation community. The next section describes the OpEx platform and analyses the different services it provides for helping industry and academia to design, deploy, assess and share innovative projects and ideas thus to discover expertise and relevant skills for materializing innovations.

III. THE PLATFORM

A. *Technology attitudes*

When it comes to creating a marketplace, different technologies have been used in the past. In addition to web-based systems, virtual worlds have successfully been used for example in the V-trade project [11]. However the V-trade project developed virtual trade show, a marketplace for already existing companies and products. In addition, the team at the Serious Games Institute offered companies considerable technical development support for creating their virtual presence. While for a trade show this is a viable approach, it does not scale very well. Delivering technical development assistance on an ongoing basis to potentially large amounts of academics, students and companies is not feasible without a large budget, hence a survey was conducted to investigate attitudes of local SMEs towards virtual world technologies and also to investigate whether we can realistically expect companies to be able to present their ideas without substantial technical assistance. The survey was conducted at two workshops, organized by the Innovation University Enterprise Network (I-UEN) project (http://www.coventry.ac.uk/research/research-directory/business-management/institute-of-applied-entrepreneurship-2/institute-of-applied-entrepreneurship-services-for-business/i-uen/):

- The Open Innovation in Social Enterprise workshop in Birmingham on 24/05/2012, 31 directors of Social Enterprises answered the survey.
- The Open Innovation Program, Coventry on 29/06/2012. 36 SME directors answered the survey.

The events were aimed at providing training and consulting support to help companies innovate. Hence the companies present at the events are likely future users of the marketplace. The survey consisted of 6 closed questions and by handing out clickers to the audience, rather than paper surveys, we achieved nearly 100% response rate. The results of the survey suggest that the marketplace idea is embraced by the majority of the companies/enterprises, and IP protection as well as access control is among their major concerns. An overview per question is shown below.

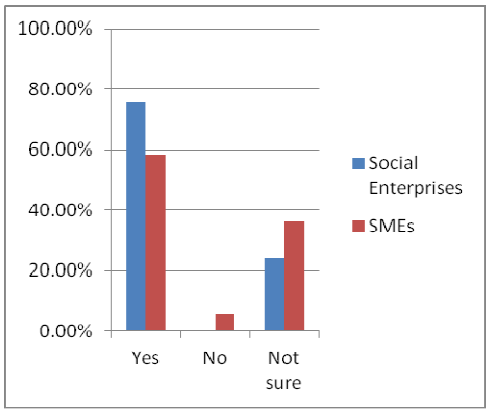

Figure 1. Would you use an online marketplace, if CU actively supported the ideas?

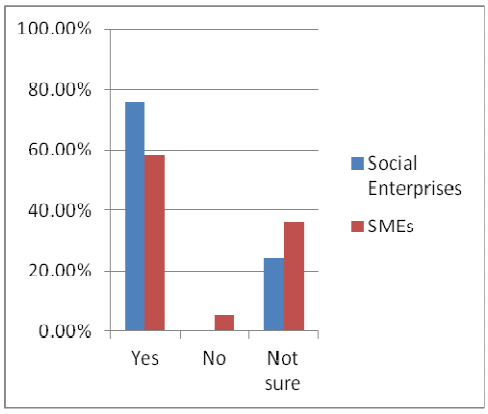

Figure 2. Are you worried about IP & want IP protection?

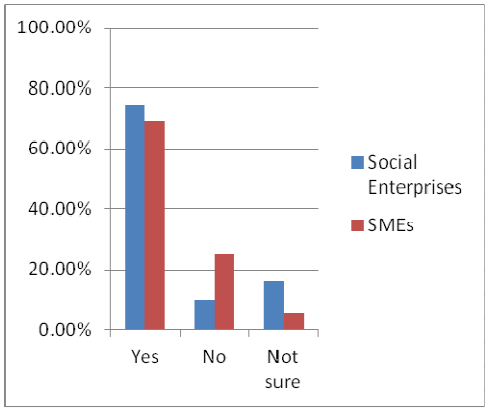

Figure 3. Are you worried about public access and do you want access control?

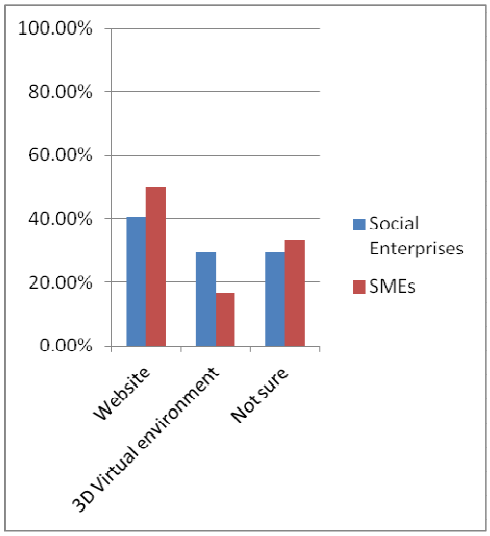

Figure 4. Would you prefer accessing the system via a 3d virtual environment or a website?

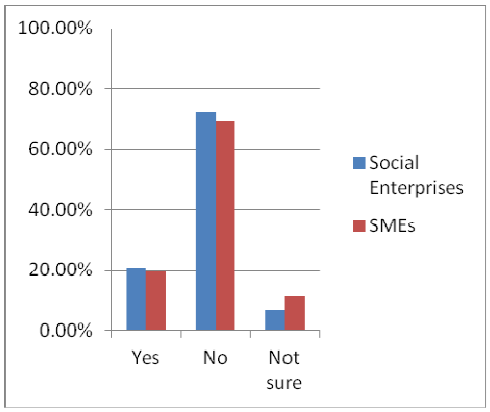

Figure 5. Do you have expertise or resources to show ideas in a 3d virtual environment (Second Life, game engine)?

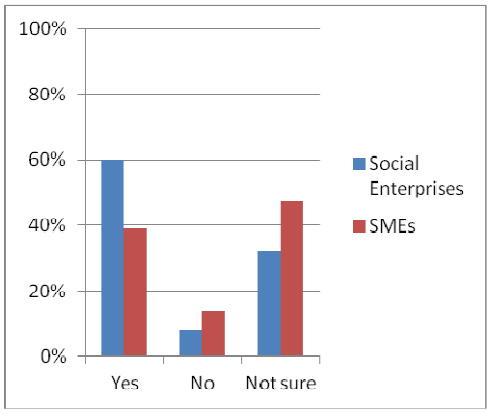

Figure 6. Would a 3d virtual showcase showing routes to market and some successful ideas bring added value?

From these results we can conclude that:

- Companies expressed that they were keen on using an open innovation marketplace to foster the exchange of ideas and establish a network.
- SMEs are worried about disclosure and IP as well as access control related to these issues. They do not necessarily want everything to be open to everybody logging on the marketplace.
- Companies do not necessarily have the skills/expertise or resources to engage with a platform inside a virtual world.

B. Platform development

Based on the results of the survey as well as on discussions with the IP services team and the Institute of Applied Entrepreneurship at Coventry University, the decision was made to develop a web-based marketplace. In this section, we will describe the platform in more detail. The system encompasses user management features that have become commonplace in many web-based systems such as registration and login. In addition University staff and students can use their university credentials without the need to register. The registration includes details of a person's expertise and company section, and for the university these are automatically populated from the database of staff CVs. After logging in, the user sees the home screen shown in Figure 7. As we can see from the menu on the home screen, the systems main features are management of ideas and projects, a visualization of users' networks and a matching tool for finding collaborators.

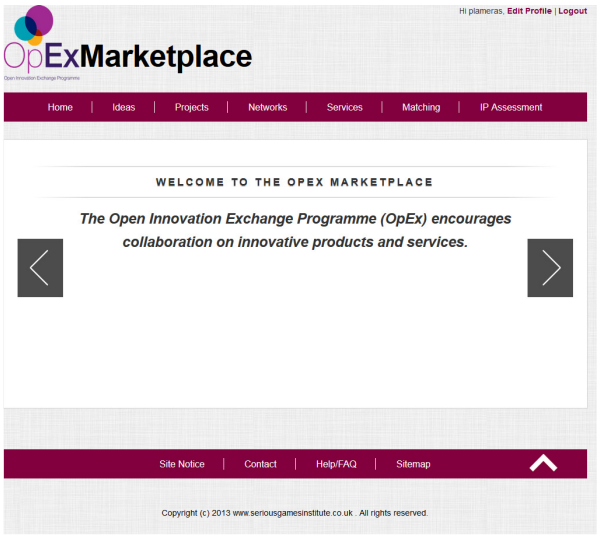

Figure 7. Home screen.

Users can add their idea in the ideas section. They can assign contributors and disclosure levels. Disclosure determines who can view the idea from everyone down to collaborators or only the original author. A short description of their idea, a website and selected files such as docs, PDFs, images etc. can all be added here. Generally, the process of adding an idea precedes the process of adding a project as a project is considered as one or more ideas which are being materialized into a project.

One of the problems identified by companies and entrepreneurs using a platform of this nature was the possible leakage of IP; and subsequent commercial exploitation of ideas by other organizations without the idea discloser getting any credit. To mitigate this, a security hierarchy would allow users to specify the viewing and IP ownership conditions. When the disclosed idea is then viewed and assessed for collaboration, the viewer will have pre-agreed on the IP conditions, in a similar manner to creative commons licenses. As an example someone with a good idea, but with no intention of working on it or receiving any financial return would enter it as 'public domain'. On the other extreme a disclosed idea might be with IP ownership retained throughout the project by the disclosing individual/company, and any commercial exploitation would return a royalty or payment to the discloser. In this manner the platform can accommodate a broad spectrum of desired end result with respect to IP.

An SME could specify that, for example, no multi-national companies can see the idea, only SMEs or universities; conversely only large organizations can collaborate on the project, flexibility being the important criteria.

One of the key platform features is an ideas assessment tool for looking at the commercial potential of the idea. This is a ten point scheme which can be completed by viewers of the idea, using the expertise search tool to select the best assessor/s. The assessment is a gap analysis as well as indicating the business readiness of the idea, and looks at technology, customers, unique selling points and financial attractiveness as output. The ten questions are shown below.

1. Uniqueness of technology and IP protection
2. Readiness for technology for market entry
3. The building of a winning team
4. Intensity of competition in the market
5. Competitive edge of your product or service
6. Ease of access to the market
7. Customer conservatism
8. Value of the accessible market
9. Anticipated profit margins
10. Funding of the project

Each category receives a score from 0 to 10 leading to a total score. A score of 80-100 indicates market readiness, 60-80 indicates the project is nearing market readiness, 40-60 that it's an attractive project that needs further work and 20-40 that the project is still at a very early stage. A score of below 20 indicates that not enough information has been supplied or if enough information was supplied, that the project is simply not viable.

The Network section of the systems shows a graph of all different people a user is collaborating with, thus visualizing their own personal network.

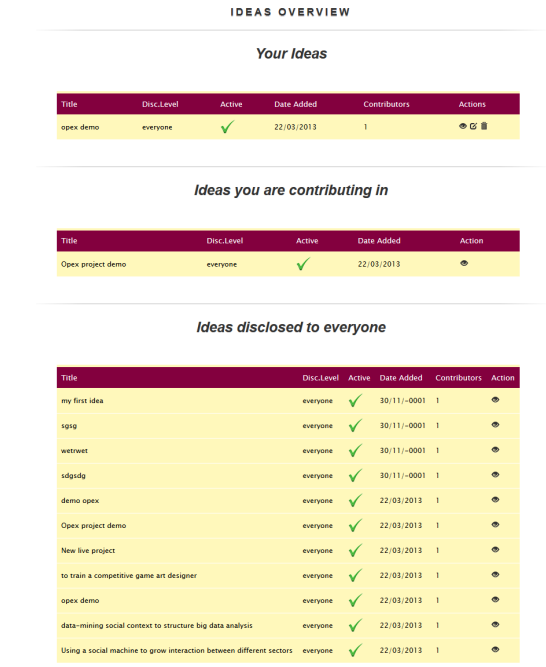

Figure 8. Ideas Overview

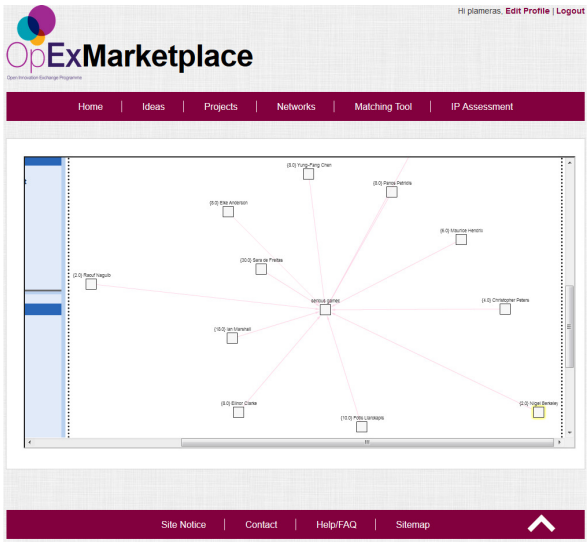

Figure 9. A visual representation of academic staff with expertise in serious games.

The matching tool can be used to find potential collaborators in complex and ill-defined fields. The searches of profiles of university staff as well as registered companies are displayed graphically. When users search for expertise, the tool shows which users are most prolific in work connecting the various search terms. Additionally users can also search for specific people, and see which different areas of expertise they are most prolific in. An example of such search results can be seen in Figure 9.

Finally an admin area has also been created for displaying various important data such as number of registered users (business and academic staff). Adding/editing and deleting frequently asked questions, controlling who can be an assessor of projects etc.

IV. EXPERIENCES: PRELIMINARY EVALUATION

A preliminary evaluation of the system has been conducted as part of the OpEx final event held in Coventry on 23 March 2013. The evaluation was conducted after a series of presentations about innovation and about the OpEx system, as well as a live demonstration of the system. After these presentations an informal session followed in which participants could use the system on their own devices or on computers especially set up for the event. After this an exchange of experiences and ideas relating to the use of the OpEx system as an enabler for establishing collaborations and links between academia and businesses took place and a small-scale questionnaire was conducted as a way of extracting meaningful qualitative data in relation to users' experiences in using the OpEx marketplace. 10 participants answered the questionnaire after giving their informed consent. Our qualitative methodology was chosen to suite the small sample size of people willing to share their experiences, which was as we anticipated (approximately 1/3 of the attendees of the event) and it proved to be sufficient to allow us to understand ways of experiencing the use of the OpEx system. Table 1 shows the division between academics and businesses and how many of the responses are based on respondents own experiences.

TABLE I. NO OF PARTICIPANTS AND THEIR NATURE OF RESPONSES BASED ON USING THE SYSTEM OR PRESENTATION AND DEMO ONLY (N=10)

Academic staff	Business staff	Total	No. based on using the OpEx system	No. based on presentation & demo only
5	5	10	4 (3 academics, 1 business)	4 (2 academics, 4 businesses)

After the collection of questionnaires from the participants, we developed a summary description of all gathered data evident for presenting awareness and usage of the system based on users' own views. A number of qualitative themes emerged from the collected data, which capture the similarity of views with representative headings. In the following section we present and summarize experiences of using the OpEx marketplace.

1) Creating ideas and projects

All participants perceived the marketplace as an easy and intuitive tool for creating ideas and projects. Respondents felt the user interface is clean and uncluttered allowing data submission in the form of information and resources in an unobstructed way. One participant found the concept of growing a raw idea into a concrete project particularly interesting. A cyclical process is being realized where ideas create projects and project create more developed ideas. The same respondent also commented that the combination of idea handling and functionality in one platform is something unique. Uploading resources was also seen as very useful for people to share resources with their preliminary ideas and

conceptual diagrams especially at the early stages of the project. A participant felt that some kind of guidelines that could be consulted when using the program especially around the use of specific languages and concepts were needed. Researchers and businesses might use different vocabulary for explaining patterns and methodologies therefore a common framework might be useful for providing specific language support. Although as the participant noted, the communication does not have to be totally homogenous, but there does need to be a structure for expressing concepts and idea in an understandable way particularly across sectors and disciplines.

2) Intellectual Property assessment

The evaluation tool is of great value to participants. They felt that the option of sending their project to an expert for assessing the potential of a project to be commercialized in a macro-scale is of paramount importance. The option of selecting the disclosure level of the project and its direct link with the subsequent evaluation are is of equal importance. Some additions were proposed such as user-generated evaluations to ideas and projects generated from other people as well as reviews in the form of free text as for project creators to get feedback from the community. In addition, the integration of metadata as means of describing a project and their connection with similar ideas seemed to be important for generating a mechanism for indentifying common ideas that would potentially lead to fruitful collaborations. A participant noted that further work might be needed in terms of designing an architecture that would allow projects to be automatically assessed by assessors that possess expertise to an associated field of interest. For example, a project that focuses on creating suspensions for cars would be assessed by an assessor with experience in the automotive industry.

3) Partner discovery

The partner matching tool is of great added value to users. All business participants commented that such a tool will create the grounds for establishing university-industry links that are based on a common understanding of the project's objectives. A web of connections with academic staff can be materialized for implementing complex projects with ill-defined tasks and activities. One of the participants commented that although SMEs do have the idea and the vision to develop an innovative product or service, often they do not possess the expertise or the skills to materialize that idea. Outsourcing as a service is meaningful but expensive, so an alternative hence effective solution is to create synergies with expert researchers in academia that can help on building a product. Some participants suggested the use of algorithms for recommending partners with expertise related to the specific aims and objectives of a project automatically. This would create an immense value for finding partners through computer-generated partner matching suggestions.

4) Changing attitudes towards open innovation

There were some positive responses with regards to how the system may change the processes and practices of exchanging information and resources within SMEs. One participant stated that the value of the system is the capacity of it to extract, gather and analyze data. By utilizing such data, we can create geographical and interest based intelligence maps that could be of use to SMEs doing applied research business support programs and sector support organizations in drawing up business and technical support plans. Therefore, the system certainly can contribute to changing beliefs and attitudes in enacting innovation but this is determined by the user community that utilizes the system as a participant commented. As this user community expands and relationships occur, the potential of changing current practices grows. SMEs will draw on exemplar practices from other firms that will drive their effort for change. A respondent commented: "OpEx could be the driving change for small business in the region. All of us should help create a community that would benefit the use of the tool for mitigating the isolation problem we experience in the region"

5) Overall effectiveness of the system

The system was perceived as an effective tool for enacting collaborations between Coventry University staff and SMEs. A participant stated: "it has the potential to be a great support system for open innovation between industry and academia". Another participant commented that the system allows for first-instance search and find, but users need to create good working relationships to make the best of it. However as with any prototype a larger community is lacking and this concerns the participants: "..a suitable large group of users is what it is missing for taking it full advantage of it.." And as another respondent put it: "...[the system] will be successful only if industry participation can be achieved". The overarching conclusion is that OpEx is an innovative tool for creating innovations but this can only be achieved through increasing user engagement. At the moment only 14 SMEs and this may influence the exploitation of the system at its full functionality. Another participant stated that the matching tool needs to provide contact details and expertise of the individual as well as list them. The matching tool should be integrated with projects for allowing communication to take place within the system.

6) OpEx challenges

Participants experienced challenges when they were prompted to answer 'what do they consider to be most problematic when trying to use the system'? A respondent argued that since content is generated by users, there must be a consistent strategy for attracting users. This requires time, effort and a strategy in order to convince SMEs to use such system. Constant communication and providing some incentives would be one of strategy. The registration process is perceived as easy, but the form is a little complex for its needs. Some users argued that finding a partner is a bit challenging through using the matching tool and needs further attention in order to be able to match staff with appropriate expertise is clear. Another participant mentioned finding it difficult to determine what language (search terms) to use in the search. Specifically for creating innovative

projects the creator might need to create a challenge description so others can provide a more effective solution.

7) Improving the system

Most of the participants stressed the necessity to increase the user base, especially SMEs, for the system to be fully exploitable. A respondent mentioned that a more flexible set of fields may be needed in order to allow users to enter additional information about the expertise required from an expert. It was also argued that a visualization in terms of how the various services work such as the IP assessment process, the scores and the assessment criteria would be a helpful feature. A participant talked about the issue of sustainability as means of sustaining the project and platform. Some related ideas were about linking patent data and publication information to individuals and building further intelligence into the matching service so that the platform makes automatic recommendations about matches. Developing a robust reporting module was also mentioned, as the data within the platform may be of great value. Licensing innovative and creative modules of the platform to existing commercial ideas management or IP data management solution providers was also mentioned as a possible way of sustaining the project. The same participant stated: "although OpEx is just in a prototype stage, it provides some solutions for creating and sustaining industry-university collaborations" and continued "However, developing and further growing the OpEx platform from a prototype stage to a commercial product is not easy and much time, energy and hard work is required to make this transition".

V. Conclusions and Further Plans

The Open Innovation Exchange project has developed an online market place for Business Community Engagement to encourage collaboration on innovation. The marketplace was developed in collaboration with the IP Services team at the university and based on a small scale study of attitudes and requirements from local businesses.

A small scale study held at workshops about Open Innovation, for local SMEs and Social Enterprises, showed that company directors liked the idea of a marketplace and of engaging in innovation with the university and other local partners. It also showed that most lacked the skills to use and represent themselves in a virtual world. However a web-based system was seen as a viable alternative and this was the route chosen by the project team.

A preliminary evaluation of the OpEx system has shown that it is perceived as able to promote university-industry collaborations as well as networking for constituting partnerships in the framework of national and international funded projects. However it is also clear that OpEx is a prototype that still needs some development in order to reach the maturity required for a full-scale implementation. Coventry University is however committed to the idea and discussions are ongoing how best to streamline the process of implementing OpEx across the University and beyond.

Ultimately the success of the platform will depend upon a very large group of users actively assessing, collaborators and delivering new products and services to market. It is hoped to encourage all ideas to be disclosed in an IP secure manner, and to encourage open innovation as originally proposed. The skills and expertise database to identify collaborators has already shown good results, and again an expansion and acceptance externally will drive use of OpEx.

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References

[1] C. Chesbrough, *Open Innovation*. Cambridge, MA: Harvard University Press, 2003.

[2] L. Berchicci, 'Towards an open R&D system: Internal R&D investment, external knowledge acquisition and innovative performance', *Res. Policy*, Aug. 2012.

[3] M. Lessl and F. Douglas, 'From technology transfer to know-how interchange', *Wissenschaftsmanagement*, vol. 2, pp. 34–41, 2010.

[4] J. Bruneel, P. D'Este, and A. Salter, 'Investigating the factors that diminish the barriers to university–industry collaboration', *Res. Policy*, vol. 39, no. 7, pp. 858–868, Sep. 2010.

[5] K. Vehmas, 'The Meaning of Social Interaction within Open Innovation Projects in Academic Context', *Proc. Int. Conf. Intellect. Cap. Knowl. Manag. Organ. Learn.*, pp. 644–649, Jan. 2010.

[6] J. Henkel, 'Selective revealing in open innovation processes: The case of embedded Linux', *Res. Policy*, vol. 35, no. 7, pp. 953–969, 2006.

[7] T. Kohler, K. Matzler, and J. Füller, 'Avatar-based innovation: Using virtual worlds for real-world innovation', *Technovation*, vol. 29, no. 6, pp. 395–407, 2009.

[8] G. Dalmarco, M. de F. Dewes, P. A. Zawislak, and A. D. Padula, 'Universities' Intellectual Property: Path for Innovation or Patent Competition?', *J. Technol. Manag. Innov.*, vol. 6, no. 3, pp. 159–170, 2011.

[9] S. Hüsig and S. Kohn, '"Open CAI 2.0"–Computer Aided Innovation in the era of open innovation and Web 2.0', *Comput. Ind.*, vol. 62, no. 4, pp. 407–413, 2011.

[10] D. Hilgers, 'Broadcast search: Applying the idea of open innovation for university-industry technology transfer.', *Int. J. Bus. Res.*, vol. 11, no. 1, pp. 108–118, 2011.

[11] S. Scarle, S. Arnab, I. Dunwell, P. Petridis, A. Protopsaltis, and S. de Freitas, 'E-commerce transactions in a virtual environment: virtual transactions', *Electron. Commer. Res.*, vol. 12, no. 3, pp. 379–407, 2012.