Towards a Framework for Collaborative Innovation

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Abstract: This paper presents the Unified Collaborative Innovation Framework (UCIF) developed in the European Integrated Project Laboranova (Collaboration Environment for Strategic Innovation). The Framework aims at the support of the early stage innovation process by means of collaborative working environments. As implied by its name, UCIF is a framework, which by definition is a conceptual construct acting as the skeleton and boundary upon and within various entities and concepts are integrated, outlining a proposed solution.

Keywords: Innovation Framework, Collaborative Innovation, Laboranova

1. Introduction

Open Innovation as a concept has been coined by Henry Chesbrough who is a professor and executive director at the Center for Open Innovation at Berkeley [1]. The central idea of Open Innovation is that in a world consisting of widely distributed knowledge, organizations like enterprises can not afford to rely entirely on their own research. Instead they should buy or license processes or inventions (e.g. patents) from other companies. In addition, internal inventions which are not used in business could be taken outside the enterprise (e.g. by licensing or joint ventures). In contrast, closed innovation refers to processes that limit the use of internal knowledge within a company and make little or no use of external knowledge.

The integration of end users and other stakeholders into innovation projects has proved to reduce business risks such as the invention and acceptance of products, services and applications. However, the integration of the end-users remains a difficult task. Thus a new methodological approach is required to cope with this problem. One solution is the concept of European Living Labs which offer a unique opportunity for organizations to include end-users and other stakeholders

in new product development or other innovation processes. This enables the user to be a co-creator in the innovation process [2]. Living Labs need support by CAI (Computer Aided Innovation), e.g. the collaborative tools of Laboranova [3].

This paper presents the Unified Collaborative Innovation Framework (UCIF) which – as implied by its name – is a framework, which by definition is a conceptual construct acting as a skeleton and boundary. Upon and within UCIF integrates various entities and concepts, thus outlining a proposed solution. As such, UCIF is expected to simplify the works in user centered open innovation, help in aligning them, remove scientific, linguistic obstacles and obstacles stemming from different backgrounds and perspectives that inhibit people involved to flawlessly exchange ideas and collaborate.

UCIF is presented using a constructive approach. This means that one piece of information (regarding one constituent part of UCIF) will be given at a time, and it will be added to those already presented. Each step of the description is supported by a diagram adding relevant comments. With the last step the whole framework should have become apparent and clear.

Using this approach it is easier to comprehend UCIF, understand the reasons for including each comprising part and allowing the following of the underlying storyline, which outlines the higher-level workflow of UCIF. That is: Influences from the environment lead an individual or team to realize of a new opportunity for innovation (idea, problem, issue, feedback etc); this opportunity is called Innovation Experience Opportunity (IEO). Then an innovation process starts seeking to generate knowledge and ideas that will exploit the new opportunity. During that process several knowledge objects (corporate or external) are sought and used, and furthermore new knowledge assets are created and added to the existing ones. Of course the impact of the innovation process might influence back the environment (closed loop), but this out of scope of this paper.

2. Knowledge and Ideation Circles

According to UCIF point of view there are two important, iterative and convoluting processes that take place during innovation, one regarding knowledge-related activities and one regarding idea-related activities. The former is called **Knowledge Circle** and the latter **Ideation Circle**. These concepts trace their origin to knowledge management perspectives such as Gartner Group KM model [4].

Knowledge Circle involves activities related to the knowledge life cycle and knowledge management. When referring to the knowledge circle in UCIF, the following tasks are implied:

- Initial definition of process goals and strategy
- Knowledge exploration or seek
- Knowledge retrieval or extraction

- Knowledge use, exploitation, leveraging
- New knowledge capture, modeling and storing
- Knowledge sharing or dissemination
- Reframing and redefinition of exploration purpose or of point of view
- Other knowledge management activities

These activities occur repeatedly as an iterative process. In each process-iteration more knowledge is extracted from knowledge sources and further knowledge is created.

Ideation Circle involves activities related to the idea life cycle and idea management. When referring to the idea circle in UCIF, the following tasks are implied:

- Initial definition of process goals and strategy
- Existing idea search, reuse and leveraging; existing idea will then be used as the starting point for further innovation
- Idea generation or ideation. Leveraging of existing knowledge assets
- Idea elaboration or development. Leveraging of existing knowledge assets
- Idea capturing, modeling and storing
- Idea sharing or dissemination
- Reframing and redefinition of ideation purpose
- Other idea management activities

As with knowledge circles, these activities occur repeatedly (iterative process). In each process-iteration more ideas are created. Since idea generation and elaboration (in Ideation Circle), as mental processes as they are, they heavily rely on knowledge exploitation and situation reframing (in Knowledge Circle). The two circles are constantly interacting, convoluting and influencing each other. More specifically, the knowledge creation and modeling activities can influence and provide stimuli for inspiration, thus causing idea generation and elaboration.

3. The UCIF Sections

The first part of UCIF to present is **Sections**. Sections are used to distinguish and separate the three major parts of UCIF storyline, which are:

- The **Influences Section** that depicts influences from the environment that might lead to realization of new IEOs,
- The **Innovation Section** that focuses on ways to exploit IEOs and produce ideas, and
- The **Knowledge Objects Section** that depicts Knowledge Objects as these are sought, used or created during the innovation process.

One thing that must be stressed is the entry point from the Influences to Innovation section. That is the realization from an individual or team of a new need that came up, or business opportunity or problem or insight, which needs to be solved or exploited or to further be investigated. It is usually created from stimuli and influences originating from the sources that will be described in the Influences Section, or in some cases from individual inspiration. Realization means the point where the influences section ends and the Innovation section begins.

The innovation process will typically be an iterative process, which includes several knowledge exploration and exploitation activities, new knowledge creation and modeling, which subsequently leads to ideation and new idea generation. Here, ideas are considered as knowledge (or knowledge objects) that have been identified to introduce innovative attributes to products or services or processes or methods etc, with regard to the context.

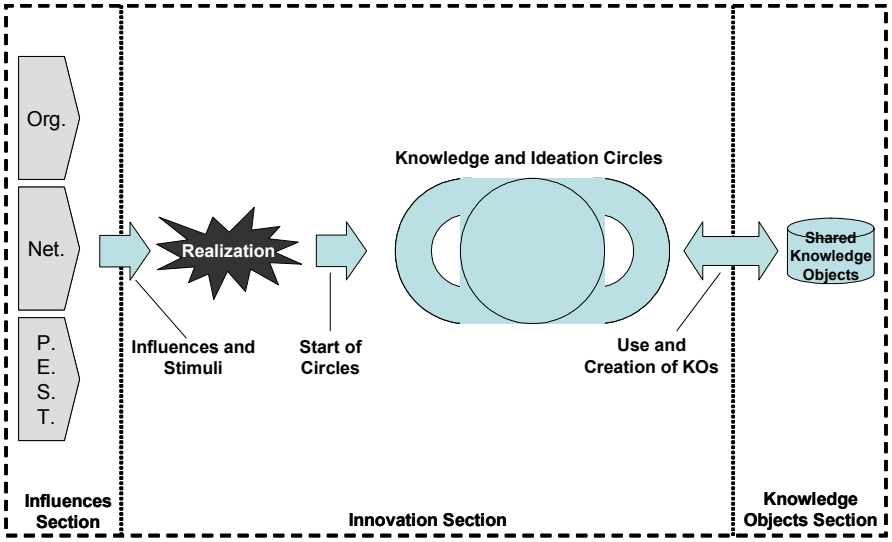

Figure 1 Sections and Storyline of UCIF.

The three UCIF Sections and the basic storyline of innovation in shown in Fig. 1. The storyline includes the following steps:

- Influences from the environment provide stimuli on people inside the organization
- Realization occurs and a knowledge exploration, modeling and ideation circle starts
- This circle which is a high-level business process includes several mid-level business processes
- During this circle many knowledge objects are retrieved and used and some are new created

3.1 The Influences Section

The **Influences Section** captures all sources of stimuli that might have some impact on the innovation process. It is the source of new IEOs. In UCIF, three types of influences have been identified depending on their origin (See Fig. 1, left side):

- Influences from inside the company or **organization**
- Influences from the external company or **organization network**
- Influences from the **broader environment** (P.E.S.T. – Politics, Economy, Society, Technology)

The **influences from the company** or organization originate mainly from the corporate strategy, policies, rules and operational tactics, as well as from the corporate culture and value system. It is worth mentioning that the procedures, structures (explicit or implicit), hierarchies (formal or informal), and social networks, have a great impact on the innovation process as they might control access to valuable knowledge resources and furthermore provide the necessary context needed for innovation to take place and propagate to the decision makers.

Another important source of **influences is the company's network** of partners, suppliers, and of course customers. Partners and suppliers can help in improving and rationalizing the organization's business processes and structures in order to increase efficiency. Customers are the users of company's products and/or services, and therefore they can provide valuable feedback about product and service functioning, characteristics, suitability for purpose, as well as provide insights on their own actual needs that must be met by new products and services.

The third source of **influences is the broader** political, economical, social and technological (P.E.S.T.) **environment**, within which the company or organization exists and operates. Technology in the last few decades has proven to be a quite versatile environment and simultaneously a driving factor for innovation. It has provided, and still provides, numerous stimuli and IEOs.

3.2 The Innovation Section

The **Innovation Section** captures the essence of the Framework, which is the innovation process that takes place within a company or organization. For this reason it is the core part of UCIF.

In real world, innovation can occur as a result of several interacting and interrelating business processes. Not all of them aim to the generation of new ideas, but they might lead to innovative results as a by-product. In UCIF however the focus is on processes that explicitly seek new idea generation (e.g. knowledge modeling) as well as considering idea management.

The Innovation Section is comprised from several business processes, which are parts of the higher-level, strategic innovation process. They span many scientific domains and areas of interest and involve people, roles and structures at various corporate levels. Business processes are usually executed in the context of projects launched within a company or in some cases in projects that span many companies and organizations. The following paragraphs describe in more detail this section and its comprising parts: Areas of Interest (Management, Knowledge, Ideas), Levels (Top Management, Network, Team, Personal), Innovation Business Processes and their interactions, and Teams and Projects.

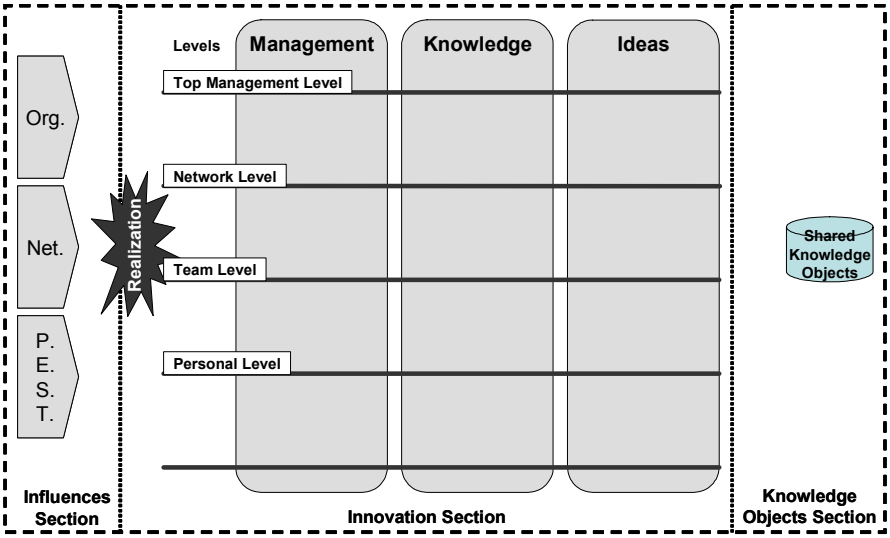

Figure 2 Structure of the Innovation Section

The realization of a new IEO is the entry point from Influences Section to Innovation Section. Fig. 2 shows the Areas of Interest (vertical) and Levels (horizontal) structure of the Innovation Section.

3.3 Knowledge Objects Section

The **Knowledge Objects Section** includes all entities and media containing or conveying knowledge. These entities are generally referred to as **Knowledge Objects**. Technically speaking Knowledge Objects can be a Database or Knowledge Base, a folder of documents, a single document, a software package etc. The knowledge and information contained in Knowledge Objects can be represented in various different formats (e.g. database records, plain text, rich text, XML, voice

recordings, pictures, drawings etc). The following **Knowledge Object Types** have been identified so far (see also Fig. 3, right side):

- Knowledge Objects residing in knowledge stores
- Idea models
- Idea portfolios
- Knowledge Objects residing in collaboration workspaces
- Evaluation reports

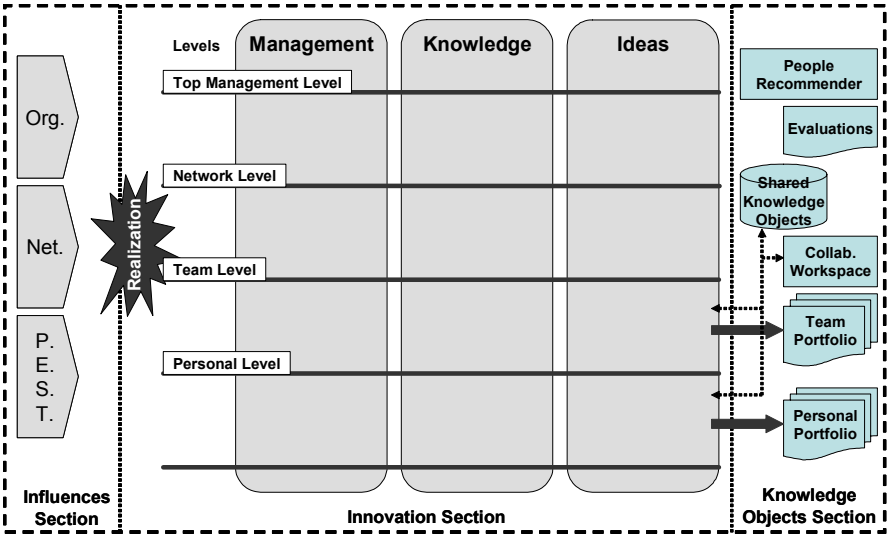

Figure 3 Knowledge Objects Section

4. Innovation Section Analysis

4.1 Areas of Interest

The **Areas of Interest** identify three domains (areas) that are involved in the innovation processes and innovation management. These areas are:

- Idea generation and management
- Knowledge exploration, exploitation, capturing and management
- Management of people, structures (e.g. teams) and resources

The **Management Area** of interest includes the activities of the strategic innovation process, which relates to the decision-making and management of people, teams, projects and resources. These activities do not generate new knowledge or ideas but provide the necessary operational environment that enables innovation to take place.

The **Knowledge Area** of interest includes the activities of innovation process, which relate to knowledge exploration, exploitation, leveraging, creation, modeling, and knowledge management. The Knowledge Circle falls into this area of interest. The activities of this area are usually providing the necessary influence, context and background needed for ideation to occur. For this reason we can consider the ideas area as an extension of the knowledge area.

The **Ideas Area** of interest includes all activities of the innovation process, which relate to the generation of new ideas (ideation), the development and evolution of already proposed ones, and the management of proposed ideas. The Ideation Circle falls into this area of interest. This area focuses specifically on ideas not on knowledge in general.

4.2 Levels

The **Levels** concept in UCIF helps in distinguishing and grouping the interacting structures and the relating business processes, depending on the level of complexity and/or authority. They introduce the dimension of size and escalation in UCIF. Four levels have been identified: Individual, team, network or open team and top management level.

Each organization or company that might use CAI products and UCIF can adapt these levels to their specific corporate environment and needs. A short explanation of these levels is given next:

- **Individual**: regards the processes, methods, tools or any other related concepts used by a single individual.
- **Team / Group**: regards the processes, methods, tools or any other related concepts used by (planned) teams. Such teams do not necessarily have a formal internal structure.
- **Network or Open Team**: regards the processes, methods, tools or any other concepts used by networks formed from interacting and collaborating teams.
- **Top Management**: regards the processes, methods, tools or any other concepts used by the top management of the company and their assistants, both for managing the whole innovation process as well as making knowledgeable decisions on innovations and ideas.

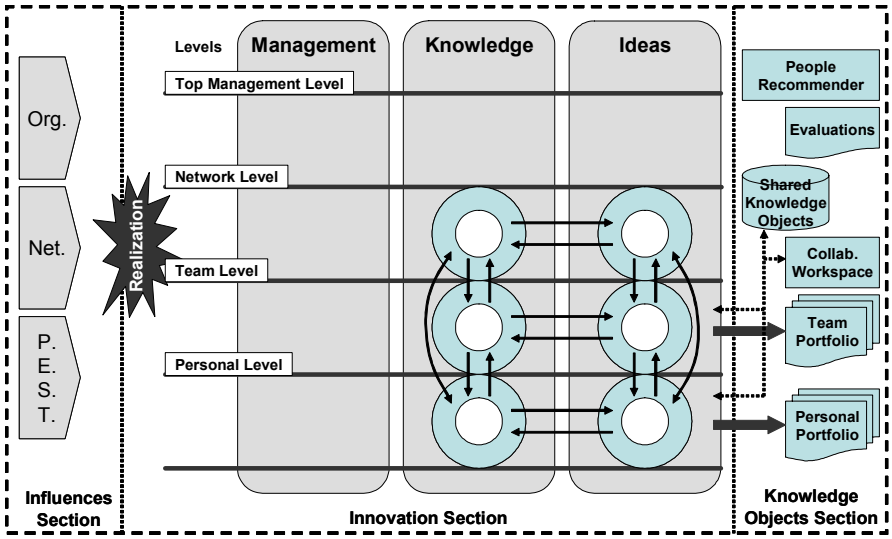

Figure 4 Ideation and Knowledge Circles in Areas and Levels of the Innovation Section

As shown in Fig. 4, the Knowledge and Ideation Circles can be broken down to several smaller circles that reside at different levels. These circles can interact both across areas of interest, across levels or even within the same level and area.

4.3 Business Processes

The business process concept is used in UCIF to represent the business processes that take place within a company or organization and which explicitly aim to idea generation and management. Business Processes exist at every level of the organization and span several areas of interest. Furthermore, interactions occur among them both within the same area and level, as well as across areas and levels.

According to [5] "a business process is a set of linked activities that create value by transforming an input into a more valuable output. Both input and output can be artifacts and/or information and the transformation can be performed by human actors, machines, or both".

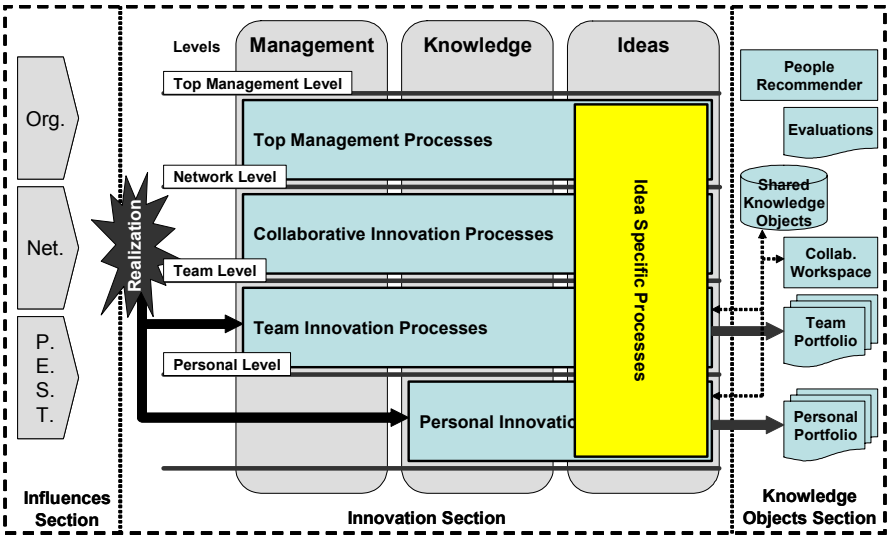

Figure 5 UCIF Business Processes

A business process can be decomposed into several sub-processes, which have their own attributes, but also contribute in achieving the goal of the super-process. The analysis of business processes typically includes the mapping of processes and sub-processes down to activity level. Activities are parts of the business process that do not include any decision-making and thus are not worth decomposing (although decomposition would be possible). In UCIF there have been identified and captured 5 types of business processes: Personal innovation-related processes, team innovation-related processes, collaborative innovation-related processes, top management innovation-related processes, and vertical, ideation-specific processes.

The first four types are horizontal (see Fig. 5), span all areas of interest and reside to one level of UCIF. On the other hand, the fifth process is vertical; it resides in the Idea area of interest and can span all levels.

The meaning of the horizontal processes is that an innovation-related business process includes activities residing in many areas of interest, i.e. knowledge-related, innovation-related and management-related activities. Furthermore, business processes at different levels have different attributes, as the goals, tools and practices used at each level differ.

The vertical business process in the Ideas Area of Interest focuses on the activities and workflows that take place across levels but within the Ideas area. These processes are of special interest because they focus on pure innovation activities (ideation, idea development, idea management, prediction markets etc.).

4.4 Business Process Interactions

As stated above, interactions occur among business processes and their activities. These interactions can be of many different types, such as workflow or activity sequencing (next activity), decision points, influences or other implicit impact etc.

Fig. 6 outlines the possible interaction combinations. The true interactions will be detailed later when we will present the processes in more detail. As shown in the diagram, the management activities tightly interact with knowledge activities to enable them produce and disseminate new knowledge. This basic interaction leads to the generation and evolution of new ideas, thus starting and influencing the innovation activities.

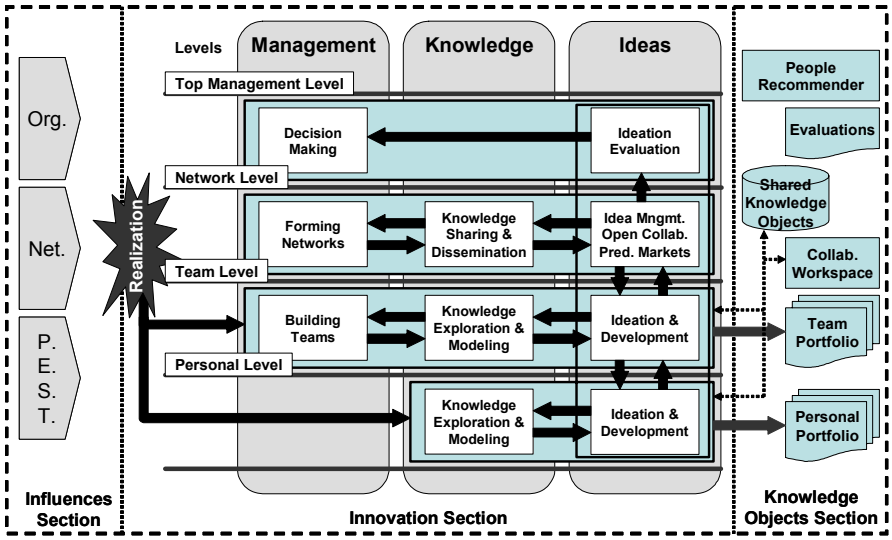

Figure 6 UCIF Business Process Interactions

More specifically, at the Personal Level it is expected the knowledge-related tasks to be the predominant type of activities. Ideation and idea development activities are also happening to some extend. The individual has the ability to share his/her new knowledge with other individuals, or teams, or disseminate it to open projects or networks, or publish it to Knowledge Bases.

4.5 Teams and Projects

In fact, humans put business processes and their interactions in practice, either individually or in teams who work on certain projects. Teams can be started for

many reasons but in most cases this happens when there is a clear need for a new project, for example research for a new idea after the realization of a new customer need. Then teams, or in some cases individuals, work on the projects following certain, usually predefined, business processes. Teams and projects are created and executed at various levels; they span many areas of interest and participate in several business processes.

5. Conclusions

Much effort has been put in identifying the vast majority of collaborative innovation related concepts, as well as of concepts related to many supportive activities. This work has been largely based on Laboranova case study analysis as well as on the prior research of various Laboranova researchers. The result is a concept map and guidelines or design principles of UCIF that trace their origins in theories such Complex Adaptive Systems, Situational Analyses, Emergent Systems etc.

The resulting framework has some very interesting attributes: UCIF focuses on the conceptual and technological aspects of collaborative innovation rather than on scientific and research issues. It is based on literature review and broad consensus among partners and thus gives a neutral, non-biased, and well-accepted view.

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