

DESIGNING A NEW AGORÀ TO FOSTER COLLECTIVE INNOVATION

Cinzia Battistella*

University of Udine, Department of Electrical, Managerial and Mechanical Engineering, via
delle Scienze 208, 33100 Udine, Italy.
E-mail: cinzia.battistella@uniud.it

Gianluca Biotto

University of Udine, Department of Electrical, Managerial and Mechanical Engineering, via
delle Scienze 208, 33100 Udine, Italy.
E-mail: gianluca.biotto@uniud.it

Alberto F. De Toni

University of Udine, Department of Electrical, Managerial and Mechanical Engineering, via
delle Scienze 208, 33100 Udine, Italy.
E-mail: detoni@uniud.it

* Corresponding author

Abstract

Achieving successful, repeated organizational innovation is a never ending primary challenge for companies. But often this cannot be pursued in a standalone modality. New practices are emerging to foster innovation, by building networks for collaboration and leveraging networks of outsiders. A structured collective approach to favor cross-fertilization and technology transfer among companies is needed. This work first builds a framework to analyze the existing Open Innovation Platforms, then presents a classification of the web ones that permitted to propose a conceptual best of breed platform for collaborative innovation. We address how it is possible to create a collaborative network through open innovation platforms, highlighting the best context and the dynamics of the cross-fertilization among different actors and innovation roles. Basing on literature and empirical analysis, in our opinion the main roots to feed an innovation ecosystem based on web platforms are: communities, self-organization and cognitive diversity.

Keywords

Collective innovation; open innovation; innovation ecosystems; emergent communities; crowdsourcing; web-platform for innovation.

Introduction

The pace of technological change is accelerating. Discontinuities seem to happen more frequently. Thus the useful lifespan of knowledge and capability is becoming shorter and at the same time the obsolescence of knowledge and capability is increasingly the norm in innovation.

The aptitude to innovate sits at the heart of an organization's ability to succeed in a competitive environment. An organization can innovate by improving existing products, services, or processes or by generating new ones. In the early 20th century, Joseph Schumpeter introduced the economic theory of creative destruction, to describe the way in which old ways of doing things are endogenously destroyed and replaced by the new. Creativity is also seen by economists such as Paul Romer as an important ingredient in the recombination of elements to produce new technologies and products and, consequently, economic growth. This recombination can be obtained in several ways for industries, for example by technology transfer or cross-fertilization and can be enhanced by the building of networks for collaboration.

Achieving successful, repeated organizational innovation, however, is a significant challenge. The hurdles to such innovation run the gamut from psychological to structural to procedural. Contrarily to incremental innovation, where specialization is a winning strategy, discontinuous innovation requires an interdisciplinary approach and a diversity of knowledge base that in general companies, and especially SMES, struggle to access. Many companies, in fact, can fall victim to myopia and other challenges, because they experience cultural and financial access barriers to innovation (Lange *et al.*, 2000), therefore they tend to adopt an unplanned, informal, crisis-driven approach to R&D, perceiving it purely as a mean of solving immediate rather than future problems (Lawless *et al.*, 2000). According to Pisano and Verganti (2008), "the new company leaders in innovation will be those who figure out the best way to leverage a network of outsiders". Companies can find the seeds of great ideas from any nook and yard of the world, and IT has dramatically reduced the cost of accessing them. Virtually no company should innovate on its own, and luckily there has been an enormous expansion of potential partners and ways to collaborate with them.

As a matter of fact, organizational processes, structures, and values can facilitate collaboration, trade, learn, manage company business processes and deliver services, and therefore shorten the innovation circuit. Given these challenges, an innovation strategy embracing the concepts of collective intelligence and openness may enable organizations to surmount these hurdles. Recently some innovative companies have tried to foster their competitiveness and innovation potential by making use of collaborative approaches (wikinomics, co-design, collective intelligence, open source organizational, lead-users innovation communities, innovation markets, etc.). The main advantage of a collective approach for the innovation process is that it involves actors from multiple environments, such as customers, suppliers users and social stakeholders. Although this approach is still in its infancy it has already delivered convincing results. See for instance the changes in innovation policy at Procter & Gamble. In particular, the collective innovation model has the potential to open up to groups of companies the niche aggregator model. Moreover, a collective approach can favour cross-fertilization and technology transfer among companies.

The present work aims to contribute in enriching the research field on the collaborative networks for innovation linking the cross-fertilization model to the technology-transfer activities in order to enhance creativity and innovation in industries. This task will be accomplished by addressing the following research questions:

- *How is it possible to create a collaborative network through web open innovation platforms?*
- *Which is the best context? And which can be the dynamics of the cross-fertilization be? And the key-actors?*

Thanks to the investigation of the literature, we first present a framework to analyze the Open Innovation Platforms, then we present a classification of the web ones that permitted us to propose a conceptual best of breed platform.

Methodology

The methodology adopted can be divided into two analysis: one of literature analysis on cross-fertilization and collaborative networks, another one of analysis of the open innovation web-based platforms, in order to evidence first the columns on which to base for the classification and then the best solutions of each of these platforms and propose a best of breed platform. The platforms considered are more than 300 (a list can be found in appendix), that we classified basing on nine criteria, that can be connected to the famous 6-wh, the six questions of Cicero's rhetoric framework.

Table 1. Open innovation platforms classification criteria

WH-Q	CRITERIA	
What?	OBJECT	Single
		Multiple
When?	PHASES	Trends
		Concepts
		Designs
Why?	MOTIVATIONS	Monetary
		Not monetary
Who?	ROLES	Single
		Multiple
	CONTRIBUTORS	Individuals
		Companies
	BENEFICIARIES	Individuals
		Corporate initiatives
Many companies		
Where?	CONFIGURATION	Static
		Dynamic
Which tool?	TOOLS	Availability of tools
How?	COLLABORATIVE INNOVATION MODEL	Elite circle
		Consortium
		Innovation mall
		Innovation community

State of the art

Today innovation is no longer regarded as a linear process but as *a dynamic and complex development beyond the boundaries of companies*. In this systemic and dynamic perspective, knowledge is simultaneously a key input and a key output to businesses and the economies they belong. *Capitalizing knowledge efficiently* is an increasing need in firms, industries, and governments to compete locally and globally (Rohrbeck *et al.*, 2008).

The theoretical basis of the research is grounded on different scientific fields, such as innovation management, complexity theory, creativity management, social network theories. Reviewing and merging these domains we derived the concept of *innovation ecosystem*: like biological and business ecosystems, it is formed by *large, loosely connected networks of entities* with varying degrees of interdependence and coupling.

An ecosystem is a system whose members benefit from each other's participation via symbiotic relationships (positive sum relationships). It is a term that originated from biology, and refers to self-sustaining systems. As it applies to business, an ecosystem can be viewed as a system supported by a foundation of interacting organizations and individuals—the organisms of the business world. “Like species in biological ecosystems, firms interact with each other in complex ways, and the health and performance of each firm is dependent on the health and performance of the whole” (Iansiti and Levien, 2004).

Over time, they co-evolve their capabilities and roles, and the relationships established across different industries become more and more mutually beneficial, self-sustaining and generate added value. This is clearly the case for Silicon Valley with the entrepreneurial industry, the venture capital industry needed to fund the entrepreneurial industry, and Stanford University, supplying the human capital needed to develop innovative/creative ideas and technologies.

For innovation, this analogy operates at many levels: firms, innovators, users, methodologies, and products are characterized by *networks of interdependencies* (very likely power law distributed) and *ecosystem-like dynamics*. The so-called *Matthew effect* dominates: “In an open, dynamic, scale-free network with positive feedback loops between hubs, the fit get fitter” (Ogle, 2007). More specifically, the innovative performance of a firm is a function not only of its own capabilities, know-how and expertise but also of its dynamic interaction with the ecosystem as a whole.

In this line Snow *et al.* (2008) highlight that a community of firms represents a new breed of collaborative venture where a number of firms interact and exchange information and knowledge for a common goal. Moreover Pisano and Verganti (2008) consider open membership networks with flat governance structures as innovation community: a network where anybody can pose problems, offer solution and decide which solutions to use. Invariably, understanding the rationale, dynamics, membership roles, governance forms and performance of these emerging collaborative arrangements is essential.

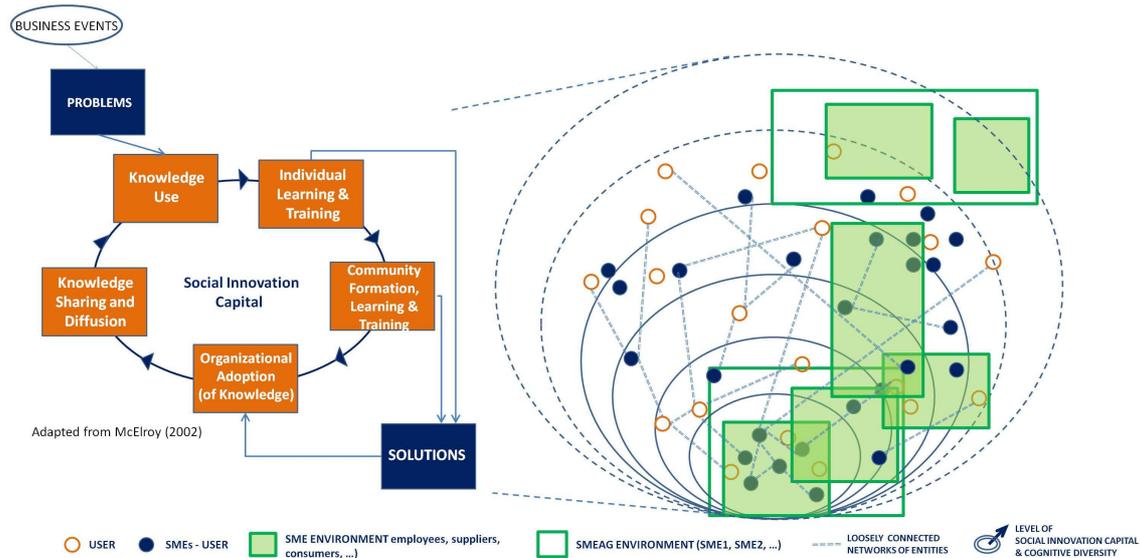


Figure 1. Social innovation capital and cognitive diversity for self-organizing communities

We now investigate one by one all the nine criteria: object, phases, motivations, roles, contributors, beneficiaries, configuration, tools and collaborative innovation model.

Object

The objects of the platforms can be single or multiple, that means that the crowdsourcing platform is open for only one or more arguments and themes to be discussed. They are crowdsourcing platforms that equip individuals and enterprises for web-based open innovation. For example, OpenMoko is only for innovation on hardware and software, while Chaordix for example is more flexible and in each theme to work on can be proposed.

Phases

Moreover, in our opinion, innovation can be divided into three main phases, foresight, creativity and design that let emerge in the development of an innovation ecosystem three main domains: the trend, the concept and the design domains:

1. The TREND analysis and setting domain: *Foresight* is the study of how the organizations can identify weak signals, anticipate emerging markets, trends and scenarios, and manage disruptions in order to be prepared to an uncertain future and to survive in turbulent markets (Schwartz, 1991; Van der Heijden, 1997; Becker, 2002).
2. The CONCEPT developing domain: *Creativity* is a mental and social process involving the generation of new ideas or concepts, and new associations between existing ideas or concepts. Theories of creative processes impact at individual, group, organizational and cultural levels (Xu and Rickards, 2007);
3. The DESIGN implementation domain: *Design* is the process of designing, building, operating, and maintaining a good or service. Design is “the initiation of change in man-made things” (Jones, 1970). In the design phase modularization is a powerful conceptual tool for managing complex systems. Modularization can also be regarded as a strategy deliberately pursued in order to organize efficiently and smoothly the processes associated with product development.

As regards open innovation platforms, we briefly describe below some examples of platforms connected to these three domains.

Foresight. Foresight is commonly applied in large firms with long and complex development processes and extended products’ life cycles, thought most SMEs do not have access to it due to resource and capability constrains (Rohrbeck *et al.*, 2008). Although Innovation and Communications technology (ICT) is commonly used as a platform for foresight methods, its main use is only enabling. In this regard, ICT is playing an increasing role in open innovation and collaboration networks among SMEs (Chen *et al.*, 2008). An example

regarding open innovation, foresight and ICT tools is given by the S&T Foresight Knowledge Sharing Platform¹ that grants practitioners access to a free Foresight software² that allows companies to implement foresight solutions according to their respective toolbox needs. Although resourceful, this open platform does not aim to integrate the foresight process into the particular managerial strategy of firms but diversify their strategic toolbox. Hence, the tool's applicability is greatly dependent on the firm capabilities and familiarity with the foresight process. Another important aspect is that the technology, although based in internet access, does not aim (nor support) the simultaneous interaction of performing firms limiting the added-value of mutual collaboration.

Creativity. The significance of creativity is increasing as organizations move towards a more dynamic concept. Creativity is fostered in environments where people are engaged in challenging activities and have the right level of skill to meet them Creativity is best achieved in open climates where there is: interaction with small barriers; a large number of stimuli; freedom to experiment; and the possibility of building on earlier ideas. It follows that team creativity, in contrast to individual creativity, has the additional advantages of knowledge from different areas being combined and the interaction of the team members providing stimulation and a pool of ideas to build on. Many platforms for creativity can be found in the web, for example Ideaconnection gives solutions for companies connecting problem solvers and innovation resources, Inventnow gives the possibility to also patent and share inventions, Fellowforce permits companies to post challenges and select the best solutions and give rewards to the problem solvers.

Design. Project complexity forces large and heterogeneous groups of designers to work together on innovative projects over long periods of time. It is important for each designer to know the design process, to aware and understand how the work of other designers within the project – or in similar projects – is relevant to their own part of the design task. So it is central to develop systems that support collaborative and networked design and, afterwards, design communities.

Platform-based design is a powerful concept for coping with the increased pressure on time-to-market, design and manufacturing costs. Internet can be therefore a distinctive capability for more interactivity, enhanced reach, persistence, speed, flexibility, and engagement of customers and suppliers and other SMEs. For example, Ducati from the motorbike industry and Eli Lilly from the pharmaceutical industry use these Internet-based collaborative innovation mechanisms to facilitate collaborative innovation at different stages of the New Product Development process (back end vs. front end stages) and for differing levels of customer involvement (high reach vs. high richness). Finally, one of the most famous examples of open innovation platform for new product development, in other words design open source is the Arduino project (www.arduino.cc³), that is a physical computing platform that can be used to develop stand-alone interactive objects or can be connected to software running on a computer (e.g., Adobe Flash, SuperCollider, etc.). An other one is Openmoko, a project that has the “free your phone” mission, to create mobile phones (releasing both hardware and software) with an open software stack, allowing users to customize the phone platform to their needs, modify existing software, and create or install any additional software.

Motivations

Since the Open Innovation platforms could be the innovation keystone integrator of different members (companies, SMEs, users and contributors), different strategies to motivate each of them to participate in these communities are defined in the platforms classified. A key issue concerns, in fact, the analysis of both the *incentives which could motivate any user to play an active role* in the platform, and the *solutions to remove or mitigate the hindrances to an effective sharing* of the efforts and benefits arisen by participation. These points are critical, and it has to be said that while literature and the empirical examples gives us support from the individual motivations point of view, from the companies and SMEs point of view much research is still needed.

Figure 2 shows a first attempt to map and identify a complete framework of incentives useful to enhance platform's use outline a matrix classifying user categories (individual user or corporate) and kinds of incentives (tangible or intangible). In our opinion, in fact, the suitable mechanisms and rules to promote long-term and innovation-oriented strategic cooperation among operators (even among competitors in the final markets) can be generally based on three main issues:

- *social network dynamics*: building of social capital, building of social networks, facilitating collaborative relationships.
- system of *monetary rewards*: *economics of open source and technology sharing*;

¹ <http://cordis.europa.eu/foresight/platform.htm>

² http://www.3ie.fr/lipsor/lipsor_uk/index_uk.htm

³ The project began with the aim to make a device for controlling student-built robots less expensively than other prototyping systems available at the time. The designers succeeded in making an easy-to-use platform which significantly undercut the prices of many competing products.

- *personal development*: system of non-monetary rewards; innovation certification system, both of the learning and training path and both of the result performed.

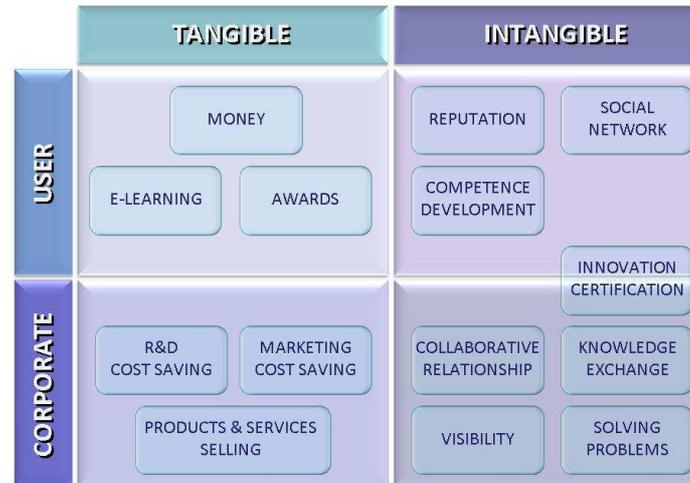


Figure 2. How users will be motivated

Given the importance of this point, the best platforms are those that are dynamic, in other words that are able to configure the reward system. This means that the system of incentives can be decided by the user, for example he can choose that for the problem he has, he can put a monetary reward, or he can decide to bet on non-monetary incentives, and so on; the user can judge ideas on multiple criteria, like profitability, commercial feasibility or other factors, and can also factor in the relative importance of each criteria.

Contributors and beneficiaries

The beginning of the platform, in other words who has a benefit from it, is based on individuals, corporate initiatives or many companies.

The *members of the communities of peers* can be both organizations and individuals, in particular the involved organizations are big companies and SMEs, but also universities, research centres and other companies (as for example consultancy companies). Individuals can be both employees of the organizations or users from the World Wide Web: the best platforms are designed and programmed to cover the needs and the abilities of these not IT experts.

The best platforms are the ones that are open not only to individuals, but are also designed for companies' innovation.

Roles

Each member is associated to one or more *roles*. The concept of member is separated from the roles a member can assume within the community: members are intended to model physical entities while roles are effectively connected with *activities*. The community roles will emerge from the different projects, covering different dimensions of the innovation community (business, knowledge, social and personal) and members can perform more than one role (e.g. user-manufacturer, user-dealer), this permits us to model the most innovative community members and research their behaviour and impact on product innovative evolution.

Some platforms analyzed let emerge only one single role, for example Innocentive lets emerge only the role of the innovators, while other platforms let emerge more and distinct roles.

Configuration

A dark side of the open innovation models is that they amplify the managerial difficulty of selecting the best options due to a greater choice of them. According to Pisano and Verganti (2008), there is no best approach to leveraging the power of outsiders, because different modes of collaboration involve different strategic trade-offs. As companies that choose the wrong mode risk falling behind in the relentless race to detect trends, create ideas and develop new technologies, designs, products, and services, to try to give a solution to this problem and to increase the flexibility the user has to choose, one of the most noticeable characteristics of the best of breed platform is its *configurability*. The configurability means that there will be for the user who is starting a new project, named A, the possibility to chose different options and to set the characteristics of the X project, in order to meet his and his company specific requirements; then also when the project is already initiated, there

will be the possibility to set some parameters again during the course. Moreover, the system will offer suggestions (and also links with consultancy firms) on how to set these flexible characteristics in order to fit better with the specific contest of the problem and of the project. The flexible configuration areas can be mainly four:

- *e-learning and training system*: for the specific project, a user can choose from the vast amount of courses and training materials the most suitable ones; moreover, the user can choose which course its employees have to follow for the project X and the possible earned points for the related activities; moreover, there will be basic free-courses, payment-courses or the possibility to have a consultancy.
- *reward system*: the system of incentives can be decided by the user, for example he can choose that for the problem he has, he can put a monetary reward, or he can decide to bet on non-monetary incentives, and so on; the user can judge ideas on multiple criteria, like profitability, commercial feasibility or other factors, and can also factor in the relative importance of each criteria.
- *community revision system*: the user who opens the project can choose the parameters of evaluations, in other words participants can rate ideas based on the criteria you define (for example, in a project to find the best new trend, you might assign uniqueness, visionariety, feasibility, etc.) and on the relative importance of each criteria.
- *interaction system*: the user can decide how much to open or close his project, in other words to let only the employees of the companies to participate, to invite other users from the web, to let it open for customers and suppliers, to open it for all the world wide web, and so on; moreover, the participants are enabled to submit ideas and solutions, and they can choose how to share them using text, audio, video or other uploadable files. The administrator of the project can invite new users, remove others and change user roles during the course of the project.

Finally, as selecting the optimal form is not one time event, companies aiming at staying ahead in the innovation race, must revisit their strategies to collaborative innovation, that's why the configurability system has not to be one-shot at the beginning of the project, but can be modified also later on, after for example feedback received.

Tools

Some platforms give access to *tools and methodologies* of the three domains, foresight, creativity and design. Tools and methodologies are connected to the activities to generate concrete *outputs* (trends, ideas and products).

Collaborative innovation model

The investigation on the Open innovation platforms' state-of-the-art shows that many of them already exist and operate. Our analysis explored more than 300 websites performing crowdsourcing, a way to access external knowledge for innovation. For our purpose, we classified the open innovation platforms using the Pisano and Verganti (2008)'s framework that describes four collaboration models, that differs along two dimensions: *openness* (can anyone participate, or just select players?) and *hierarchy* (who makes key decisions—one "kingpin" participant or all players?). These four models are: *elite circle* (closed and hierarchical network): one company selects the participants, defines the problem, and chooses the solutions; *consortium* (closed and flat network): a private group of companies jointly select problems, decide how to conduct work, and choose solutions; *innovation mall* (open and hierarchical network): one company posts a problem, to which anyone can answer, and the company chooses the best solution; *innovation community* (open and flat network): anybody can propose problems, offer solutions, and decide which solutions to use.

Finally, Table 2 reported only the most popular and interesting platforms (sorted by web traffic rank) considered in this classification of more than 300 platforms.

Table 2. Most popular and/or interesting websites performing crowdsourcing

How?	PLATFORMS	What?		When?		Why?		Who?				Where?		Which tools?	TRAFFIC RANK						
		1) OBJECT		2) PHASES		3) MOTIVATIONS		4) ROLES		5) CONTRIBUTORS		6) BENEFICIARIES		7) CONFIGURATION		8) TOOLS					
		SINGLE	MULTIPLE	TRENDS	CONCEPTS	DESIGNS	MONETARY	NON MONETARY	SINGLE	MULTIPLE	INDIVIDUALS	COMPANIES	INDIVIDUALS	CORPORATE INITIATIVE		MANY COMPANIES	STATIC	DYNAMIC	AVAILABILITY OF TOOLS		
9) COLLABORATIVE INNOVATION MODEL	INNOVATION COMMUNITY	1	SOURCEFORGE	SW															187		
		2	OPENMOKO	SW+HW																57.432	
		3	MAEMO	SW																70.123	
		4	OSCAR	HW																887.949	
		5	OPENSOURCEMACHINE	SW+HW																1.736.029	
		6	ARDUINO	SW+HW																37.952	
		7	WATERBIKEPROJECT	HW																3.232.457	
		8	OPENREMOTE	SW+HW																1.023.751	
INNOVATION MALL	INNOVATION INTERMEDIARY AND INNOVATION SERVICES	9	99DESIGNS		X	X	X	X											7.313		
		10	IDEACONNECTION		X	X	X	X		X		X	X			X	X			83.493	
		11	INVENTNOW.ORG		X	X	X	X		X		X				X	X			20.073	
		12	ZOOPPA	X							X		X				X	X			71.072
		13	INNOCENTIVE		X	X	X	X		X		X	X			X	X			140.005	
		14	IDEASTORM		X															142.260	
		15	MYSTARBUCKSIDEA	X		X	X	X				X	X		X	X				211.082	
		16	CAMBRIAN HOUSE (now VENCORPS)		X		X	X	X		X	X		X		X	X			218.462	
		17	KLUSTER		X	X	X	X	X		X	X		X				X		328.939	
		18	REDESIGNME		X	X	X	X	X		X		X			X	X			462.947	
		19	NINESIGMA		X	X	X	X	X		X		X	X		X	X			776.631	
		20	CROWDSPRIT		X	X	X	X	X		X		X	X		X	X			1.182.234	
		21	FELLOWFORCE		X	X	X	X	X		X		X			X				1.386.640	
		22	IBM-THINKPLACE		X	X	X	X	X		X		X	X		X		X		392	
		23	P&G CONNECT& DEVELOP		X	X	X	X	X		X		X	X		X		X		2.256.294	
		24	GURU		X						X	X	X			X	X			5.199	
		25	ZAZZLE		X						X	X		X		X				1.507	
26	PONOKO	X			X	X	X		X	X		X		X				32.570			
27	LEGO FACTORY	X			X	X	X		X		X	X		X	X			450.000			
CONSORTIUM	INNOVATION SHOWCASE AND MARKETPLACE	28	METAFORESIGHT		X	X	X												1.249.612		
		29	IBM MICROELECTRONIC	SW+HW																392	
		30	BLUETOOTH CONSORTIUM	SW+HW																77	
ELITE CIRCLE	INNOVATION SHOWCASE AND MARKETPLACE	31	IDEO DESIGN COMMUNITY		X		X	X		X		X		X	X	X			66.514		
		32	ALESSI DESIGN COMMUNITY	OBJECTS			X	X	X		X		X		X					561.170	
		33	BRAINSTORE		X		X	X	X		X		X		X					740.343	
		34	VEEEL DESIGN		X		X	X	X		X		X		X					10.990.000	

A best of breed platform

The systematic application of foresight, creativity and design methods and tools into the decision-making process of companies and their products development is seen as a fundamental support to innovation (Rohrbeck *et al.*, 2008; Becker, 2002). But, as a matter of fact, in our exploration of more than 300 platforms in the web, we didn't find any Open innovation platform that perform and support individuals and companies in all the phases of the innovation process (foresight/creativity/design).

Table 3 focalises only on the two models with a high level of openness (Innovation Community and Innovation Mall platforms), giving examples to evidence their opportunities and main limitations.

Table 3 – Comparison of open innovation (innovation community and innovation mall) platforms

Type	Example	
INNOVATION COMMUNITY	Arduino (http://www.arduino.cc/)	
	Description	Main Limitations/Opportunities
	Arduino is an open-source electronics prototyping platform based on flexible, easy-to-use hardware and software. It's intended for artists, designers, hobbyists, and anyone interested in creating interactive objects or environments.	The Hardware can be built by hand or purchased preassembled; the Software can be downloaded for free. The community is focused in developing this HW and SW platform for many purposes.
INNOVATION MALL - Open Innovation Intermediary and Innovation Services -	Innocentive (http://www.innocentive.com)	
	Description	Main Limitations/Opportunities
	Innocentive is based on the Challenge: it is a unique problem posted by Seekers (companies and no-profit organizations) to the Open Innovation Marketplace. If a solution is selected as "best" by the Seeker, the Solver receives a financial award, which varies per Challenge.	The platform let emerge only a single role (inventor and problem solver). The reward system for members is only monetary and there's no way for them to get trained. Moreover there's no collaboration activities among members
INNOVATION MALL - Innovation Showcase and Marketplace -	Ponoko (http://www.ponoko.com)	
	Description	Main Limitations/Opportunities
	Ponoko is an online community and marketplace for inventors, designers and gadget makers to show, make and sell their unique projects to the world. Many design tools are available on the platforms.	The platform is a marketplace for (industrial)-design proposals (2D and 3D objects) submitted by users.
INNOVATION MALL - Corporate as (External) Open Innovation Intermediary -	Procter & Gamble, BMW, Kraft	
	Description	Main Limitations/Opportunities
	These companies desire proprietary, commercially viable products and technologies for their existing categories and for new solutions that will make their products better for the client, more convenient or more socially responsible.	The "Open" concept is limited from a one way interaction. Is difficult to establish non-monetary rewards systems.
INNOVATION MALL - Corporate as (internal) Open Innovation Intermediary -	IBM ThinkPlace	
	Description	Main Limitations/Opportunities
	ThinkPlace is a web application for facilitating innovation through idea generation, collaboration, and refinement. Anyone in the company can suggest ideas, comment on them, refine them, express support or even explain why the idea might not work. More importantly, the ideas that employees think have the greatest potential to grow the business, solve existing problems, or improve IBM's culture will automatically be considered.	The collaboration is planned only amongst internal collaborator or inviting an expert. There's no expertise exchange

Basing on literature and empirical analysis, it can be stated that the roots *to feed an innovation ecosystem* based on web platforms are mainly three key-concepts:

- *communities*: this is constituted by distributed and loosely connected networks of users, producers, dealers, partners, customers, more in general by the stakeholders of the innovation, and become the new organisational unit of analysis of the innovation process and define the ecosystem of innovation;
- *self-organization*: generation of innovative ideas, the development of new product and the diffusion of innovations are carried out in parallel by *self-organising communities* of actors;
- *cognitive diversity*: the key aspect that will define success or failure in discontinuous innovation projects is the amount of *cognitive diversity* (Van der Vegt and Janssen, 2003) that networks (or group of firms) will be able to form and manage.

Many companies, and especially SMEs, wishing to adopt a collective innovation approach have not yet developed specific operational tools and well-assessed methodologies. In fact, companies need in order to reach and improve their innovation capabilities to lever on different areas, as:

- to facilitate their access to cognitive diversity and connection with different and far other companies and end-users in order to foster collaboration for innovation;
- to be assisted in being aware of the possibilities to access to far or hidden knowledge in order to learn building and developing social innovation capital: "the collective capacity of a firm to innovate" (McElroy, 2002:30). Moreover, he argues that social innovation capital "refers to the collective manner in

which whole social systems (i.e. firms) organize themselves around – and carry put – the production and integration of new knowledge” (McElroy, 2002:32).

- to be helped in identifying future emergent technological and economic trends/discontinuities by developing network-based approaches to early perception of ‘weak signals’ and currently this type of analysis is being pioneered by some major companies and national security intelligence agencies;
- to manage creativity in the area of new product/service development to individuate new product or service ideas;
- to improve the design process in order to receive suggestions and co-develop a product or a service, and to study the related business models and especially to create a business ecosystem to support the design, manufacture and distribution of the product;
- to be helped in reducing the market risks associated with investment in innovation and R&D by developing distributed networks of external intelligence, which provide users’ feedback on the market potential of the innovation and in some cases (see Von Hippel) provides embryonic markets for the development of the innovation.

Companies may have a high innovation potential, but innovations to become successful must be adopted and spread into nowadays competitive and turbulent markets. Each single company often faces the market risk, after sustaining R&D costs, without any preliminary feedback from the users about the potential success of the product idea. Moreover, a single company needs a support and a connection to the entire business ecosystem related to its core business, because it cannot sell its products without being supported from other structures which cover its not-core areas.

Companies, in order to achieve successful, repeated organizational innovation; access to learning and knowledge processing; access to cognitive diversity; have the possibility to be connected to foster collaborative projects, can leverage on web open innovation platforms. The present work helped in drawing the characteristics of a best of breed platform, basing on empirical state-of-the-art analysis of the platforms, and an investigation based on literature to highlight the best characteristics for each point.

More specifically we claim that the most important characteristics of a best of breed open innovation platform resulting from our analysis are:

- *openness and collaboration*: the platform performs crowdsourcing and triggers the formation of communities;
- presence of a *semantic engine*: it will give the possibility to set a system of *alerts* dedicated to news, innovation projects, new technologies, etc. relatively to the specific project the user opened or participate in; it will be possible also to permit a contacts research and to be suggested of the new connections with other actors of the supply chain;
- the communities are *multifocused, dynamic and evolutionary* and each of the three stages of the innovation process (foresight/creativity/design) let outcrop *n communities*;
- the presence of *multi-roles* and *multi-level* members profiles;
- a *multi-output* and *multi-focus* platform: it can simultaneously manage all the three categories of output (trends, concepts, designs) and multiple topics (unlimited, because they depend on the choice of the users) - there are not platforms that manage all the three stages of the innovation process.
- *configurability*: As the situations of open collaboration offer an array of choices and complex trade-offs, the main trait that characterises the best of breed platform is its configurability: configurability will permit the SME to choose, for example, referring to the “collaborative innovation model” criteria, the openness and hierarchy levels of the specific project and so to be an elite circle, a consortium, an innovation mall or an innovation community.

In synthesis, following our framework of analysis, the best of breed platform needs to have the following characteristics as highlighted in Table 4.

Table 4. The best of breed open innovation platform

WH - Q	CRITERIA	BEST OF BREED PLATFORM
What?	OBJECT	<ul style="list-style-type: none"> • Multiple
When?	PHASES	<ul style="list-style-type: none"> • Possibility to develop all of the three (trends/concepts/designs)
Why?	MOTIVATIONS	<ul style="list-style-type: none"> • Configurability to have both monetary and not monetary reward systems
Who?	ROLES	<ul style="list-style-type: none"> • Multiple
	CONTRIBUTORS	<ul style="list-style-type: none"> • Both individuals and companies
	BENEFICIARIES	<ul style="list-style-type: none"> • All
Where?	CONFIGURATION	<ul style="list-style-type: none"> • Dynamic
Which tool?	TOOLS	<ul style="list-style-type: none"> • Available
How?	COLLABORATIVE INNOVATION MODEL	<ul style="list-style-type: none"> • Configurability to choose one of the models proposed by Pisano and Verganti (2008)

Conclusions

The ICT operational platform can be a powerful instrument to develop conditions for the creation of communities (bottom-up approach) supporting each phase of the innovation process.

This research contributes in this direction, mapping the web-based open innovation platforms that perform crowdsourcing and enriches the research field on the collaborative networks for innovation linking cross-fertilization, self-organizing communities and technology-transfer. Moreover the present work proposes a best-of-breed platform and some useful add-ons, in order to comprehend how it is possible to create a collaborative network through web open innovation platforms.

Basing on such a literature and empirical analysis, the present work proposes that the roots to feed an innovation ecosystem based on web platforms are mainly three key-concepts: communities, self-organization and cognitive diversity. The new approach in innovation is due to the *self-organized emergence* of communities that act and transform the ecosystem evolving through the innovation phases (foresight, creativity, design) and time and creating an embryonic market, in which innovation generation and diffusion simultaneously grow and nurture themselves embedded in the innovation ecosystem.

The network based, collaborative and multilingual approach of the best-of-breed platform proposed represents a promising potential solution to the major constraints of companies' innovation, in terms of reduction of costs and time invested, increasing the capability in carrying the process for new ideas, increasing of the possibility to *capitalize knowledge*.

Finally the present work proposes insight for designing a *new AGORÁ for collective intelligence and emerging communities*, able to facilitate the innovation process, to foster collaboration among users and to trigger structured proactive actions.

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In appendix we list the web-based platforms we analyzed in our research.

99designs	http://99designs.com
actblue	http://www.actblue.com
AKVO	https://www.mturk.com
amuen	http://amuen.com
Artistic Hub	http://www.artistichub.com/
Artistshare	http://www.artistshare.com
Atizo	https://www.atizo.com/
AX84 Firefly	http://www.ax84.com/
BalloonBoard	http://www.balloonboard.org/
Battle of concepts	http://battleofconcepts.nl/
Baynote	http://www.baynote.com/
Big Idea Group	http://www.bigideagroup.net/
Bizual	http://www.bizual.com/
BMW Customer Innovation Lab	http://www.hyve-special.de
BrainReactions	http://brainreactions.net/
Bug Labs	http://www.buglabs.net/
Build-It-Solar	http://www.builditsolar.com
c,mm,n	http://www.cmmn.org/
Callooh	http://www.appropedia.org/Callooh
CambrianHouse	http://www.cambrianhouse.com/
CandyFab Project	http://www.candyfab.org/
Canuckle	http://www.greenwatts.info/
Chumby	http://www.chumby.com/
Collar Free	http://www.collarfree.com
Concentrated Solar Power Open Source Initiative	http://www.csposi.org/
ConnectedText	http://www.connectedtext.com/
Contraptor	http://www.garagefab.cc
Cool Software	http://software.intel.com
Crowdsprit	http://www.crowdsprit.com/
Daisy MP3 Player	http://www.makezine.com
Dell IdeaStorm	http://www.ideastorm.com/
DESIGN 21	http://www.design21sdn.com/
Digital Ecosystems	http://www.digital-ecosystems.org/
DIY Drones	http://diydrones.com/
ECB AT91	http://wiki.emqbit.com
elance	http://www.elance.com/
EMC Community Network - ECN	https://community.emc.com
Ethernut	http://ethernut.de/
e-tipi	http://beta.e-tipi.com/tipi/
Eureka medical	http://www.eurekamed.com
ExpressPCB	http://www.expresspcb.com
Fab@Home	http://www.fabathome.org
F-CPU	http://f-cpu.seul.org/
Fellowforce	http://www.fellowforce.com/
Fragment Store	http://www.fragmentstore.de/
Free IO	http://freecio.org/
GameChanger	http://www.shell.com
GP2X	http://gp2x.co.uk/indexgp2x.html
Guru - freelancers	http://www.guru.com/
Hexayurt	http://hexayurt.com/

Hollrr	http://www.hollrr.com
House_n	http://architecture.mit.edu
HumanGrid	http://www.humangrid.eu/
IdeaBlob	http://www.ideablob.com/
IdeaConnection	http://www.ideaconnection.com/
Ideacrossing	http://www.ideacrossing.com/
IdeaMagnet	http://www.idea-magnet.com/
Ideawicket	http://www.ideawicket.com/
Ikea Hacker	http://ikeahacker.blogspot.com/
IkeWiki	http://ikewiki.salzburgresearch.at/
iLiad	http://www.irextechnologies.com/
Incuby	http://www.incuby.com/
Innocentive	http://www.innocentive.com/
Innovation Exchange	http://www.innovationexchange.com/
InventNow	http://www.inventnow.org
Jaldi Battery Charger	http://drupal.airjaldi.com
Ki Work	http://www.ki-work.com
KiWi	http://www.kiwi-project.eu/
kluster	http://www.kluster.com/
Kolabora	http://www.kolabora.com/
LEGO Factory	http://factory.lego.com/
Maemo	http://maemo.org/
Manticore	http://icculus.org/manticore/
Metaforesight	http://www.urenio.org/metaforesight/
Mojiva	http://www.mojiva.com/
Monome 40h	http://monome.org/about/
Moodle	http://moodle.org/
Multimachine	http://opensource-machine.org/
My Starbucks Idea	http://mystarbucksidea.force.com/ideaHome
Naked&Angry	http://www.nakedandangry.com/
NeuroS OSD	http://www.neurostechnology.com/community
Ninesigma	http://ninesigma.com/
obiwi	http://www.obiwi.com/
Octopus USB	http://embedded-projects.net/
odesk	http://www.odesk.com/
OKVM Project	http://okvm.sf.net/
OLPC XO-1	http://www.laptop.org/en/
onto wiki AKSW	http://ontowiki.net/Projects/OntoWiki
Open Architecture Network	http://architectureforhumanity.org/
Open Beacon	http://www.openbeacon.org/
Open Bicycle Computer	http://obico.de/
Open Bios	http://openbios.info/
Open EEG	http://openeeg.sourceforge.net/doc/
Open GPS Tracker	http://www.opengpstracker.org/
Open Graphics Project	http://wiki.opengraphics.org/tiki-index.php
Open Handset Alliance	http://www.openhandsetalliance.com/
Open Micromanufacturing and Nanomanufacturing Equipment	http://www.engr.uky.edu/psl/omne/
Open Moko	http://wiki.openmoko.org/wiki/Main_Page
Open OEM	http://p2pfoundation.net/Open_OEM
Open Pandora	http://openpandora.org/
Open Peer-to-Peer Design	http://www.openp2pdesign.org/blog/
Open Prosthetics Project	http://openprosthetics.org/
Open Remote	http://www.openremote.org/display/HOME/OpenRemote

Open Router	http://www.myopenrouter.com/
Open Source Drug Discovery (OSDD)	http://www.osdd.net/
Open Source Green Vehicle	http://www.osgv.org/
Open Source Scooter	http://members.optusnet.com.au/~a4x4kiwi/scooter/
Open Source Sewing Patterns	http://www.burdastyle.com/
Open Source Velomobile Development Project	http://www.velomobile.de/
Open SPARC	http://www.opensparc.net
Opencellphone	http://opencellphone.org
OpenPCD	http://www.openpcd.org/
OpenRISC	http://en.wikipedia.org/wiki/OpenRISC
Open-rTMS	http://open-rtms.sourceforge.net/it
OpenServo	http://openservo.com/
OpenStim	http://transcenmentalism.org/OpenStim/tiki-index.php
OSCar	http://www.theoscarproject.org/
OSCirrus	http://oscirrus.see-do.org/
OSMC	http://www.robotpower.com/osmc_info/
Owela	http://owela.vtt.fi/owela/introduction/
P&G Open Innovation Challenge	http://www.britishdesigninnovation.org/
Peugeot's design contest	http://www.peugeot-concours-design.com/
Pharmalicensing - open innovation for the life sciences	http://pharmalicensing.com/
Picnic Green Challenge	http://greenchallenge.info/
PLAICE	http://flash-plaice.wikispaces.com/
Ponoko	http://www.ponoko.com/
Popular Ideas - Dell IdeaStorm	http://www.dellideastorm.com/
Portable Light	http://www.portablelight.org/
Processing 1.1	http://www.processing.org/
Project VGA	http://oeye.ie.hva.nl/~meeuwi10/pVGA/projectvga.php
Ravelry	http://www.ravelry.com/
RedesignMe	http://www.redesignme.com/
River Simple	http://www.riversimple.com/
Ronen Kadushin Open Design	http://ronen-kadushin.com/Open_Design.asp
Sahkoautot	http://www.sahkoautot.fi/
Science Commons	http://sciencecommons.org/
Sellaband	http://www.sellaband.com/
Semitone Open Dimmer Project	http://www.engbedded.com/semitone
Sense Worldwide	http://www.senseworldwide.com/hello/index.php
SHPEGS Open Energy Project	http://bfi.org/
Simputer	http://www.simputer.org/
SolaRoof	http://www.solaroof.org/wiki
sourceforge	http://sourceforge.net/
SpiffChorder	http://symlink.dk/projects/spiffchorder/
spigit	http://www.spigit.com/
Spreadshirt	http://www.spreadshirt.net/it/IT/T-Shirt/Spreadshirt-1342/
SquidBee	http://libelium.com/
Strobit Trigg Project	http://code.google.com/p/strobit/
Sun SPOT	http://www.sunspotworld.com/
Swarmrobot	http://www.swarmrobot.org/tiki-index.php
TekScout™	http://www.tekscout.com/
The Open Source Embroidery project	http://open-source-embroidery.org.uk/osembroidery.htm
Threadless	http://www.threadless.com/
TIDES	http://www.appropedia.org/STAR-TIDES
TopCoder	http://www.topcoder.com/
Traxmod	http://www.k9spud.com/traxmod/

Twine	http://www.twine.com/
Tynax	http://www.tynax.com/ttx1/default.asp
Ucaterisk	http://rowetel.com/ucaterisk/
Universal Software Radio Peripheral	http://www.ettus.com/
Vator Tv	Vator Tv
Vehicle Design Summit	http://www.vehicledesignsummit.org/website/
Via OpenBook	http://www.viaopenbook.com/
Vocalpoint - P&G's network for women	http://site.vocalpoint.com/guest/index.html
We have a dream	http://www.wehaveadream.com/
Whirlwind Wheelchair International	http://www.whirlwindwheelchair.org/
WhyNot	http://www.whynot.net/
Wikimapia	http://wikimapia.org/
Wikipedia	http://en.wikipedia.org/wiki/Main_Page
Willow Project	http://pr.willowgarage.com/wiki/
wilogo	http://fr.wilogo.com/
Wine Hacking	http://p2pfoundation.net/Wine_Hacking
Worldbike	http://www.worldbike.org/projects/open-source-bike
x0xb0x	http://www.ladyada.net/make/x0xb0x/index.html
Yahoo Answers	http://answers.yahoo.com/
Ybox	http://ybox.tv/
Yet2.com	http://www.yet2.com/app/about/home
Your Green Dream	http://www.yougreendream.com/index.php
yourencore	http://www.yourencore.com/
zazzle	http://www.zazzle.com/
Zero Prestige	http://www.zeroprestige.org/
ZOOPPA — Home	http://www.zooppa.com/
zopa	http://www.zopa.it/ZopaWeb/
Zoybar	http://www.zoybar.net/