

BIVEE Virtual Innovation Factory

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Abstract. Innovation is a complex endeavor, traditionally involving several stakeholders according to three basic approaches: (i) Push-mode and technology driven, when the innovation is generated on the supply side; (ii) Pull-mode and demand driven, when the innovation is requested by the demand side; (iii) Co-creation, when all the stakeholders cooperate together to generate product or process innovation. We are of the opinion that the latter is the most effective and the most difficult to achieve. The BIVEE's Virtual Innovation Factory (VIF) is direct consequence of the co-creation concept. This paper aims to show the main goal of the VIF is to boost and manage innovation by creating both an easy to use and attractive tool to enhance the co-creation, the crowd-sourced projects and organizations.

Keywords: Open Innovation, BIVEE, Virtual Innovation Factory, Innovation Waves

1 Introduction

Generally the innovation cycle has been represented as a process flow happening in the context of a single enterprise where the interrelations with the external environment are for the most part marginal and where collaboration is mainly sought within the organization.

Starting from 2003 this paradigm of closed innovation has been debated and contrasted with the emerging paradigm of Open Innovation, firstly championed, among others, by Henry Chesbrough [Chesbrough, 2003]. Open Innovation has nowadays already taken a permanent place in the business and organizational world. The concept is that companies should make much greater use of external ideas and technologies in their businesses, while letting other companies work with their unused ideas. Open innovation offers organizations of private as well as public sector an opportunity to leverage intellectual resources from outside of their closed innovation cycle.

The concept of open innovation has already evolved to its extreme with the development of crowdsourcing methodologies and platforms. "Crowdsourcing represents the act of a company or institution taking a function once performed by employees and outsourcing it to an undefined (and generally large) network of people in the form

of an open call. This can take the form of peer-production (when the job is performed collaboratively), but is also often undertaken by sole individuals” [Howe 2006].

2 Objectives

The ultimate goal of the BIVEE project is to transform existing production processes and organizations into new ones.

BIVEE’s VIF focus on innovative co-creation that requires from different players - with different cultures, skills, and needs and, often, conflicting objectives – who share cooperation space spanning across the whole product lifecycle, that is, from R&D, to production.

3 Methodology

The ideas management in the VIF is supported through collaborative and social network tools. The design is based on both innovation management methodologies inherited, for instance, from the DISRUPT-IT project and from the more recent open innovation theories and methodologies. Together with ideas coming from people in the production line and the outer business space, the environment will collect current and historical process maps from the process warehouse as a source of internal information and will exploit OLAP tools. A further service is the capture of activities performed in the VIF, so that they can be organized in an innovation process repository with respect to the activity timestamp, actors performing the activity, the kind of activity, tools used, objects manipulated, results achieved, etc.

The innovation cycle moves through phases that in the BIVEE project are called ‘Innovation *Waves*’ (*IW*). The *IW* concept implies that the phase does not have a clear ending point and may last in time during the life of other *IWs*. With this approach, the innovation cycle is provided with a more flexible lifecycle allowing it to go back and forth.

The first *IW* in the innovation cycle is the idea generation (Creativity wave). Ideas can arise from observation of current/future problems. Once the opportunity has been recognized, it needs to be managed, evaluated, rated, possibly discarded and eventually recycled under a set of different circumstances and/or market conditions. In the evaluation phase (Feasibility wave), if there is alignment with the objectives of the organization, the idea moves to a new stage where it can be investigated and further developed. The development phase (Engineering wave) may involve further research into the opportunity or the patenting of the concept. Prototypes may well be designed, developed and tested at the final stage (Prototyping wave).

The innovation now moves out of the organization’s control and into the hands of the users of the production space.

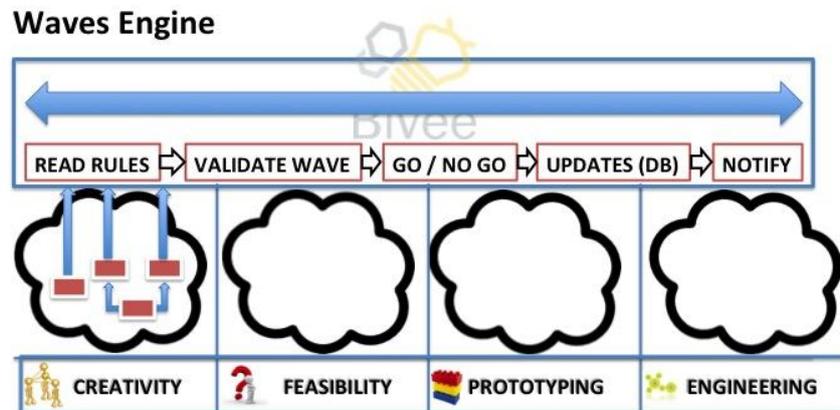


Fig. 1. Innovation Waves

There's another important concept that is key in the innovation cycle: the Observatory. The Innovation cycle from the Observatory standpoint is:

- **Monitoring & Assessment.** Here a careful and continuous observation of the production space evolution and the evolution of the external world guarantees that BIVEE Innovation Observatory timely triggers optimization and/or innovation processes.
- **Innovating:** conceiving the innovative solutions, starting from the opportunities / needs identified by the innovation Observatory. Here also a careful assessment of the innovation solutions is needed, e.g., by means of simulations, quantitative analytics, impact investigation, risk assessment, etc.
- **Innovation implementation plan.** After having decided the changes, these are introduced in the identified Production Map, i.e., on the production units, with their organization, processes, financial strategies, etc., or the production map as a whole.
- **Innovation Rollout:** the innovative Production Map becoming operational. This is a critical phase, performed by the Mission Control Room with the support of Virtual Innovation Factory.

Finally, the VIF will provide the users with another important concept/component: the Whiteboard. The motivator idea of this concept is the leverage the idea creation by providing the users with a tool that lets them enrich their idea with more visual concepts like sketches, sticky ideas, images, documents, etc. It also will allow to collaborate in real time.

4 Main Components

The VIF is divided into a seamless set of components that once mixed all together becomes the VIF. Due to the chosen technology, the components of the VIF can be

detached and substituted by others compliant with the defined APIs. This provides the VIF with a natural capability of evolve in time. Next figure depicts the main components of the VIF, which are the Innovation Observatory and the Innovation Waves Engine.

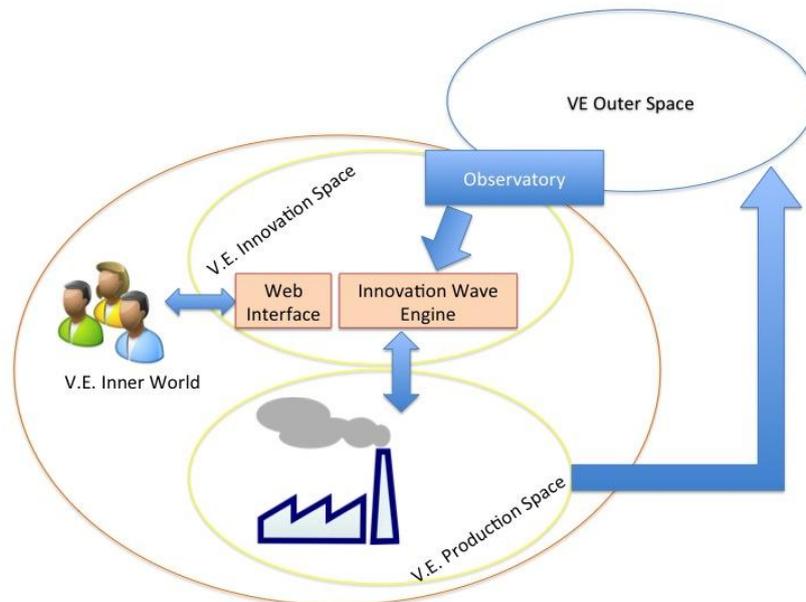


Fig. 2. Main components of the VIF

The incomes to the VIF can come, either from the outer world –here comes into play the Innovation Observatory - either from the users of the Virtual Enterprise through the provided responsive web interface.

The communication with the Production Space is bidirectional since, once the Innovation Cycle comes to the end of its lifecycle, and it becomes into something real – a product, a protocol, etc. – the PS provides feedback to be taken into account if the Innovation Cycle needs to start over.

5 Technology Description

The VIF is being developed following the RESTful paradigm. Why RESTful? The basic idea of using RESTful as a SOA architecture is to use the same concepts as web. WSDL-based solutions allow great flexibility but imply greater complexity. In RESTful architectures, the set of operations is reduced, standardized, with well-known semantics. Therefore, RESTful architectures expose a more simplified interface design reducing the learning curve and integration issues plus adds semantic meaning to HTTP protocol based on its verbs. This approach also helps on the design and building phase since the user interface can be designed as a set of building blocks.

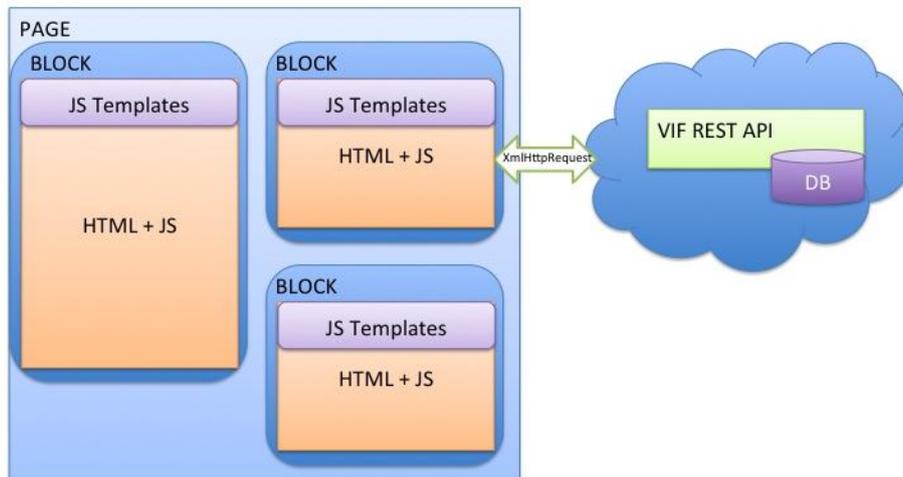


Fig. 3. VIF Technology

The VIF will be delivered in two flavours; the one that it is plugged to the BIVEE platform will be developed using Vaadin, which is a Java web application framework. It is designed for creating rich and interactive applications that run in the browser, without any plugins. A server-driven architecture together with reusable component model is used to simplify programming of applications and for better web application security. No HTML, XML or JavaScript is needed and all Java libraries and tools are at your disposal. The browser side rendering engine of Vaadin is implemented using GWT. At runtime there are no GWT dependencies in the server side, and the browser side is pure Javascript with no dependencies to Google. The javascript code shipping with Vaadin is precompiled, and no GWT compilation is required when using them. Vaadin also helps when there is a need to extend the app with browser side code, the extensions are needed to be written in pure Java against the GWT API, and to be compiled to Javascript using the GWT compiler. This is automated successfully with the Eclipse plugin or Maven support.

The second flavour in which the VIF will be delivered is a pure HTML5 + Javascript + CSS3 + Ajax + JSON. No server side will be required for the rendering allowing the VIF to change the endpoints where to obtain the information.

6 Business Benefits

The central objective of BIVEE, Virtual Innovation Factory is to achieve the cooperation of all players, in all IWs of the innovation cycle.

The baseline of the Project business plan is to operate within an Open Software, Open paradigm approach, primarily intended to diffuse the BIVEE paradigm. In this

perspective, business activities will be directed towards EU enterprises, and in particular networks of SMEs and virtual enterprises.

7 Conclusions

Innovation, as we understand it, is the capacity to conceive and introduce profound changes that involve different enterprise dimensions, such as production processes, means and methods, organization and human resources, finances, marketing strategies, etc. In the most radical cases, the innovation process may require the extinction of (part of) what exists, to be replaced by radically new solutions³. However, we need to consider the risk that an innovation process may fail, therefore it is necessary to show, with reliable forecasting methods, that the undertaken direction has good chances of delivering better results than what previously existed.

Innovation allows companies to have a competitive advantage and helps them to stay ahead of competitors.

The innovation cycle describes the activities involved in taking an innovative product or service to the marketplace.

The BIVEE, Virtual Innovation Factory supports and enhances the innovation cycle at all stages and it can be used in a wide range of environments.

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