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Means for Serendipitous Discovery in the Innovation Process

How organizations can harness serendipity through idea management system

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MEANS FOR SERENDIPITOUS DISCOVERY IN THE INNOVATION PROCESS

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Abstract

"While serendipity is generally considered a spark for innovation and new knowledge, the triggers for serendipity appear infinite and consequently information systems' support for serendipity has been difficult to realize." *(Mccay-Peet, 2013)*

UK Research Council funds a project of 1,87 million Pounds aimed at understanding the role that serendipity plays in research and innovation in the digital economy. The question is not why, but rather why not earlier? Serendipity is a slippery concept, but it is widely acknowledged that it plays its part in the advancements in science and technology. Famous examples of scientists innovators accidentally stumbled upon new ideas that have triggered progress is plain to see: penicillin, vulcanized rubber, safety glass microwaves, Ink-jet printers, post-it notes, Teflon, Viagra, and so on. *(Roberts ,1989)*

In today's tumultuous business environment, innovation is more than a prerequisite to survive as an organization. But it is more likely today that innovation will result from a serendipitous discovery rather than a formal planning process. *(Loosemore,2013), (O'Connor & Price, 2001) (Kingdon, 2013)*

To try to manage serendipity is rather an oxymoron, but research showed that it is feasible. To manage serendipity means to create an environment where all the precipitating conditions of serendipity unfold. It seems that serendipity occurs during social networking, active learning and in the act of exploratory search.

This thesis proposes a new perspective on Idea Management System, as a mechanism that systematically facilitates serendipity.

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1. INTRODUCTION

It is widely acknowledged the existence or the value of serendipity. It is a matter of taxonomy, if it should be named chance or pure luck, an unexpected encounter with information that will generate value. Serendipity is the "phenomenon of spontaneously understanding unexpected things". Serendipity is labeled also as revelations, discoveries or innovations because serendipity drives implications in many areas of life. Serendipity is affecting many aspects of life, thus its meaning spawns wide. Serendipity is a human- centric experience, as it is the individual who witnesses and grasps the benefits of the unexpected discovery. Out of this experience, which is the individual's valuable interaction with ideas, information, objects or phenomena, new knowledge rises.

Serendipity affects advancements in science, as at the base of many innovations stands a **serendipitous discovery** (SD). Taking example Alexander Fleming's discovery of penicillin, one could clearly pinpoint this event as covering all the aspects of serendipity. Alexander Fleming was investigating bacterial inhibitors by conventional scientific methods. Because he forgot one of the petri dishes on a shelf, mold contaminated the bacteria he was studying. He realized that mold has killed the bacteria and unexpectedly, Alexander Fleming understood that he just stumbled upon a new effective antibiotic. (*Roberts,1989)*

An interesting observation is that Alexander Fleming by himself could not have invented penicillin, but because he received support from his peers (Howard Florey) and from the organization (Pfizer), the true value of the SD was grasped.

Serendipity in the organization or how can serendipity be facilitated in the organizational context is a subject that should be further researched. In the process of innovation, a serendipitous discovery, the organization and the actions taken in order to seize the value of opportunity discovery play a fundamental role. *(Napier & Vuong, 2012) (Nonaka, 1991) (Mendoca, Cunha, & Clegg, 2008)*

Large companies like P&G, 3M, IBM or Google, either through adopting strategies like Open Innovation or designing physical spaces, try to maximize the potential for serendipitous discoveries. It is a form of planning serendipity or managing serendipity for the benefit of the organization. *(Loosemore, 2013)*

Scholars agree that if triggering conditions of serendipity are fostered, organization will be able to reap the fruits of serendipity systematically. *(Mendoca, Cunha, & Clegg, 2008)*. Even though it is hard to put the finger on serendipity as its meaning supports various interpretations, there are a series of reoccurring patterns, which can be incorporated in a process framework of serendipity. These patterns generate a list of conditions, namely **Facilitating Conditions of Serendipity** (FCS), required in order to nurture a serendipitous discovery.

In contrast to today's advancements in Information Technology, in the past we could have not witness serendipity without physical proximity *(Rasmus, 2013)*. Digital network increases the bandwidth for serendipity. The exchange of ideas between individuals, sharing insights and being able to reap over the bisociations instantly made in their minds, in other words, activities that may lead to an opportunity discovery, are today enabled through digital networks. Innovation as the result of a serendipitous discovery is limited to those who are connected. A shift in the perception of connectivity is being witnessed, which is not linked to physical proximity anymore because progress in technology shapes this new paradigm.

This thesis explores the FCS, as they have been contoured from the literature available, from the work-related serendipity examples of the interviewees and as well from relevant historical examples of scientific and technological innovations.

I have also highlighted the steps an individual goes through in the process of serendipitous discovery in the organizational context. Serendipity is credited as a spark of innovation; this report underlines the importance of this elusive concept, which is serendipity, and the ability to harness it, for the organization and for its growth.

This research is concerned also with identifying linkages between the characteristics of a propitious environment where serendipity is likely to unfold, and a digital platform that it is used in organizations in their innovation processes, specifically Idea

Management System (IMS). I am proposing a new interpretation upon the functionality of IMS as a mechanism that can systematically facilitate serendipity in the organization.

As a starting point I have reviewed prior research and have evaluated a series of examples of serendipitous discovery in the innovation processes, both from empirical data (interviews and secondary data) and literature review. At this point, reoccurring themes and patterns were identified in both the process of and regarding the FCS.. From this stage, I have compared these conditions to the characteristics, features or functionalities of IMS and formulated a new assumption on IMS functionality as a mechanism that can systematically facilitate serendipitous discoveries in an organization setting.

On a more general note, this case relates to how established organizations are keen, or not, on pursuing innovations triggered by serendipitous ideas and if these ideas can be nurtured through the IMS platform.

Based on several interviews with individuals who hold key functions in the innovation management of international successful companies, the empirical section of this paper describes perceptions on SD related to innovations in an organizational environment and also helps at gaining new perspectives on how IMS is used in the innovation process.

Justification of the research

There is an obvious interest in management research, in understanding why industry incumbents fail to see disruptions coming until it is too late *(Clayton Christensen, 1997)*. Also, today organizations are more aware of the fact that they need to proactively generate these discontinuities, thus changes in the innovation management are undertaken *(Sandstrom,2009).* An important aspect that receives great attention today is the ideation activities inside the organization, as part of the new knowledge creation

and innovation capabilities *(Bjork, 2013).* The aspect of ideation provides a direct link towards Idea Management System (IMS), as this system provides both means for managing innovation and new knowledge creation in the organization.

IMS is a dual system *(Sandstrom,2013),* which offers a structured support of the ideation phase in the innovation process and its design and scope today ,at least in theory ,is directed toward both incremental and radical ideas. Though, because there is a difference in the nature of ideas, i.e. incremental and radical, and in the impact each of them have on the organizational practices, studies have showed that discontinuous innovation employ different selection criteria and evaluation procedures than incremental innovations *(Rice,1998).*

This difference implies a counterproductive trend, where radical ideas are disregarded, as they do not fit into the current business model and evaluation process.

The justification of this research is that in theory, IMS is a dual system aimed at generating both incremental and radical ideas for innovation, but in practice organizations adopts it more as a tool to handle ideas in order to provide continuous improvements. Understanding that serendipity plays an important part in identifying opportunities for innovation, and showing that much of the radical innovation have at its base a serendipitous idea, then the aim of this paper is to present a new perspective on IMS as a tool able to create a propitious environment for serendipitous discoveries of opportunities for innovation to be made.

Objective and Gaps in Scientific Knowledge

The objective of this research is to understand whether an IMS can provide the means to enable serendipitous discoveries of opportunity and if in practice it is perceived to do so. I looked at the characteristics of IMS and searched for its correspondent in the Facilitating Conditions of Serendipity (FCS) in order to support the assumption.

The literature about Idea management systems does not elaborate on issues such as the usage of the system as a tool designed to generate radical ideas, but rather most of researchers' views on this system is limited to positioning it as a way of coming up

with continuous improvements or incremental ideas. Even though the nature of innovation has changed, the use of IMS does not shifted to the same extent. There is a scarcity in the studies of practical understanding of how IMS is used by organizations in the innovation process *(Sandstrom, 2013).*

Also, there is little research on creating mechanisms to support serendipity in digital environment *(Mccay-Peet, 2013), (Makri)* and within this thesis I will try to explore and analyze an assumption regarding an existing digital platform, namely **Idea Management System** (IMS).

Research Question

Giving the introduction above, I have reached the research question as it follows:

RQ: Can IMS provide the means for a serendipitous discovery of opportunities in the innovation process of the organization?

Firstly, the theoretical exposition will provide support for answering the research question and then I will probe the assumptions made by identifying recurring themes and patterns in the empirical data.

The following sub questions are as well important as they will provide a deeper understanding of the research.

How do organizations perceive the usability of IMS? How do organizations embrace serendipitous discoveries in the process of innovation?

> Where usability is: “The extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use." *(ISO, 2004)*

2.THEORETICAL EXPOSITION

This section concerns two main themes: IMS and SD, and will include a short summary of various theories and concepts used as a support to argue our observations throughout the paper.

Ideation

As knowledge is widely perceived as one of the most important sources of competitive advantage, ideation or idea creation is as well considered as essential in knowledge creation. Björk (2013) suggests that given the competitive business environment where companies operate and the urge to constantly innovate mixed with the increased focus on knowledge creation as a strategic resource, this new paradigm pushes firm to "actively attend the creation of new knowledge that can be turned into innovations" *(Björk, 2013).* Ideation is therefore, the process of generating and handling new innovative ideas, which unfortunately is scarcely studied by researchers in management. Creativity and knowledge creation are concepts, which often are found in relation to social interaction and communication. Therefore interactions between individuals create the means for generating new ideas and these interactions are vital for innovations. *(Bjork, 2013)*

Scholars address aspects like the influence of the size of the social network of an individual or the social capital of an organization on the process of ideation, or how important is the range of knowledge diversity at an organization level and as well to an individual level for generating new ideas *(Bjork, 2013),*

Knowledge Management (KM) encompasses a wide range of processes and practices through which organizations manage to manipulate knowledge pertaining to its employees for the benefit of the company. These practices are use by the organization to identify, create, capture and distribute knowledge for reuse, awareness and learning across the organization *(Sarayreh, Mardawi, & Dmour, 2012)*. It is seen as a key to economic performance how knowledge and experiences of employees are combined into organizational capabilities for the company's interest. The aim of KM is to best organize knowledge assets available to an organization so the outcome of these practices will yield competitive advantage.

Even if the available literature on KM offers many interpretations, throughout this paper I will stick to a school of thought generated by professor Ikujiro Nonaka, as the Nonaka's model of KM plays a critical role in understanding how to transfer knowledge into information. The SECI model *(Nonaka,1991)* elaborates on the codification of knowledge as the main approach to move around knowledge in the organization. Nonaka (1991) argues that this was to be achieved through turning tacit knowledge into transferrable information through such things as knowledge databases, or knowledge banks.

This school of thoughts is suitable for this thesis as the emphasis of this research is on IMS, which is a software used to handle ideas in the innovation process, and also because the Nonaka's model stresses on the importance of the process of combination in transferring explicit knowledge. In this process, explicit knowledge can be conveyed in documents, email, databases, as well as through meetings and briefings. The key steps of this process refer to collecting relevant internal and external knowledge, dissemination, editing and processing it to make it more usable *(Sarayreh, Mardawi, & Dmour, 2012)*. Combination allows knowledge transfer among groups across organizations. Thus, I interpret the process of combination as seen in Nonaka's (1991) model as the framework base of an IMS. *(See Table 1)*

Knowledge is an intangible asset and resides inside individuals as tacit knowledge. Nonaka(1991) shares the opinion that one of the biggest challenges in KM is to unleash, capture and harness individual-based knowledge making it available for the entire organization. The challenge refers to how can tacit knowledge be more efficient and more effective transformed into explicit knowledge, therefore being used across the whole organization. The outcome of converting tacit knowledge into explicit knowledge is the creation of new knowledge to the benefit of the organization. Nonaka implies that knowledge can be effective managed if the organization is capable to convert internalized knowledge, which is embedded in the company's employees into codified knowledge, thus making the process of sharing ideas and knowledge throughout the whole organization, a smooth process. *(Nonaka, 1991)*

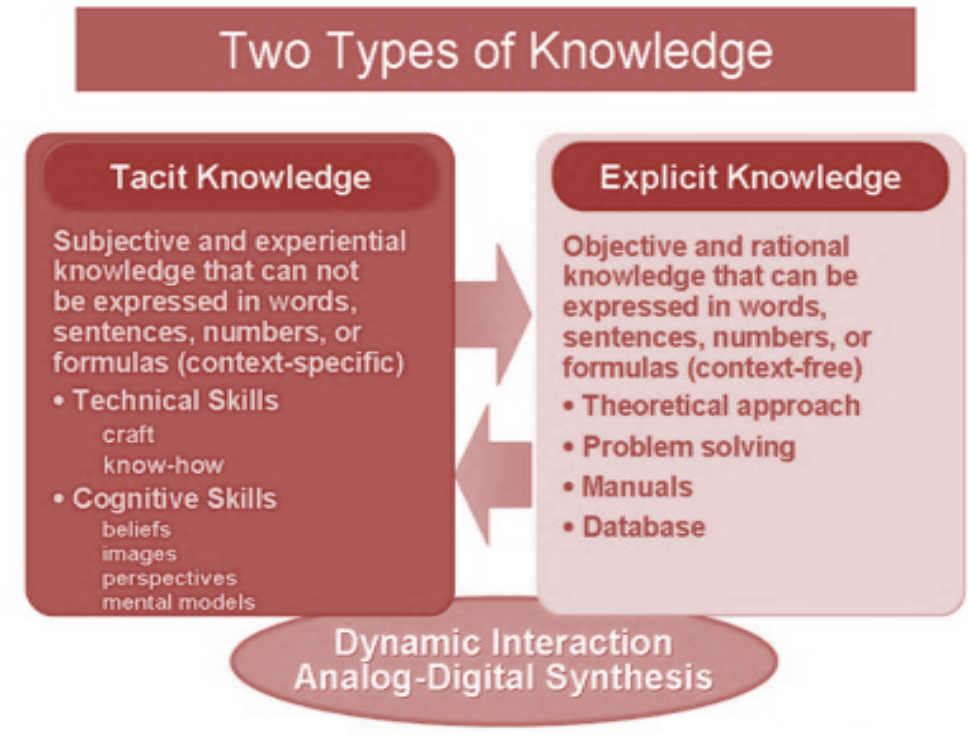


Fig. 1- The codification of Knowledge (Nonaka, 1991)

The process of conversion tacit knowledge into explicit knowledge is made in 4 steps: socialization, externalization, combination and internalization.

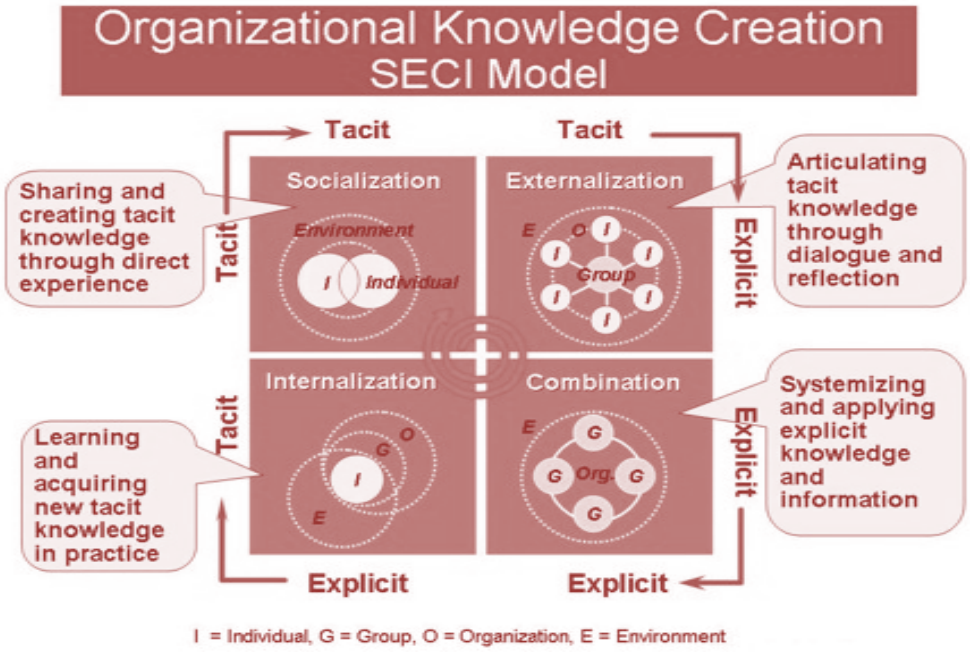
Nonaka argues that through socialization, which is better described as a process where employees and also third parties (suppliers, partners, consumers), interact to each other by sharing ideas, experiences, knowledge in a space outside the workplace ; where they are not constraint by organizational boundaries and where each other will become part of the other's tacit knowledge. This step in the process is considered limited because it is rather observed an exchange of knowledge between peers, where learning is made through observation and where tacit knowledge remains still tacit knowledge. Thus the company as a whole will not grasp the value of socialization to its benefit.

The next step is externalization and that happens when tacit knowledge is being articulated, converted into explicit knowledge, so everyone else could apprehend it, thus allowing it to be shared throughout a group of employees. Within this step, tacit knowledge, which is now presented as tangible under the label of explicit knowledge, is being critically evaluated through intense dialogue and reflection inside the group.

The next step, combination, takes place when the newly converted explicit knowledge is combined with more explicit knowledge and that creates new knowledge, visibly, for the benefit of the company. This new knowledge can be usually translated as innovation of products or process.

The last step cannot be considered as a final step as this process is a continuous process and it is constantly building and reiterating itself, which, from an organization point of view implies improving on past performances. In this step, explicit knowledge transfigures into an individual's tacit knowledge, which later on will be converted again.

Fig.2 – The SECI Model (Nonaka, 1991)



Nonaka claims that creating new knowledge is as much about ideals as it is about ideas and thus this fact fuels innovation. Innovation happens when one's ideal is materialized and the world adopts this ideal as valid. The creation of new knowledge inside an organization means to reshape the company and all its components through a non-stop process of personal and organizational self-renewal, according to Nonaka.

Innovation process

Innovation is about new ideas and how can those be successfully commercial exploited. Innovation process encompasses a series of activities, from scientific to business activities, all leading to the commercial introduction of new or improved product or service. *(Napier & Vuong, 2012)*

To be in concordance with the aim of this paper I will use a simplistic approach of innovation process in order to better visualize where in the context of innovation process should Idea Management System and Serendipitous Discovery be positioned.

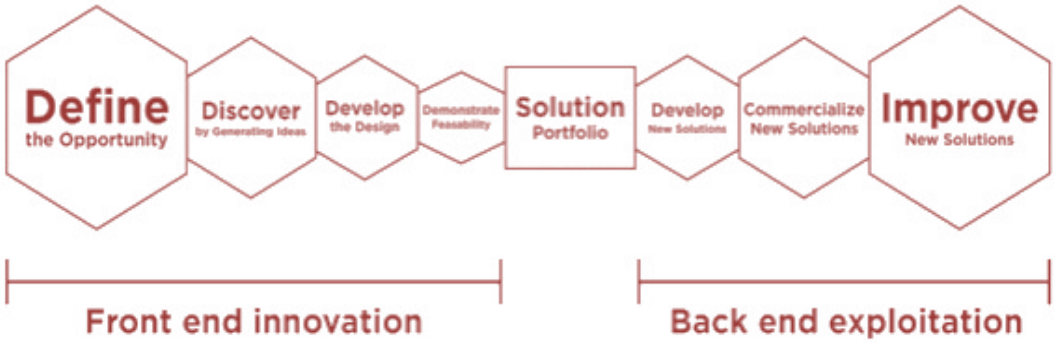


Fig. 3 – The process of Innovation

The innovation process is seldom a linear process as presented in the picture above, but rather an iterative process. In organizational practice, the innovation process is divided into two phases: pre-innovation or front end phase where the focus is on discovering and identifying the right opportunity for innovation and back end exploitation. In the first phase companies put emphasis on what to offer, and it is a process less structured and more opportunistic than following phase, where development and commercialization of the new solution implies focused activities. Within this paper a particular interest is on the first phase of innovation, firstly because an IMS encompasses all the activities from discovering the opportunity (being a challenge-driven platform, solutions required and labeled under a challenge, stem from a need recognized in the market) and second because a serendipitous discovery is likely to occur in this phase, therefore before the solution is produced. The first phase of this process is better characterized by exploration of the unexplored ground. *(Rogers, 2003)*

Innovation as an opportunity discovery

Innovation must include an organized, systematic and continual search for new opportunities. Since the concept of opportunity here has a broad sense, in order to further build on the previous assertion I will refer to the concept of Innovative

Opportunities *(Holmen et al. , 2007).* . Innovative Opportunities, which is a more encompassing concept and implicitly more complex, as a concept lies at the conjunction of three categories of opportunities in relation to innovation, namely technological opportunities, entrepreneurial opportunities and productive opportunities.

An innovative opportunity is defined as "the possibility to realize a potential economic value inherent in a new combination of resources and market needs, emerging from changes in the scientific or technological knowledge base, customer preferences, or the interrelationships between economic actors." *(Holmen et al. , 2007).* As both innovation process and opportunity discovery are central themes within this thesis, this classification of opportunity in relation to innovation was inherent at this stage.

As IMS is a tool used in the front end of the innovation process, whereby organizations mainly focus is on identifying and discovering opportunities for innovation, thus the act of innovation and its outcome as an advancement in technology and knowledge can be considered to follow the path of an opportunity discovery described in the entrepreneurship theories. In the context of innovation, opportunity discovery fills the gap between an unfulfilled market need and a solution that satisfies the need *((O'Connor & Price, 2001).*

Following, I will emphasize more on opportunity discovery for discontinuous innovations, as it is directly dependent on "individual initiative and capacity" and it is a prerequisite that "individuals may be alert and ready to react to ideas and information that have the potential to become an opportunity" *(O'Connor & Price, 2001)* In other words, opportunity discovery for radical innovations is rather based on serendipitous characteristics, as it employs alertness, preparedness, and capacity of the individual to react to an unexpected encounter with ideas and information that will eventually become an opportunity, as it will generate value. In contrast to discontinuous innovations, incremental innovations are basically outcomes of "routine practices and procedures of the firm" (O'Connor & Price, 2001), implicitly opportunity discovery here is rather deliberate. The main reasons for adopting institutionalized practices and procedures in the innovation process is that these kind

of organizations try to minimize the risks associated with radical innovations, mostly because of costly downside risks.*(Murphy, 2011)*

Discontinuous Innovation and Serendipity as a trigger

One of the important strategies a firm needs to adopt in order to achieve competitive advantage has been widely recognized as to be the innovation of products, services and business models. Even if many companies acknowledge the fact that innovation is the key path to growth, little manage to innovate successfully and repeatedly. *(O'Connor & Price, 2001)*

Generally, within an organization where the sole business is innovating, most of the innovations point to sustaining, incremental innovations, whereas merely a 10 percent of all innovation products, account for discontinuous, radical innovations. *(Sandstrom, 2009)*

Sustaining innovation is a type of innovation that satisfies a current customer base by systematically improving the performance of existing products or services.

On the other hand, a discontinuous innovation as a term is often used interchangeably with disruptive or radical innovation. In this paper I will adopt the definition of discontinuous innovation given by Sändstrom (2009), where discontinuous innovation is an innovation, which creates a distinct and momentary shift for the incumbent firm, or its value network. This change results from adopting a newly created substitute of current technology or new business models. *(Sandstrom, 2009)*

I have chosen to analyze the aspect of radical innovation in relation to serendipity, because of the importance of serendipity in the discovery of new products or services.

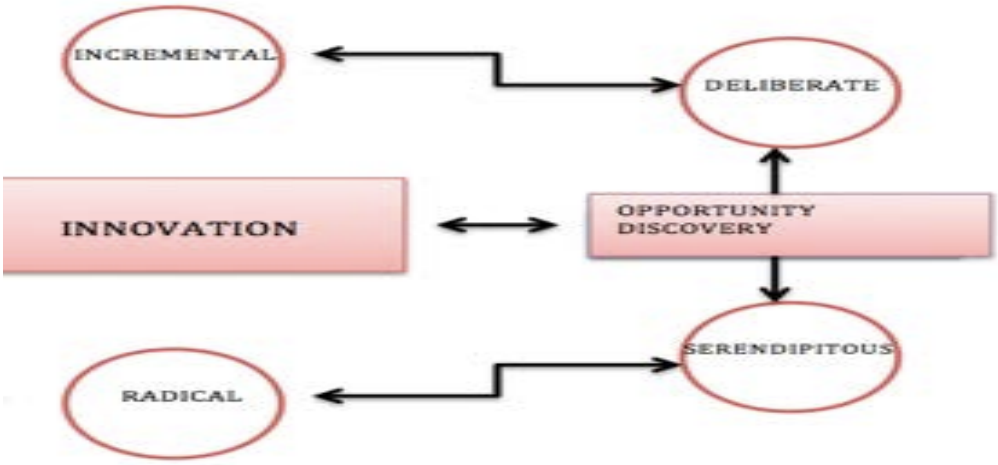


Fig.4 – Innovation as opportunity discovery model

In order to support the observation that serendipity is a trigger for radical innovation we will invoke a study made on 12 radical innovation projects made in ten large, established firms in U.S. Professor Gina O'Connors conducted the study. During the study she observed that the radical innovations arose either out of an invention, which can as well be attributed to a serendipitous discovery, or either through insight based on new combinations of technologies and process, which embodies if not in total, at least in part, the process of SD. The insight she mentions in her study, is later described as a technical discovery, made by an engineer or a scientist, therefore by a individual with a prepared mind, who she assumes " was not prepared-either through training or life experience- to make the cognitive leap from a technical idea to an envisioned and articulated business opportunity." In my opinion, her observation suggests that, given the context of where the discovery was made, which is the organization, the engineer or the scientist receives support from the organization to convert his discovery in a breakthrough innovation ready to be commercialized for that the organization and society grasp its value.

In her study, O'Connors (2001) give several examples of opportunity discovery in a breakthrough innovation but without labeling them as examples of serendipity. Because O'Connors (2001) refers to the unexpected information encounter that

triggered opportunity discovery as the “big bang”, this can be considered a relevant example of serendipity encounter. The next example is taken from the study:

> *“One example of the multiple levels of opportunity recognition is the General Motors hybrid-electric vehicle project. Initial technical development began in 1969. Because of the inability to overcome technical hurdles at that time, the project was shelved. In the late 1980s, two research managers and a research engineer had adopted a practice of getting together every week or two for Informal technology reviews, primarily to consider ideas volunteered from random individuals and customers outside the firm. The review of one of those ideas triggered the occurrence of opportunity recognition—the "big bang" that became the catalyst for the formation of the project {the first opportunity recognition). In the process of explaining why a particular idea violated the laws of thermodynamics, an insight by the research engineer caused the group to come up with a new way to look at the technology, which could meet a well-understood market need if a set of technical hurdles could be overcome. (O'Connor & Price, 2001)*

Following, I will touch upon the concept of serendipity in entrepreneurship and how opportunity discovery can be linked to serendipity, as both are built on same premises *(Dew, 2009.)*. Opportunity recognition is also perceived as a bridge that connects a breakthrough idea to the initial innovation evaluation process *(O'Connor & Price, 2001)*

Because one of the focuses of this paper is to comprehend the value of serendipity in organizations that are goal oriented towards innovations, it is likewise important to highlight the value of serendipity in the context of opportunity discovery in entrepreneurship, as seen in Dew's (2009) work.

Serendipity is defined as a search leading to unintended discovery. Theoretical concepts in entrepreneurship link serendipity to opportunity discovery, as in both cases, serendipity and opportunity discovery, " some combination of search, contingency and prior knowledge" composes the propitious environment for them to unfold. *(Dew, 2009)*

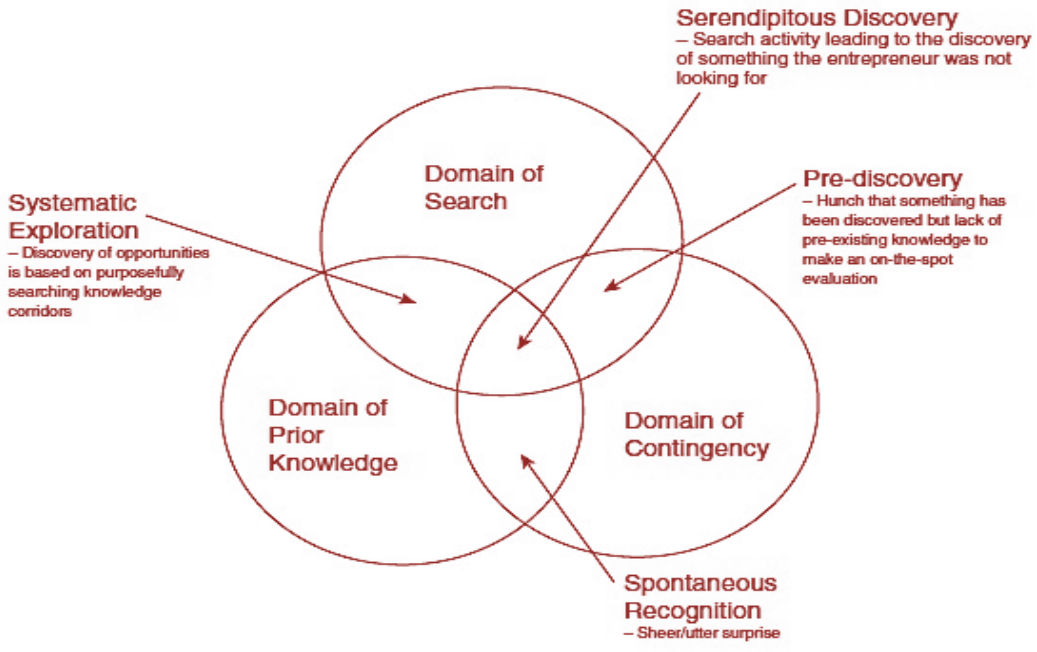


Fig. 6- Serendipity in Opportunity Discovery (Dew, 2009)

This figure helps at identifying where in the process of opportunity discovery an entrepreneur could encounter a serendipitous discovery. As the figure shows, at the center of the interaction between prior knowledge, active search and contingency, most likely the opportunity discovery happens serendipitously.

Taken one by one, each of the three domains constitutes a different framework for opportunity discovery, which have been intense discussed in entrepreneurship literature. *(Shane, 2000)*

Prior knowledge in entrepreneurship points at the notion of sagacity, which means "acute mental discernment and a keen practical sense." *(Dew, 2009).* Prior knowledge is consistent with the rate of entrepreneurial discoveries, as it is widely admitted that one's knowledge and experience regarding a specific matter can provide a strong trigger in opportunity recognition. A technological innovation can become an opportunity for any knowledgeable observer, as it is obvious and plain to see *(Shane, 2000)*

Contingencies refer to an anomalous context, which can be better defined as a series of unexpected events, which in a parallel reality would have never taken place. Dew suggests that these events may happen by pure chance and from an entrepreneurial standpoint, opportunity discovery is tight connected to the external environment, which may contain influential factors *(Dew,2009).*

Search or one's ability to append new sources of information is often correlated to opportunity discovery. It is considered to be an influential factor of opportunity discovery, because search as a capacity can be perceived as a source of a competitive advantage: "search is costly (...) differences in search costs may explain the propensity of some individuals to become entrepreneurs rather than others." *(Dew, 2009)*

At the confluence of these three domains, serendipity occurs. All these three concepts will be reiterated in the following sections, as they will provide the support for identifying the facilitating conditions of serendipity occurrence.

Serendipitous Discovery

Theories in entrepreneurship show that opportunities form either through a deliberate search or based on a serendipitous discovery. *(Murphy, 2011, Alvarez& Barney, 2007;Gaglio& Katz, 2001)*. Theories shows that this dichotomy, deliberate search versus serendipity as dominant entrepreneurial discovery modes, lends to a unidimensional logic. The formation of opportunities holds this unidemnsional logic, mostly because the research on opportunity discovery introduces a multitude of assumptions stemming from conceptual foundations and schools of thought as diverse as neoclassical equilibrium, psychology, Austrian economics, sociopolitics, cultural cognitive and so on, which, though internally consistent, they do not speak to each other. *(Shane & Venkataraman, 2000).* For example, even though psychology, sociology or economics study the same phenomena, i.e. opportunity discovery, the research leads to different kind of questions thus the results are impeding from informing one another *(Murphy,2011).*

Deliberate search refers to one's search tactics, information processing abilities and effective choices among detected opportunities *(Murphy, 2011*). Scholars stress the importance of deliberate search, as deliberately scanning more potential ideas, the more opportunities are found *(Kaish and Gilad, 1991*); others stress the importance of motivation, as deliberate search for an opportunity comes at the cost of innovation *(Murphy,2011),* whilst others agree that even if not all entrepreneurs systematically searched for opportunities, the ones that did discovered more of them *(Shane, 2000).* Conclusively, deliberate search comprise a series of actions, which are utterly important to the discovery of opportunities.

Yet, individuals make discoveries serendipitously and are surprised by the resultant opportunities *(Shane, 2000).* The basis of discovering opportunities serendipitously resides in personal characteristics of the individual, namely possessed knowledge and the level of alertness important for discovering opportunities when they emerge *(Shane 2000, Kirzner 1997).* Possessing unique knowledge enables an entrepreneur to see

opportunities that others cannot, even if those others are undertaking deliberate search. *(Murphy, 2011).*

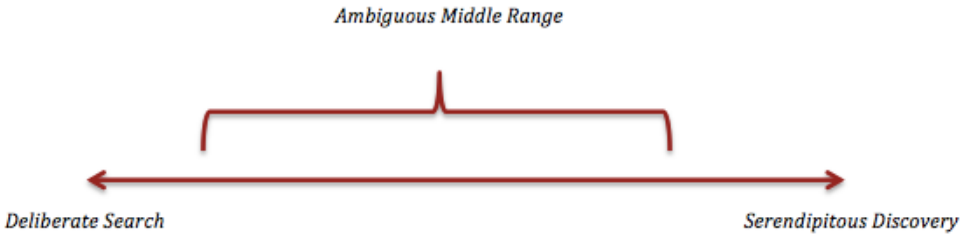


Fig. 7- Unidimensional Logic of Opportunity Discovery

Thus, there is a preponderance in the opinions regarding opportunity discovery that points toward a unidimensional logic, where the individual either discovers an opportunity through a systematic search build on deliberate actions, or by contrast, seize an opportunity by being alert to a set of triggers identified in the knowledge it possesses.

In my opinion, one should not exclude the other though. There are researchers confirming that opportunities are discovered in both ways, as the individual may witness a serendipitous "a-ha" experience which initiates a series of actions to further deliberate search for more information *(Long & McMullan, 1984);(Mendoca, Cunha, & Clegg, 2008)*. In the deliberate search there are involved deliberate activities of procuring, filtering, and elaborating external information which will eventually lead to an opportunity discovery, but all of these are prior to a serendipitous discovery, whilst the serendipitous discovery precedes all these actions, thus opportunity development follows the SD. Conclusively, opportunities may form by either a deliberate creation or by discovery, two modes which are internally consistent, but as well could be considered complementary *(Alvarez and Barney, 2007).* This implies a trichotomy where researchers "tacitly assume that opportunities fit into either the first or the second category or they join those two categories with a forced trade-off." *(Murphy,2011)*

Primarily an IMS was designed as a tool to handle ideas in an organization. An official description of the tool, as it is widely recognized, is that IMS is a formal process, by which ideas are generated, recorded, filtered and selected for implementation. IMS offers a structured support of the ideation phase in the innovation process *(Sandstrom,2013)* and as well as a way to coordinate and manage individuals 'creativity *(Ekvall,1971).* Historically, IMS purpose in the organization, starting with its incipient form as a suggestion box, was to increase continuous improvements capabilities of the firm. Continuous improvements refer to ways of cutting costs and ways to initiate cultural change in the organization (*Sandstrom, 2013).* These systems were aimed at improving organizational efficiency and competitiveness, or with improving certain practices and procedures" *(Carrier, 1998).*

Giving the rise of technology and the development of IT, IMS become more advanced and so was the use of it. IMS exceeded its purpose of mainly generating continuous improvement to become a stream of ideas for new products. IMS has become a source of innovation. Thus, IMS are mainly used today at the front end of the innovation process, aimed at collecting and documenting opportunity discoveries.

Throughout the history, scholars shared a diverse set of opinions regarding IMS primarily scope. Some agreed that IMS still is a tool that deals with minor improvements *(Sandstrom, 2013)* while others perceived it as suitable for enabling a bottom-up communication inside the organization *(Proctor et. al , 2004),* but its core function description , as it is widely recognized today, is that IMS is a tool used in order to structure the early phases of the innovation process.

As stated before, ideas stem from people's knowledge, experience and skills. Ideas are the corner stone in the innovation process, so in order to better handle the process, a mechanism was developed starting from the need of prioritizing and channeling these ideas; thus an IMS would fulfill the gaps and assist in the front end stage of the innovation process. *(Hornitzky, 2009)*

The table below helps identifying the functions of IMS as they are linked to each steps in the front end stage of the innovation process.

Table 1. – IMS assistance in the Innovation Phase

Innovation Phase	IMS assistance
Idea Generation	An IMS helps an organization to find, adapt or create ideas by encouraging its employees to put forward ideas. In this stage, an IMS main purpose is to ease the process of refining and iteration of those ideas by enforcing employees to collaboratively work upon ideas through sharing their perspectives and input
Idea Selection	At this stage, an IMS is designated to make the users of the platform aware of suggested approaches regarding ideas; these ideas can be evaluated through a series of parameters thus permitting a collective review of experiences, limitations, impacting factors and improvements related to the idea.
Idea Implementation	Once an idea becomes a project, the implementation process can provide a series of reflections. These observations can be recorded through an IMS , thus in another idea implementation phase, the process can be ran smoothly. Therefore an IMS assist at this stage by recording explicit knowledge and codifying it into

	tacit knowledge.
Idea Spreading	Once the culture of managing ideas efficiently and effectively in an organization becomes embedded, IMS will enable a sustaining approach toward working with the diffusion of knowledge throughout the organization. By recording ideas and outcomes of implemented ideas, other areas of the business may face similar or parallel issues and may be better resolved in the future.

Within this paper I will try to determine whether Idea Management System can be perceived as a system that facilitates or induces a SD in an organization, but in order to understand that, an analysis of IMS in general is to be done through a methodological research of available data about the subject at hand. Through this research I will try to determine the characteristics of IMS, the benefits of implementing it in an organization as an innovation process and as well its limitations and how can it be further developed to meet the criteria needed to become an engine of innovation for the organization and a serendipity facilitator.

Idea Management System (IMS) is a tool used for Idea Creation , Idea Capture and Idea Management in the innovation process. Although IMS is a tool that addresses innovation from an organizational standpoint, it is still individuals who initiate, create, cultivate and implement ideas. *(Hornitzky, 2009)*

An IMS is built around the idea of providing means to structure and share ideas in an organization, but as well it can be seen as a tool to induce and enhance the creation of new ideas, rather to solidify the aspect of ideation in an organization. A general perception upon this type of systems is that an IMS aims at solving unstructured

innovation processes in order to help companies create innovation more effectively. Since innovation can be perceived as an implementation of all ideas- big and small *(Hornitzky, 2009*), then the significance of ideation in the innovation process can be easily recognized. Ideation encompasses the creation, respectively the discovery of new ideas, thus new knowledge, but it can also encompass the application of existing knowledge to new situations, resulting again in new ideas.

In the literature, I often find that the innovation process can be described as a series of three stages process such as Idea Creation, Idea refinement and management and Idea Implementation or Realization. *(Hornitzky, 2009)*

Within this paper, a higher emphasis will be putted on the first stage which is Idea Creation because of its highly creative nature and because it encourages the innovators to explore their thoughts as individuals and even more with their peers in a group setting; also in accordance with the paper's theme and its main purpose to argue that IMS is a facilitator of serendipitous discoveries, Idea Creation is that phase in an innovation process where the precipitating, facilitating conditions of serendipity occurrence can be found.

IMS Characteristics

An Idea Management System is a software, often referred to as Idea Management Software/ System. Whether it is perceived as an online version of the traditional office suggestion box, an Idea software, name it IMS, is used today by organizations to ensure a structured innovation process, providing the right tools to capture and sort ideas and least but not lastly, the system is being implemented as a tool to generate ideas.

An IMS is designated to harness the collective intellectual power of individuals in an organization in order to solve an organization's roughest challenges and turn them into great opportunities. An IMS provides an open platform where each individual in an organization is encouraged to collaborate with its peers in order to get a solution to a pressing problem the company is facing. IMS offers a company the opportunity to

unleash breakthrough innovations by tapping on tacit knowledge residing in human capital and transform it in explicit knowledge to the benefit of the company.

Especially the large companies, which endure from not being able to access efficiently the knowledge and talent of its employees mostly because of geography, departmental and communication silos, retirements or functional barriers, are the most advantaged when implementing this system.

An IMS creates the conditions for collaboration, connecting individual experts from all areas of the company, and also outside the company, identified as selected third parties in an open innovation environment, allowing them to build upon their ideas together, thus enabling cross-fertilization of ideas.

An Open Innovation Environment (OIE) is characterized by the act of involving a company's major departments and functions in the innovation process, from R&D to commercialization and also the organization's shareholders. Open Innovation (OI) is a process, which is considered to accelerate innovation by breaking down the boundaries in an organization and emphasizes on collaboration. Also, OI allows companies to share and integrate resources with partner organizations, establishing an open approach towards innovation; this open approach benefits a company in several ways, such as: shorter time to market; eases the access to new technologies used by partner organizations and new knowledge and skills base, access to a greater pool of ideas and also cost reductions implied by the partnership collaboration where costs can be shared.

When it comes to innovation process, the OI paradigm is relatively new, but many organizations today are keen on adopting it given the benefits it can offer. A very important step in implementing OI in an organization resides in the creation of the organizational culture. Organizational culture may encompass the toughest challenges a company can face when trying to adopt a new paradigm, i.e. OI. One of the challenges the literature mentions when it comes to implementing OI in an organization is NIH syndrome (Not-Invented –Here Syndrome), where employees are reluctant at adopting ideas, technologies or knowledge that pertain to other departments or coming from outside the business. In other words, this reluctance is

often directed towards solutions coming from outside, impelling in favor of internally-developed solutions. *(IFM)*

The process of opening up the innovation process, thus to let it expand from the R&D department, towards other areas of an organization and towards outside partners, increases the chances to nurture serendipitous discovery of opportunities, which can lead the organizations somewhere else than planned, even better. Clearly, organizations should not only rely on serendipity to drive innovation, but the combination of open innovation and serendipity can create strategically relevant innovation opportunities. Chris Thoen, P&G's Director of Global Open Innovation argues that serendipity and connecting the unexpected dots are very important still in addition to the targeted proactive searches for new opportunities and when engaged with partners in exploring open innovation opportunities it is a prerequisite to be open to the unexpected thus to embrace serendipity. The outcome can unleash a breakthrough idea that the company was never in search for and its value can be higher than originally intended. *(Strategyn)*

The open approach of innovation, once adopted inside the organization, increases serendipity and thus innovation. Large companies like P&G understood the benefit of it and they systematized the phenomena, and developed an online platform like "Connect &Develop". They created an OIE , allowing the organization to connect its internal research with unexpected opportunities offered by an external network. *(Kingdon, 2013)*

In each case, where an organization decides to adopt an open approach towards innovation, an IMS supports the innovation process with the social software it offers, helping companies to increase the size of their innovation ecosystem by opening towards selected third parties; an IMS platform is built so companies can open up steps in their innovation process without putting to risk the security of intellectual property and knowledge. An IMS can improve a company's capacity to innovate, making it more reliable by increasing collaboration inside and outside the organization. *(HYPE) (Makri)*

Serendipity is defined as the ability to recognize and leverage or create value from unexpected information *(Napier & Vuong, 2012).*

The word itself has a young history actually.

Horace Walpole coined it, in 1754 while he was writing to his friend, Horace Mann. In the letter he makes references to a very old Persian fairy tale called "The three Princess of Serendip". In this fairy tale, the three heroes are always making discoveries, by accidents and sagacity, of things they were not in quest of". Their father, king Giaffer, sent the three princes in a quest that presumably will educate them to a higher level before assuming the duties of the throne. On their way, they noticed and made observations about information they had not sought or expected. These observations ranged from the quality of the grass, spit wads on one side of the road, insects and footprints. On their way they met a camel driver who had lost his camel. When asked if they have seen the camel, the three princes asked the camel driver in return if the camel was blind in its right eye, if it is missing a tooth on the left side of its mouth, if its left leg is injured and even if the animal was carrying honey and sugar. (Roberts,1989)

At that moment, the camel driver, astonished by the uncannily accurate description of its animal accused the three princes of theft and asked the emperor to punish them. Fortunately, the three princes got the opportunity to explain themselves and used the observations they made on their way to defend from the false allegations. Their explanations go like this:

"We noticed along the way that the grass on the left side of the road had been eaten, while the right side was still covered with fresh grass (so we assumed that the camel is blind in one eye). We saw wads of grass that had dropped onto the ground, through a hole where a tooth should be in the camel's mouth. Bees like honey and flies like sugar, which the camel was carrying in packs on either side of its back and ,

as it swayed, must have left drops in the road. And finally, we noticed three footprints and a drag where a fourth would be, suggesting that the camel was lame in one back leg."

This story emphasize on one's ability to notice unexpected information that is not in quest of and turn it into something of value. Another valid point in understanding serendipity is that there is a need for a context so the serendipitous event takes place. The unexpected information requires a context or a problem to be associated with. As the story tells, out of curiosity the three princes mad observations but only when the context required, as in when they were allegedly accused of theft, they connected the various pieces of information and came out with the valuable explanation of how they knew about the camel.

Even if most dictionaries would define serendipity as the occurrence of events by chance in a happy or beneficial way- "a happy accident", serendipity as a concept is nothing close to as purely chance or randomness. Unfortunately, the element of sagacity is taken out of the context, leaving the ability of recognizing opportunity, as serendipity should be perceived like, to its definition, plain and simple as a happy accident.

In recent times, scientists have moved from reluctant to open acknowledgment that serendipity may be seen as an invention or a discovery among others, but not too many business scholars or managers studied or applied serendipity in any way. *(Napier & Vuong, 2012)*

In the history of scientific discoveries and innovations, the concept of serendipity seems to be utterly suited in the process of innovating. The thing about innovation is that when you dig under the skin about why products or services are successful, what you don't find is executives sitting around the boardroom table, planning everything out. Actually the story is a lot more serendipitous. It's about right people bumping into right people, with the right attitudes and the right behavior. It seems that the

serendipitous nature of innovation isn't just luck either. A lot of hard work goes into getting the conditions that fosters the right culture for innovation. *(Kingdon, 2013)*

The value of serendipity

The most appropriate way to identify and stress on the importance of serendipity in innovations is by mentioning famous examples of accidental discoveries that became lifesaving or revenue-generating products. It is now largely accepted by scientists that pursuing unexpected or anomaly information may lead to more interesting results.

Scholars of science and management have driven underground discussions about the notion and that is mostly because of its connection to rather esoteric, enigmatic and hard to quantify concept of luck *(Loosemore,2013).* That makes serendipity to be hardly perceived as an essential element in the innovation process.

Still famous examples of unsought innovations throughout the history of mankind are easy to find and its contribution to the advancement of civilization is plain to see.

Discoveries such as new route to Americas by Columbus, who was looking for a new trade route to the Orient, who in 1492, unexpectedly came upon new found lands. Also Alexander Fleming, discovered penicillin while searching for a cure for another disease. He discovered it when a petri dish of bacteria accidentally became infected with mold, which killed the bacteria.

Products that reshaped people's life are also worth mentioning examples of serendipity occurrence. Vulcanized rubber was invented, or rather discovered by Charles Goodyear who accidentally dropped a piece of rubber mixture with sulphure on a hot plate. Also an accidental happening lead to another innovation, safety glass. A French scientist knocked a glass flask by mistake onto the ground but the broken pieces haven't dispersed because of the liquid plastic that had evaporated and formed a thin film inside the flask.

Lucky observations such as a chocolate bar melting inside of a pocket when walking past a radar tube helped a scientist invent the microwave. Velcro was invented out of

the curiosity and because of rigorous observations of why cockleburs kept sticking on the inventor's pants.

Again, successful products that emerged thanks to a serendipitous events back then are yet today high revenue generating product in large industries.

Post-it notes were created when secretaries in 3M discovered a use for non-stick glue. What is even more intriguing in this example is that the non-sticky glue was an idea abandoned as useless by managers. Teflon was invented in 1938, accidentally, when scientists were attempting to make a new CFC refrigerant.

But one of the latest and noise-making accidental discoveries is Viagra. Today Viagra is one of the most financially successful drugs on the market. In the early stage of the research, Viagra or sildenafil, the substance, was used for the treatment of side effects of hypertension. Only during clinical trials, scientists noticed the little effect on hypertension but the great effect on penile erections. Scientists that worked in the research of sildenafil admit that they accidentally entered the Viagra field. They acted as mediators of erectile dysfunction. (Roberts,1989)

"But we think that Viagra wouldn't have been possible if we had not laid the groundwork and discovered the enzyme and the mechanism. Our work involved some logic, some prediction, some direction, but a lot of serendipity. I like to think that's the way basic science ought to be" admits the Ph.D. Jackie Corbin who was involved in the serendipitous discovery of Viagra. (Vanderbilt Medical center, 2012)

Each of these above mentioned serendipitous discoveries were made possible due to the context the event took place in and also because of the characteristic of the originator. About the context of each of the discoveries, which is the organization and its objectives and about the features of the inventor, mentions will be made.in next sections of the paper further.

"Serendipity was not the result of an isolated moment of accident but of curiosity coupled with organizational determination". *(Mendoca, Cunha, & Clegg, 2008)*

Definition

In the review of the literature *(Napier & Vuong, 2012) (Mendoca, Cunha, & Clegg, 2008) (Mccay-Peet, 2013) (Kingdon, 2013)(Roberts,1989)*about serendipity I often stumbled across the Walpole story, which could be considered useful to determine the main characteristics of a serendipitous event and its beneficial outcomes. The story is not useful enough for someone who tries to connect the concept to business strategy and organizational theories.

Some researchers define serendipity as an unsought, unexpected, unintentional, unanticipated event or information and explores the concept as an element of organizational learning. *(Mendoca, Cunha, & Clegg, 2008)*

Mark De Rond, 2005 in his work "The structure of Serendipity" finds an even more comprehensive definition of serendipity and describes it as an alertness or capability to notice what others do not, to recognize, to consider, and to connect previously disparate or discreet pieces of information to solve a problem or find an opportunity. He emphasize on the matter of labeling serendipity as a capability rather then chance, or just an isolated event. In his paper, he proposes a novel typology. *(De Rond, 2005)*

J. Barney for example in one of his articles "Strategic factor markets: expectation, luck and business strategy" refers to serendipity as a manifestation of a firm's luck. *(Barney, 1986)*

Therefore, serendipity regained its popularity in the beginning of the 20th century but mostly because of its significant role as chance in scientific and industrial innovation. *(De Rond, 2005)*

Even in its definition from the New Oxford Dictionary of English , serendipity is "the occurrence and development of events by chance in a happy or beneficial way" which unfortunately is not by far contrasting with the definition of chance, which is "any event happening in the absence of any obvious design, randomly or accidentally, one that is irrelevant to any present need, or one of which the cause is unknown. *(New Oxford Dictionary of English).*

In fact, a chance encounter might transform itself in serendipity but only if there is enough "sagacity, awareness and good fortune for allowing the insight and least but not last, the outcome of this encounter generates value". *(Kakko & Inkinen, 2009)*

Along with these above-mentioned prerequisites of serendipity to happen, there are several others, which may in a fruitful combination generates a series of opportunities for innovation to take place, within an organization.

Within this paper I hope that a new emphasis on serendipity as a capability will be brought so that it will be proved that an element of unpredictability, luck and happenstance, altogether, exists in the fabric of all organization for which current models of strategy are insufficient. And it is because of an even more dynamic and complex business world that innovation will occur more often out of serendipity rather than from a formal planning process.

Facilitating conditions of Serendipity

In this section I will try to highlight the conditions that are favorable for serendipity to take place. A new term was coined, namely Facilitating Conditions of Serendipity (FCS).

For many already established organizations, whose sole business is continuous innovation, the only way to manage innovation stems from traditional Western management, which could be defined as a "highly prescribed and standardized process"; this may be the outcome of people's "averseness to unpredictability and uncontrollability" *(Mendoca, Cunha, & Clegg, 2008)*, and that managers are more keen on producing knowledge that is formal and systematic, quantifiable and they trust better the process of gaining that knowledge which is based on codified procedure and universal principles . *(Nonaka, 1991)*

"The importance of luck and good fortune is particularly visible in the case of innovation, namely in new product development." (Mendoca, Cunha, & Clegg, 2008),

therefore many scholars invited managers to take advantage of serendipity (Mendoca, Cunha, & Clegg, 2008); still Nonaka admits that managers everywhere recognize the serendipitous quality of innovation *(Nonaka, 1991)*, but how many of them manage it for the benefit of the company?

In his work, Nonaka observes that executives in large Japanese companies like Honda, Sharp, Canon , Matsushita ,NEC and Cao are managing serendipity to the benefit of the company, its employees, and its customers. *(Nonaka, 1991)*

So if serendipity is being widely recognized as a key element and it is often found in the nature of innovation, what prevents then companies from innovating better or from managing serendipity?

In 2010, an Innovation Track Record Study conducted by Strategyn (Strategyn) engaged a researcher to study the success rates of traditional innovation methods and the results showed the success rates of these processes yield barely a 17 percent in comparison to a new paradigm of innovation strategy.

The reasons for this low number may reside in aspects such as time utilization *(Graebner, 2004)* referring to the actual number of hours in a day, week or month employees in an organization are encouraged to think creatively, generate ideas for possible innovations, collaboratively work together to make innovation happen.

Large companies like Google, LinkedIn, HP and 3M understand the necessity from an innovation standpoint, to let serendipity happen or to create the conditions for it to take place. These companies adopted a policy through which they allow their employees to enjoy 20% of their paid-time to work on a firm's-related passion project of their own choosing or of their own creation. In other words they cultivate serendipity in the company *(Loosemore, 2013)*

A relevant example to support the assumptions that large companies should embrace serendipity and nurture it is the Post-It notes.Post-It 3M produced it first and it is still, after 40 years, a generous revenue stream for the company. This iconic product is a

result of the 20% policy. 3M launched this policy and successfully implemented the program ever since 1948 and because "Innovate and die" is a lesson well learned at 3M, many successful innovation were carried into the 21st century thanks to this policy. *(Kingdon, 2013)*

This policy supports employees in pursuing something they discovered through the usual course of work, something that triggered their attention and interest, didn't have time to follow up on, but with the support of peers and managers, of the organization in its all, they manage to generate value of the discovery. *(Goetz)*

Serendipity is the outcome of specific conditions colliding. To have a more comprehensive overview of these conditions, I will refer to those conditions that favor the encounter with serendipity in a business context, and where the outcome of this encounter accounts for an innovation or a major breakthrough in an organization.

Being an emergent process, it is believed that serendipity cannot be managed but organizations can create conditions for it to emerge, therefore increasing the likelihood of serendipity. This opinion belongs to Cunha. He emphasizes on the importance of these conditions in an organization and how temporal happenstance, active learning and relationships, if present, increase the chance of serendipitous discovery. *(Mendoca, Cunha, & Clegg, 2008)*

TEMPORAL HAPPENSTANCE

By temporal happenstance he refers to that situation when individuals find themselves in the right place at the right time. At the collision of these two elements, right place and right time, a condition for unsuspected discovery is emerging.

As well, this concept can be recognized in Jung's "synchronicity" which is defined as a relationship between minds, implicitly ideas, that gives rise of relationships which are not causal in nature. This word, "synchronicity", was coined by Carl Gustav Jung in 1921 to reveal and describe a "temporally coincident occurrences of acausal events." *(Wikipedia)*

This Jungian concept it can be bridged with grounded business applications and it can be often seen regularly in the life of an entrepreneur for whom "at the right place at the right time" creates the element or the event from which a great business opportunity stems or for whom timing and synchronicity helped in the creation of the business and in the ongoing decision-making *(Satori,1991.)*

(Lawley & Tompkins, 2008) make a reference to synchronicity in order to distinguish it from serendipity. In their opinion synchronicity can become serendipity after a period of mental incubation; they describe synchronicity as an immediate recognition of the "meaningful coincidence of two events happening close in time", whilst serendipity is only unfolding until later when the effect of synchronicity is evaluated as having a high and valuable impact. They argue upon the matter of synchronicity, as they believe that serendipity can also emerge from events that are not synchronous, however they recognize synchronicity or temporal happenstance as a facilitating condition of serendipity. *(Lawley & Tompkins, 2008)*

Therefore, in relation to serendipity, the temporal happenstance is an important element for facilitating its occurrence but taken alone could not radically influence a serendipitous discovery.

By perceiving temporal happenstance as a facilitating condition of serendipity I imply that, innovation as an outcome of serendipity depends on these elements, right time and right place, and that it is an organization's calling to enable this collision of elements. The larger an organization is, the harder it is to manipulate this event and manage it to become beneficial for the company *(Bjork,2013).*

It is a prerequisite of this encounter to put together pieces of tacit knowledge belonging to several individuals, thus in a moment of socialization and externalization, explicit knowledge is being created for the benefit of the company.

Within this paper, I will try to determine whether the importance of the locus of where the serendipitous discovery takes place should be essential physical or if a digital platform can also create an auspicious environment for it. By locus I refer to a determined space where the condition of right place and right time unfolds.

Active Learning

Active learning is another facilitating condition for a serendipitous discovery. By active learning I refer to a collaboratively work between learners, which is a prerequisite in business serendipity. From an organization standpoint, through active learning, the knowledge of one individual can be transformed into organizational knowledge, which will be valuable for the company as a whole. It is about tapping on one's tacit knowledge and transforming it to explicit knowledge to the benefit of the company. *(Nonaka, 1991)*

In order to foster serendipity through active learning, organizations should put emphasis on activities such as observation and reflection, discovery of new concepts and testing them in new situations and ongoing dialogues with self and others. In the next chapters of this paper I will try to discuss if an Idea Management System can provide the tools and processes needed to enable active learning inside an organization *(O'Connor & Netting, 2009).*

Relationships

By relationships in relation to business serendipity the allusion is made to the social capital of an organization and how social capital is an imperative element to nurture accidental discoveries.

Cunha names it relational serendipity and describes it as a result of social connections and interactions. It is generally accepted that the larger the social network and the more diverse expertise of individuals willing to share their knowledge then the higher incidence of serendipitous discoveries. *(Bjork,2012)*

This situation is translated in "unplanned and unstructured opportunities for the coming together of ideas that may lead to the serendipitous development of new intellectual capital". *(Mendoca, Cunha, & Clegg, 2008)*

These conditions altogether creates a propitious environment for serendipity to happen and it indicates the nature of an organizational culture that can foster serendipity.

Insight, bisociation and intentional search process are also core elements of a serendipitous discovery. I would argue that these elements concern the serendipitous individual, as in, describing the capacities an individual should have in order to be able to seize the potential of a serendipitous discovery and therefore to grasp on it.

INSIGHT

Insight refers to one's capability to make acute observations and deductions around one subject through understanding of cause and effect based on identification of relationships and behaviors within a model, context or scenario. *(Mccay-Peet, 2013)*

Therefore insight is a core element of a serendipitous discovery and it is perceived as the equivalent of a Eureka moment. The literature about serendipity defines insight in various ways, but after its review in the literature , a set of three characteristics emerged, which are alertness, preparedness and sagacity. All these three characteristics are closely related to each other and somehow synonymously, but it is in our opinion a mix of these three what makes insight a integral element of serendipity.

ALERTNESS

If serendipity represents a viable mean of opportunity discovery, then alertness is the moving wheel of serendipity. Alertness refers to one's capacity to recognize an opportunity emerging. Serendipity and alertness go hand in hand, as if not alert, one can ignore an opportunity raised from encounter with unexpected information. History of innovation is full of examples of how being alert can unlock a potential and valuable discovery, such as: penicillin, Velcro, microwaves and so on. *(De Rond, 2005)*

PREPAREDNESS- can be described as one's attitude towards the exploitation of unexpected information that the searcher comes across with. It is about the

preparedness of minds or of spirits, and as Louis Pasteur was stating in his opening speech as Dean of the new Faculty of sciences at Lille in 1854 about the fact that "chance favors only prepared minds", he was pointing to the fact that an individual can witness a serendipitous discovery only if his mind is sensitive to specific triggers. Innovation occurs if the innovator, or the person leading the process of search owns prior knowledge, or have undergone training or preparation in that matter *(Shane, 2000)* A famous example like the Newton's law of universal gravity or Archimedes' principle supports the concept of preparedness as a core element in serendipity; and as Bernard M. Barusch acknowledges, "Millions saw the apple fall, but Newton was the only one who asked why." *(Roberts,1989)*

SAGACITY is one's quality of being sagacious. A sagacious person has or shows understanding and ability to make good judgments. Sagacity is the quality of having acuteness of mental discernment and soundness of judgment. *(Wikipedia)*

In relation to serendipity, the notion of sagacity or intuitive sagacity is closely related due to its implications. Sagacity is a "latent skill which comes from a random juxtaposition of ideas in which loose pieces of information frequently undergo a period of incubation in the mind and are brought together by the demands of some external event, such as a reference query, which serves as a catalyst." *(Lawley & Tompkins, 2008)*

As it is mentioned in the literature, sagacity or intuitive sagacity refers to one's previously exposure to relevant knowledge and its effect upon recognizing the potential for serendipity. Thus, for serendipity, insight is the discovery of new patterns or the use of old patterns in novel ways.

BISOCIATION

The concept of bisociation, in Koestler (1976) opinion, implies a mixture of two different concepts, both pertaining to two separate contexts or categories of objects; by the process of bisociation, our minds perceive two distinct entities, which if mixed

give birth to new and creative way of information jointure, even if unrelated and even if conflicting.

Bisociation follows as someone combines previously separated matrices of knowledge or skills, and after an incubation period in the individual's mind a new way of representing a problem rises. Cunha (1999) believes that the bisociative process "happens when unsuspected connections or hidden analogies are revealed, enabling the development of creativity." *(Cunha et al.1999)*

Extrapolating this concept to serendipity in business context, many of major innovations in science and technological fields are based on bisociative processes. Even though, bisociation is anot a process exclusively pertaining to the individual. Also, through bisociation, several individual can combine distinct sets of knowledge and experiences, which will ultimately result as new knowledge creation. (*Corbett and Katz,2012)*

INTENTIONAL SEARCH PROCESS refers to another core element of serendipity and it means that serendipity as an unexpected and unintended discovery that has a high value for the searcher, has as a starting point an intentional search process. The searcher has to be looking for a solution to a specific problem.

Therefore it could be admitted that one must be in quest for a solution to a problem and because he observes an "unanticipated, anomalous and strategic datum", he seizes the opportunity to build upon a new theory or extend on a previous theory.

Process of SD

In this section I will reinterpret the Process of Serendipity *(Lawley & Tompkins, 2008)* in the light of how a SD unfolds in an organizational setting. Taking this process to the next level, thus analyzing it from the perspective of implementing it in an organization, will make the reader grasp the similarities between the process of serendipity and the process of innovation.

I have chose the process model presented by Lawley & Tompkins (2008) as it comprises main FCS, as previously presented. They stress on six components that are needed for serendipity to occur. Within this model, these six components are presented in sequence. In order to better comprehend the process of serendipity, they refer to an event "E" , by design serendipitous, and to phases before and after the event :"E-1", "E+1", "E+2" and so on. These phases correspond to the six components that need to be in place for serendipity to occur. *(Lawley & Tompkins, 2008)*.Thus, the model presented by them looks like this.

Table 2- Maximizing Serendipity (Lawley & Tompkins, 2008)

E-1 A prepared mind
E An unplanned and unexpected event happens
E+1 There is a recognition of the potential for positive significance in the future
E+2 At some point this is followed by an action, which aims to amplify the potential for positive significance
E+3 Over time there are consequences of the action, and of other things that are happening, which further amplify the benefit of E.
E+4 The value of the original event and the subsequent effects becomes apparent – at which time serendipity can be said to have taken place

Lawley & Tompkins (2008) claim that this is an iterative process and taking out any of these components/ phases, the outcome of the process will not have a serendipitous nature. *(Lawley & Tompkins, 2008)*

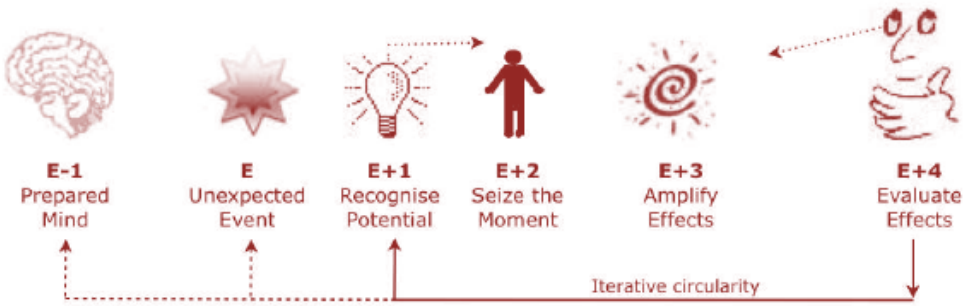


Fig. 7.1. – The Process of Serendipity (Lawley & Tompkins, 2008)

In the following context I will refer to the person who discovers the opportunity for innovation for the benefit of the organization as to an **individual**.

E-1 I have previously touched upon the elements that characterize the serendipitous individual, and that preparedness is what enables a person to recognize unexpected potential because of the fact that he has previously been exposed to the knowledge regarding the matter, or has undergone preparation or training. Therefore, the individual is sensitive to a set of triggers and when he will face those, he will assess the value of the unexpected encounter.

E Is the event, which by design is serendipitous, meaning that at this point, the individual who has a “prepared mind” will come across an ”unexpected, unanticipated and anomalous piece of information”. At this stage, there is an individual who is prepared, alert and sagacious, therefore he is ready to recognize unexpected potential and thus seize the moment, and there is an event where an unexpected discovery is taking place, however at this point he is not witnessing serendipity, but more a happy accident.

E+1 I would argue that at this point, the individual who came across an ”unexpected, unanticipated and anomalous piece of information” needs the context for where that discovery fits in. Now it’s a matter of sharing the idea and receiving

feedback from peers, so the potential of the discovery is being recognized throughout the group or organization.

Behind many lifesaving or revenue-generating products, as results of a serendipitous discovery, the organization's support played a crucial role. *(Napier & Vuong, 2012)*

Lawley & Tompkins admits, "Detecting potential involves evaluation; however because 'potential' has not yet happened it must be a forward-facing evaluation."

E+2 After the personal evaluation of the potential of the discovery by the individual, follows the phase where the organization must decide whether to seize the moment and take action immediately or preserve it and wait to act on it much later. Napier& Voung (2012) share the thought often met in the scholarly literature that two factors are incident when unexpected information is being noticed and leveraged. These factors exist at two levels: individual and organizational, both creating the context where SD unfolds. The literature related to organizational context finds organizational culture as an important factor in influencing serendipity occurrence: it can enhance it or hinder it! *(Napier & Vuong, 2012)*

In this phase of the process, managers of an organization found themselves often when, even if they know they have to innovate, they must decide if they will follow up with the discovery and reap the fruits of it or if they would hold up for reasons such as: economic conditions that makes them focus more on cost reduction, or examples of failure when their competitors adopted disruptive strategies and also, if embracing the serendipitous discovery and so act upon it, there is always the risk of producing unacceptable returns. *(Rigby & Corbett, 2002)*

Even so, Lawley & Tompkins suggest that : "most of what you do should follow a safety-first principle, but a small proportion can be devoted to going for something out of the ordinary on the off chance that it points to something more significant." This approach can also be applied in organizations when it comes to innovations, and especially in already established organizations where managers are confident that their business face very few disruptive threats. *(Rigby & Corbett, 2002)*

This opinion is also shared by Napier & Vuong (2012) who argue that if an organization that will not allow "a certain amount of experimenting or sloppiness, a discovery may be recast as one that was rational, leading to potential loss of other discoveries in the future".

E+3, E+4 In this phases, the benefit of other facilitating conditions in the process of serendipity are acknowledged. As Lawley & Tompkins (2008) confirm: "It often takes the confluence of the effects of other happenings to turn an event from an interesting anomaly into serendipity". Therefore, temporal happenstance, active learning, relationships and bisociations can be seen as happenings of whose effects enable the transformation of one's encounter with an unexpected, unanticipated and anomalous piece of information into serendipity. If an organization decides to capitalize upon serendipity and turn it into something that adds value for the organization, it should put emphasis on these conditions, thus to enable them.

For this process the final outcome tends to be unexpected or unsought.

IMS as a support for Serendipitous Discovery

The assumption this paper is built on is that IMS can become means for fostering serendipitous discoveries; a tool which provides a high emphasis on temporal happenstance, therefore creating the propitious ambient for individuals to meet at the right time at the right place. I will try to argue that an IMS offers a third space, located at the frontier between physical space and virtual world, a meeting place that has elements of both home and workplace. To be in concordance with the aim of this paper, I will also argue that an IMS can offer a third space with a virtual dimension where one's knowledge and skills collide with other's knowledge and skills, and this possible encounter will enable the organization to discover opportunities serendipitously, thus respectively have a higher rate of innovation inside an organization.

An IMS is designed as an interactive system. It is a challenge-driven platform and the system permits interaction between its users; therefore the outcome of this interaction will yield innovation ultimately. Since the purpose of this paper will be to understand if an IMS is a system that systematically facilitates serendipity occurrence, I will try to argue that this system meets the requirements of a system developed to encourage the collision of facilitating conditions of serendipity.

As of right now, given the thorough research about this matter, there is no system that can directly 'induce' serendipity. One of the key reasons of why this happens is that, serendipity is an emergent process and thus, it cannot be manipulated, designed or managed in any way. Just because serendipity deals with discoveries that are unexpected, surprising and fortuitous, it is acknowledged that the solely controllable aspect of this issue is to create a system where the facilitating conditions of serendipity can be nurtured.

Scholars that have researched serendipity concluded that people often make serendipitous discoveries particularly when interacting with information and people. There have been documented attempts of designing systems that encourage serendipity, like systems that generate random information that might trigger a serendipitous observation from an individual side, but all of them are in the state-of-the- art phase, and more likely will remain in an incipient phase because they are systems that are not focused on the user.

One will argue that SD by definition cannot be systematized because it will loose its nature of being unexpected, surprising and fortuitous event. Serendipity researchers aim at developing a system that "surprise and delight users without devaluing users' perceptions of the role of chance and insight". *(Makri)*

There is a scarcity in the studies regarding end-user requirements of how an interactive system that systematically facilitates serendipity should be designed.

There is though one that have revealed relevant results, and in our opinion, some of the requirements can already be found in IMS. In the study, examples of these requirements are divided in four groups: individual, social, contextual and usability requirements.

By **individual requirements** it refers to how the system connect the individual to relevant information. In our opinion, in an IMS the information flow is restricted to whatever is relevant for the challenge posted. The system guides the users towards a common goal, it can stimulate curiosity and encourage creativity, thus creating a larger pool of ideas and enhance people's knowledge. *(Sun, Sharples, & Kefalidou, 2103)*

In the study, under social requirements category, participants of the study emphasized on aspects such as "how the system should connect people to other relevant people". By relevant people, the study refers to people who share common interest, relevant knowledge and are co-located in a place. The observations made suggest that IMS creates the propitious environment for individuals with common interest, relevant knowledge and co-located in the same place, thus employees in an organization, to meet up virtually; therefore IMS encourages social interactions with relevant people, facilitates conversations, sharing resources, filtering information or highlighting connections between people. *(Sun, Sharples, & Kefalidou, 2103)*

This study provides an understanding of the importance of these factors from the end-user perspective, such as how can a system be effectively developed to harness serendipitous discoveries. This aspect is in the end more important, because these systems should have a user-centric design.

IMS was not developed in order to harness serendipity, but could conclude that it possesses main characteristics to fulfill the requirements for an interactive system to facilitate a SD.

Summary of the Theoretical Exposition

Ideation is the process through which individuals create new ideas, thus new knowledge. Knowledge creation is a critical source of competitive advantage of organizations in a very tumultuous today's business environment, as this knowledge can be turned into innovations.Knowledge Management refers to the processes and practices an organization adopts in order to better identify, create and distribute knowledge for reuse.

The main challenge an organization faces when managing knowledge is to figure out how can it better transform tacit knowledge pertaining to its employees into explicit knowledge, thus to make the knowledge of one individual available to the whole organization, thus to profit the organization.

Because in the front end of the innovation process, the focus is on discovering the opportunity for innovation, a tool used in the ideation phase of the innovation process, aimed at collecting and documenting opportunity discoveries, is intrinsically suited.

Explicitly, IMS is a dual system designed to offer a structured support of the ideation phase in the innovation process, its scope being directed towards handling both incremental and radical ideas.

Its usability have been studied *(Sandstrom, 2009,2013)* and the research showed that in practice, IMS is mostly used as a formalized method for developing incremental changes mostly, even though it holds the means to help organizations to generate radical innovations.

A study made on 12 radical innovation projects made in ten large, established firms in U.S. *(O'Connor & Price, 2001)* showed that radical innovations arose either out of an invention, which can as well be attributed to a serendipitous discovery, or either through insight based on new combinations of technologies and process, which embodies if not in total, at least in part, the process of SD. The basis of discovering opportunities serendipitously resides in personal characteristics of the individual, namely possessed knowledge and the level of alertness important for discovering opportunities when they emerge *(Shane 2000, Kirzner 1997).*

Thus, the characteristics of an IMS points towards a new assumption of its usability as support for serendipitous discoveries; IMS is a tool which provides a high emphasis on temporal happenstance, therefore creating the propitious ambient for individuals to meet at the right time at the right place; IMS offers a third space with a virtual dimension where one's knowledge and skills collide with other's knowledge and skills, and this possible encounter will enable the organization to discover opportunities serendipitously, thus respectively have a higher rate of innovation inside an organization; being a challenge-driven platform, it guides the users towards a common goal, it can stimulate curiosity and encourage creativity, thus creating a larger pool of ideas and enhance people's knowledge; it encourages social interactions with relevant people, facilitates conversations, sharing resources, filtering information or highlighting connections between people. In Fig.8, I have illustrated IMS as a system not only explicitly suited in the innovation processes, as it is a tool that handles ideas, both radical and incremental, but also as an organizational mechanism for supporting opportunity discoveries. I have previously explained that an opportunity for radical innovation is discovered serendipitously, as this discovery is inherently dependent on individual's characteristics like alertness, preparedness, insight, creativity etc. On the contrary, incremental innovations rely in total on organizational process and practices, as they are dependent on efficient routines. Thus, as seen in Fig. 8, in this case the discovery of opportunities is rather deliberate.

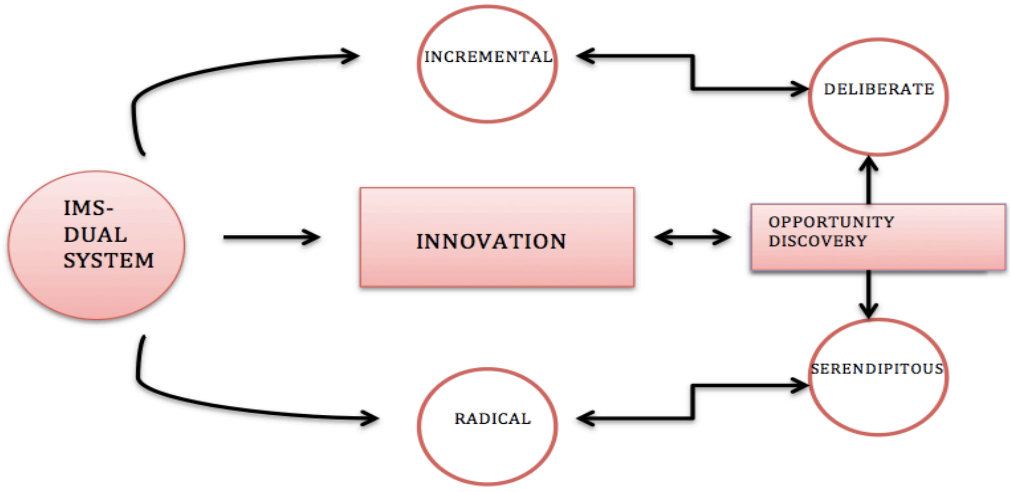


Fig. 8- IMS's Usability

3.METHODOLOGY

Within this section I will try to frame the background of this case study and outline the methods used to collect and analyze data.

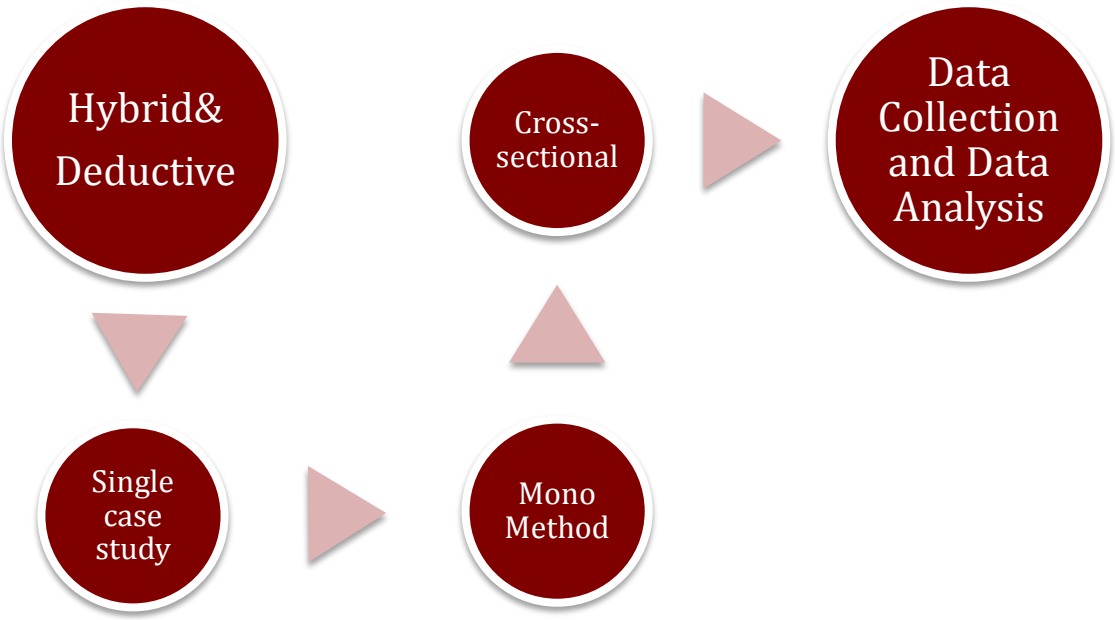


Fig. 9- Research Strategy

I have chosen this strategy, as it will enable my research to confirm or discard assumptions made during the review of theoretical framework. The assumptions lead to the formation of a model *(See Fig, 8)*, for which I have been looking evidences in practice (via qualitative interviews), thus to observe an emerging trend in the usability of IMS among organizations as its users.

Background

This research is an **exploratory study** as I am trying to seek new insights regarding the usage of IMS and if its usage can be assessed in a new light, specifically as a facilitator of serendipitous discovery.

This research was conducted through an intense search of the literature and also through interviewing individuals who could be considered "experts" in the subject.

This study case is about how serendipity relates to the reality of what it feels like to innovate and how can a system that ignites collaboration and communication in an organization can be perceived as a facilitator of serendipity. The nature of the research strategy used in this case is emergent, given the fact that the term "serendipity" is scarcely used in combination with idea management systems and because innovation managers in general are attributing major innovations to a rather formalized innovation process then to a process based on uncertainty and chaos.

The data collection proved to be difficult given the fact that serendipity is a concept hard to define and it can be subject of various interpretations, but in the end, all of the interviewees agreed on the fact that "luck and happenstance" play a major role in innovations and that an IMS, analyzed from different angles, can create the environment where serendipity unfolds.

Research design and Data Collection

As a research strategy I have chosen a **single case strategy** as this research gives me the opportunity to observe and analyze a phenomenon that few have considered before *(Saunders, Lewis, & Thornhill, 2009)*. Even though I have interviewed managers from several organizations, the research strategy should still be considered a single case study, as in fact I am analyzing a singular aspect, which is the usage of a specific innovation system, namely IMS.

The approach of this research is rather a **hybrid of both deductive and inductive**. Mostly I have been working deductively, as I have moved from theory to data. The theoretical framework helped at emerging an assumption, which I have tested with the research. Nonetheless, because many times I have questioned the theoretical framework in terms of appropriateness, I would agree that the research points also towards an inductive approach.

The concepts treated in this paper can be perceived as rather esoteric, and because the aim of this paper is to bridge concepts like serendipity and its value in innovations, with Idea Management System, many of these linkages had to be clearly explained and developed. The approach adopted offers a high level of flexibility in data collection and analysis, mostly because the literature regarding this particular matters can be best described as scarce. However, since much of the literature about serendipity didn't exhibit what I initially anticipated, most of the notions have been interpreted and explored in a manner that permits to support the arguments brought in this paper.

In terms of interviews, I have used **semi-structured interviews**. These interviews were conducted using a guided protocol, allowing for changes given the emergent nature of the discussions. These discussions have followed to some extent the pace of writing, which cannot be at all described, as linear, therefore additional interviews were needed to strengthen tacit understanding of particularities of the case.

Although the research objective has not shifted along the interviews or the writing, I would agree that I was able to gather valuable information regarding the subject that permitted a degree of cross-validation of key themes.

The data collection technique chosen is a **mono-method** as it involved a **single qualitative data collection technique** such as in-depth semi-structured interviews.

The interviews took place over a series of 6 sessions with 4 different innovation managers and researchers from large companies from Sweden and Finland. The aim was to engage innovation managers in a fruitful discussion about the IMS used in their companies and about their perception upon the value of serendipity in innovation process. Also, a researcher of serendipity and soon the author of a book on Serendipity Management was invited to share his opinions on the subject, therefore

the choice of individuals was made so to encompass a wide range of experiences, knowledge and personal perspectives.

Most of the interviews were held personal; the location of the interviewees allowing for a face-to-face meeting, but one was conducted via Skype. There were also 2 follow-ups on the interview, made via phone. The language of interview was English, allowing no misinterpretations in the discussion, given the fact that every participant spoke the language fluently. The interviews were recorded with the permission of each participant and their length ranged from 50 to 90 minutes.

Because I am interested in analyzing a particular phenomena, namely the perception on the usage of IMS in organizations, and because time is a constraint , the research is a **cross-sectional** study.

Data Analysis

The data used for this paper encompasses a wide range of empirical and secondary data gathered from articles, reports, books and websites. The data collection started without having an initial theoretic framework, but rather observations. These observations have lead to generating a new series of predictions and observations. The research has begun with a clear assumption, which was tested with a series of interviews. The approach used was inspired from grounded theory. The data analysis is better described as an iterative process that have allowed for further clarifications when inconsistencies in the data was found; these were clarified with further interviews and secondary data sources.

Limitations

This thesis proposes a research based on, as ones might say, elusive concepts, i.e. serendipity. Though I have tried to link those to earthy notions like IMS, there are still a series of limitations imperative to highlight them in this section of the paper, such as: participant sample, participant memory, conceptualization, subjectivity, study bias and validity. *(Saunders, Lewis, & Thornhill, 2009) (Mccay-Peet, 2013)*

Participant sample

The qualitative study numbered 4 participants, which it can be considered large enough to account a repetition of themes. Given the time constraint and the inability to contact more participants willing to be part of the study, I have abandoned the thought of investigating the study even further using questionnaires. Even though I could have gain more interesting perspectives on the research topic, that might have changed the course of the research, I agree that when confronting the empirical data from the interviews with prior research from secondary data, repletion of themes becomes apparent. Therefore the connections made through observations were supported by both sources. The sample size has to be limited to participants who are involved in innovation activities, have the understanding on concepts like serendipity and have the user's experience with IMS. Even though, I still consider the sample size a limitation of this research.

Participant memory

Because the source of the data available on serendipity for this study is the memory of participants, I agree that the collection of this data is challenging. It is difficult to capture a memory of serendipity without altering the narration, as these observations are reliant on human memory. Even though the collection of data on serendipitous experiences was quite detailed, the participant's memory and his interpretations on that particular set of memories can be influenced by the research topic itself.

Conceptualization

Another limitation of this research can be the lack of previous research of a specific digital environment, namely IMS, and its influence on serendipity occurrence. I have conceptualize the facilitating conditions of serendipity occurrence and linked those to characteristics of IMS, but the conceptual leap made between these concepts I consider it a potential limitation.

Subjectivity

The researcher subjectivity in this study is one of the most dominant limitations because this study begun with an observation made regarding the similarities between a propitious environments for serendipity to occur and the IMS platform, as it is used today by organizations in their innovation processes. Though I have tried to reduce the researcher subjectivity through taking a qualitative approach, the opinions of participants in the interviews have only enforced our hypothesis.

Study bias

It could be a study bias because the sample size is limited to a distinct set of personal characteristic of the interviewee. Even so, given the level of subjectivity, flexibility and diversity of the data collected (personal experiences of serendipity) the reoccurrence of themes may exclude bias. On the other hand, each of the interviewee had user experience with the same IMS platform, they were all working in large companies in large industries, and even if I don't perceive an influence on the results, they were all males.

Validity

As it is a qualitative study, validity in this context is affected by the researcher's conception on validity. Within this thesis, a new perception on the functionality of IMS was proposed, i.e. as a facilitator of serendipity. In this context, aspects such as quality, rigor and trustworthiness should mirror validity. These aspects reiterate on the limitations described above, thus I could argue that the validity of this research is also a limitation to this study.

4. EMPIRICAL FINDINGS

Interviewee Background

The target audience for the interview was innovation managers. It is perceived as a prerequisite to interview a specific set of people as individuals that are known to be or have been involved in some form of innovative activity could have the knowledge that concerns the research topic.

One of the interviewee is a researcher in Serendipity Management, and he could share a wide-ranging opinion upon Serendipity as a phenomenon in the innovation process.

Table 3. Interviewees Background

Respondent/ ORGANIZATION	*Role in the organization*
MIKE / SWISSLOG	*Innovation Manager in a large organization in the automation industry*
IKKA/	*Researcher of Serendipity Management and an expert in global science& technology park development and management*
JONAS/VOLVO TRUCKS	*Innovation Manager of one of the leading heavy truck and engine manufacturers around the world.*
BENGT/ SCA	*Director of Innovation and Knowledge Management of the leading global hygiene and forest products company.*

Analysis of Qualitative Data

The purpose of the interviews was to understand which is the perception about serendipity in relation to innovations of individuals who have been or still are managing innovation processes in organizations; also the aim of conducting interviews with persons in charge with innovation management is that they can have a wide overview upon the efficiency of innovation tools, processes and practices such as IMS. They have been also asked to reiterate upon some major innovation that have

happened throughout the history of the company they are or have been working and to try to grasp the value of serendipity in those occasions.

I have designed the questions and the focus area for the interviews around the concepts presented in literature review; I have also touched upon personal experiences of the interviewees with serendipity in order to enforce my findings and beliefs, but I tried to keep the discussion around the main research topic that concerns IMS as mechanism that systematically facilitates serendipity occurrence.

MIKE

Within the Swisslog organization, ideas for innovation projects come from several sources. Most of the ideas, are ideas that result as incremental innovations in product development. These ideas usually come in a natural progression, as that is always a need for smaller improvements (products need to be cheaper, more efficient) in order to satisfy the customer base. Mike talks about a second source of ideas that lead to innovation, which is when collaborating with the customers. Swisslog decides to adjust current offerings to fulfill the specific need of one customer (it happens mostly in B2B interactions). This process of innovation comes naturally in a form of "adaptation". Mike suggests that it can also be accepted as an example of open collaboration for innovation. Lastly but not least, another source of innovative ideas is a "random source", from where ideas can come unexpectedly. Mike shares the opinion that one example would be when an employee comes unexpectedly across a piece of information, which can produce value to the organization, and once shared with the others can be materialized in a project. Another example is hearing rumors about what the competitors might be doing, therefore the trigger point of an idea can be a natural reaction to a disruptive threat. A natural response to these contingencies is to react to the benefit of the company and evaluate the possibilities of making those ideas projects. Mike agrees that, otherwise, if these ideas are overlooked, the company might loose a chance at innovation.

In Swisslog, collaboration is a key component in innovation processes. In new projects, there is an embedded practice of continuously reiteration on previous work, thus it could be admitted that from a knowledge management standpoint, the

organization follows the pattern presented in the theoretical framework: tacit knowledge is codified into explicit knowledge through externalization and socialization and again explicit knowledge becomes tacit knowledge which is further utilized in future projects.

Mike believes that “serendipity happens quite often” and that “it is a natural part of innovation”. Even though he acknowledges the value of serendipity in innovation and that the “best ideas come from unexpected sources and events”, the organization demands a structured process of innovation, i.e. a stage-gate process. As an innovation manager, Mike also emphasize the need of having a stage-gate process as it is a prerequisite for a clear process where each deliverable is distinctly underlined. Even though, he admits the fact that a “stage-gate process of innovation, which is highly formalized”, can be accredited as a process that “drives out serendipity”. The explanation of this is that serendipity seldom occurs in the beginning of the innovation process, thus it is hard to place it anywhere if the process has already an established path.

From his narration of several memories about serendipity, a series of patterns and themes progressed. These patterns and themes pointed to aspects that describe serendipity precisely: active search, temporal happenstance, unexpected information encounter and relationships.

One example of “serendipity triggers innovation” is when Mike was in quest for a solution to a challenge the company was facing. During a meeting with the customer, the customer made an unexpectedly observation about a drawing. The observation was about a technical feature of the product. As Mike was the engineer and the project manager at that time, he thought it was a “crazy” idea. He firstly denied, and have not been recognized its value at that time. That was indeed a trigger moment; later on, after a period of incubation, the idea was evaluated and it was successfully implemented.

As it was part of his expertise, he rejected the observation the customer made on premises like unsuitability. Thus, this suggests that prior knowledge and insight could also create reluctance towards serendipitous discoveries in a first phase.

Mike believes that the reluctance towards serendipitous ideas may stem from organizational boundaries as well. An organization may cultivate a too formalized way of thinking about innovation and thus, hinder serendipity.

When it comes to the usability of IMS in relation to serendipitous discoveries, Mike points out that serendipity doesn't happen when asking specific questions, but instead when leaving people space to become creative and when make them react to a diverse set of triggers. With IMS, the trickiest part if you expect serendipity to take place, is to set a challenge that is neither too specific nor unclear. From his experience, he acknowledges that, the more specific a challenge is, the more alike the ideas generated are. On the other hand, the wider and unclear the scope of the challenge is, the more, ideas generated lack consistency and value.

Mike sahares the assumption that the structure of an IMS is designed to support serendipity as he agrees that interaction, collaboration and the challenge, which are the key functions of an IMS, are key components in the serendipity process as well.

But, because serendipitous ideas are often correlated to disruptive/ radical innovations, than these ideas are usually disregarded in a conservative industry. He points to the fact that an organization becomes conservative, as the industry within it operates faces few disruptive threats. Swisslog does not seem to face disruptive threats on a general basis, Another reason behind this happening is that the Swisslog's customer is also conservative; the customer needs to be reinforced that the new product will deliver the expected result, thus they don't want to risk.

Mike admits that serendipity is valuable when it comes to innovation, but whether to expect serendipity happening while using IMS, is a matter of users' perception. The organization uses it for nurturing a resolution for a specific need or challenge, thus the more specific the challenge becomes, and solutions are more alike.

Mike believes that IMS can foster serendipity, but as it is used today, organizations fail at capturing those unexpected, anomalous ideas. These ideas are overlooked, as they are "crazy" and they don't fit in the organization's agenda for innovation; it is

because the organizational culture is rather reactive to this sort of phenomena, then being actually proactive.

In Swisslog, they run 4 specific challenges a year and they receive roughly 150 ideas. There is no observation made to recall any serendipitous ideas among the 150, and Mike believes that this happens mainly because these ideas are used for small changes to available products. They do use a software platform, where random ideas can be submitted, which is rarely used. They got around 15 ideas in 2 years timeframe, which indicates a low involvement of the users. Out of these 15, only 2 ended up as projects. Mike admits that a good reason for that happening is because of the short term thinking mindset of organization, where the organization is busy with prioritizing the short term projects rather then investing resources in a risky project.

IKKA

Ikka is a researcher, who, for the last 10 years has been studying serendipity management in organizations. Serendipity Management aims at determining how can organizations better design a physical space environment and/or a digital/virtual environment to harness serendipity occurrence. One of the reoccurring themes in his research as well shows that **organizations tend to be too conservative**; his forecast about this situation is that companies that will not take a proactive approach towards serendipity will eventually fade away. In order to tackle this threat, suggestions made for conservative companies encompass principles like: extended enterprise-thinking approach, which is better translated as **open innovation** and intrapreneurhip- where the organization supports its employees to act on their own ideas, projects and passions by pitching their idea to the top management in order to win the company's money to fund the project.

Ikka believes that the reason why organizations do not embrace serendipity to its benefit stems from the attitude the top management reveals towards serendipity. It is a matter of organization culture that is promoted throughout the whole structural hierarchy that can pose a great challenge. Ikka considers that once a company adopts

principles like open innovation – thus opening up the borders of the company, and intrapreneurship, thus creating a start-up culture inside the company, surely the rate of serendipity occurrence in the company will raise. A recurrent theme, as seen in the previous interview, is that the more **formalized** an **innovation process** becomes, the less serendipity the company encounters. Flexibility in work processes is a vital component of serendipity, thus the more these processes are precise and strictly described, the more chances to get zero serendipity.

Ikka supports the idea that IMS, as a virtual space designed for employees in large companies, which are usually dispersed geographically, to come together and collaboratively work and build on each others ideas to the benefit of the company, is much more important for harnessing serendipity then the physical space. One of the biggest challenges an IMS faces is that "it is not always also designed as an open innovation platform, thus too many times, the platforms is exclusively used internally." Because of the wide spread impression, that much of the "wisdom" rests outside the company, open innovation platforms are an imperative improvement to the regular IMS (used only internally).

Serendipity management is a concept used at an organizational level and it refers to how an organization can create the propitious conditions for serendipity to take place. Even so, after a serendipitous discovery occurs, which can be better described as an innovation opportunity for the organization, eventually it will be managed following traditional innovation management principles.

Therefore, emphasis is brought again on three propitious conditions an organization should enable thus serendipity to be harnessed: workspace design, both physical space and virtual, as a collaboration platform and team building principles.

Ikka considers that serendipity should be embraced by organizations in order to survive, as most of the opportunities for innovation stem from serendipitous ideas. Unfortunately, many companies are too **conservative** and they do not feel threatened of any possible disruptions in the industry they operate, thus **disregarding potential opportunities** disguised under serendipitous ideas.

Ikka agrees that IMS can be perceived as a mechanism that systematically facilitates serendipity as it fulfills main requirements for creating a propitious environment for unexpected discoveries to take place.

A drawback to how IMS are used is that as long as the **challenges are too specific**, then the unexpected factor is taken out and the ideas generated will only be guided results. The importance of mixing non traditional people in the process of generating ideas through IMS to be able to trigger bisociations and to harness serendipity is another recurrent theme, as the closer an individual is to the core of the problem, the solution generated by him will not contain any serendipity.

JONAS

Jonas is the innovation manager for the second largest producer of heavy trucks. Inside the company, they were using IMS for generating both radical and incremental ideas. When they first started to use it, they did it in order to strengthen the innovation culture in the organization; therefore **they were expecting mostly radical ideas** to be generated. The point was to make people in the organization share ideas, thus creating the culture of collaboration. He shares the perception on IMS, namely IMS as a knowledge-building tool, and that is , when using an IMS the company becomes able to transform individual knowledge into organizational knowledge.

In the beginning they planned to capture ideas that are radical because these ideas usually die prematurely.

Now, they use IMS for challenges tight connected to specific issues of the company, mostly for incremental changes. The reason for that, is again, the **short term thinking mindset of the organization**. It is that, because the organization prioritizes projects that are relevant in short term/ near future; these projects usually have as a starting point an incremental idea. Jonas believes that serendipity on the other hand, it is generated by random ideas which are initially categorized as “radical ideas”.

Once a “crazy” idea or “serendipitous” idea gets in the system, there are many barriers it has to surpass in order to become a project. Though Volvo trucks has the ability to always keep an eye on emergent technologies, because they understand the value of not disregarding an opportunity that may arise serendipitously, actually this

ability is translated into a small team of people who are designated to evaluate radical ideas and push them forward towards implementation if those are valuable for the company. Even though the company has the resources to support this kind of projects, usually the top management demands a safe, conservative path when it comes to innovations.

Jonas also believes that it is important for a large company to cultivate a start-up culture inside the organization in order to manage serendipity to the benefit of the company.

Regarding the usability of IMS inside Volvo Trucks, the level of involvement in generating ideas using IMS platform is not necessarily proportional to the size of the company; it's the influence the top management has on the employees in regards to IMS usage, as they demand for people's participation. Even so this culture can be educated, thus making people be very open towards collaboration, sharing ideas and building new networks.

A reoccurring pattern is the embedded practice in the organization to scope down the challenge, as in to make it as specific as the pool of resolutions developed will only be related to the challenge. Jonas suggests that serendipity is driven out in this situation because of narrowing down the pool of possible solutions.

For having thousands of users on IMS platform from all around the world, who collaborate and share thoughts virtually, the manager believes that serendipity happens when people combine diverse set of knowledge and insights when they collaboratively work for the same challenge.

He also acknowledge that improvements should be made to the actual state of the IMS today in order to support serendipity. He talks about triggers of bisociations, as features implemented in the platform that will automatically generate random keywords, pictures, videos, website links, etc. that will accelerate the "a-ha" moment for the user. As it is designed and used today, **IMS is a tool that rather limits a person's creativity because the challenge is very precise framed**. In his opinion the tool is too static, too formalized and it lacks randomness, which it could bring a portion of serendipity in the process of ideation.

BENGT

One of the participants in the research was Bengt, the Director of Innovation and Knowledge Management of a leading global hygiene and forest products company.

In the analysis of the following empirical data, a persistent theme is again observed, where a large company imposes specific deliverables, letting no room for serendipitous ideas. Bengt agrees, or to quote one him: “With your lips you are saying: Yes, we are embracing new and crazy ideas” but in reality the company is busy with prioritizing **short term projects** which will generate value in the near future. Usually, when there is a new solution that might generate value for the company in the long term, it is hard to find a person that is not fully occupied, to push it forward. In this situation, the chance for serendipity encounter is close to zero.

Again, the reason for this happening is that organizations tend to **overvalue current projects by 3-5 times**, resulting in a **conservative organizational culture**, which is anything but proactive. Serendipitous ideas are mistreated as their source comes from outside the organization’s scope.

Secondary data shows that they have been using IMS since 1995, and until present times, they could count up to 8500 ideas generated through the platform. Out of these ideas, only one ended up as a new product, the rest of them were only incremental changes to established products.

Large companies are reluctant to radical ideas, because of the investments already made, which can account for a large amount of money. Organizations prefer to protect the current business model and stick to it, thus to prolong its period rather than embrace a serendipitous idea and jump in a risky project and “cannibalize on themselves”.

Bengt sees that overemphasizing in what already is, rather than investing in what is about to come seems to be the chronic issue of large established companies.

He agrees that IMS is used for generating ideas that will lead the organization to new opportunities for innovation but even if the platform is designed to support ideas that are “wild” it is still a matter of organizational culture that makes the users not create ideas in that sense. It is an embedded belief or a shadow of uncertainty among users of IMS that in order for their idea to be successful, thus to be accepted as a project, it has to be an incremental idea. The users know that “there is no time to waste for wild things or “serendipitous ideas”. Also he considers that this limits the scope of their potential individual value.

Bengt believes that serendipity is right now avoided in idea management since organizations focus on challenge driven idea management mostly. This means that the need is identified prior to the idea and since he have noticed that serendipitous ideas have little or no chance to come through to become projects mostly because, usually radical ideas have a more serendipitous origin and IMS is designed and used to support highly specific challenges.

Therefore, he points to the fact that it is not necessarily the structure of IMS that cannot support serendipitous ideas, but because organizations avoid radical, disruptive ideas , they use IMS as a mean to nurture ideas for incremental changes.

Key Findings

I have started this journey with the purpose of understanding whether an IMS can be as well categorized as a tool to enhance the serendipitous discoveries of opportunities. As this type of opportunity discoveries is mostly associated with radical innovations, I have also gained insights from the respondents regarding organization's penchant for embracing serendipitous ideas.

Throughout the empirical analysis, several observations have emerged. Some of them, such as the fact that organizations tend to use IMS for managing continuous improvements to the pool of available products, rather than using it for discontinuous innovation purposes, confirmed the belief that IMS is categorized as a dual system (designed to handle both incremental and radical ideas) just in theory.

All of the respondents agreed on the fact that IMS, as it used today in the organizations, implies a too formalized process. This formalization is associated with a deliberate discovery of opportunities, as these opportunities derive from deliberate search when it is not appropriate to rely on luck or chance because of costly downside risks. (Murphy, 2011) (See Fig,8). Each of the interviewees approved that serendipity is driven out, as through the pipe of ideas generated in IMS, mostly ideas that are directly linked to a specific challenge, thus ideas for incremental changes, end up as projects. That is because, when a radical innovation project proceeds, an increased commitment of financial and human resources is involved and some organizations lack the infrastructure to focus on aspects such as discontinuous innovations. (O'Connor & Price, 2001). This aspect makes organizations become reluctant to investing in a serendipitous idea, thus the development path of the idea to become a project, usually stops before it begins.

The following findings have derived both from the theoretical framework and from the data collected from the interviews. This set of findings is meaningful in relation to the data collected.

Acknowledging the value of serendipity

Research shows that managers recognize the value of serendipity in the innovation process.

Conservative industry

A conservative industry is an industry that faces few disruptive threats, once in decades, because the market it serves is stable. An organization is conservative because it operates in that type of industry. Even though the disruption sensitivity of one industry can change. The data collected shows that, even though organizations might be able to generate and grasp the value of a serendipitous idea that can disrupt the competitors, a conservative organization is more geared to encourage incremental changes and safe projects.

Short-term thinking mindset

Organizations today acknowledge the dynamic business environment in which they operate and the demand for breakthrough, discontinuous innovations in order to survive. Even though, most of these organization focus on satisfying the customer's immediate needs and reductions of costs of production to generate market expansion rather than embrace a game changing new business. Even though a radical innovation is the engine of organizational growth today, organizations are prioritizing activities that lead to operational excellence and customer satisfaction, thus developing a short-term thinking mindset in the organizational culture in relation to innovation.

Incremental vs. Radical

Even though IMS have been initially designed to support companies to structure the innovation process for incremental improvements, by the years, given the development of Information Technology, these systems evolved to a state where it can support both incremental and radical innovations at the same time. Even though, organizations, which are veteran in using the system, hold back from using the system for harnessing radical solutions. Based on empirical data and linking it to the short-term thinking mindset of organizations, I would argue that organizations fail at exploiting IMS functions in that direction.

Disregarded contingencies

As presented in the theoretical framework, a contingency in serendipity refers to an anomalous event that can trigger opportunity discovery. Radical innovation in an established organization is also perceived as opportunity discovery, following same patterns as opportunity discovery in entrepreneurship. Since serendipity is a trigger for discontinuous innovations, and basing our assumptions on the data collected, I could argue that many of these contingencies are disregarded on the fact that the organizations are heavily focused on incremental changes, than to see serendipity in action.

A too formalized process of innovation

Theories show that the more systematized, planned, with each deliverables clearly underlined an innovation process is, the more serendipity incidence is hindered. While IMS is used in organizations to generate innovative ideas, the more guided and specific described the challenge is, the more solutions coming out the pipeline will fall in the same category. And that is not radical ideas category, as the data confirms.

IMS as a Knowledge Building Platform

IMS is a system that sustains, enhance the storage, assessment, sharing, refinement and creation of knowledge. Being an interactive system, it enables interaction and

collaboration between its users, thus effectively and efficiently transforming their tacit knowledge into explicit knowledge. The organization benefits of this transformation, as individual knowledge becomes organizational knowledge. The most propitious environment for serendipity is one where active learning takes place and where social networks facilitate the sharing of curious connections with others *(Mccay-Peet, 2013).* IMS as a knowledge building software can therefore foster serendipitous connections.

FACILITATING CONDITIONS

Most of the ideas that lead to radical innovation inside a company usually come unexpected and unintentional. Examples found in research studies confirm this supposition. If analyzed, each of these examples will generate a pattern of discovery. This pattern of discovery is similar with the process of serendipity. It is about an individual, who is alert and has his mind prepared (he possesses insights, prior knowledge and experience) to react to a trigger (unexpected piece of information for example), who will be able to enhance the discovery by creating bisociations in his mind or by sharing the discovery with his peers, thus building together on the idea through further bisociations, an idea which eventually will be of greater value than expected, if everything would have gone as planned. Facilitating conditions of serendipity have been previously examined and they will be restated as it follows, in relation to IMS: intentional search- either the individual, or the organization is in quest for a solution, in IMS a challenge is being posted stating that the organization is in quest for a solution; temporal happenstance- even if it is a condition impossible to manipulate, an auspicious setting for creating the "right time and the right place" it is likely to unfold in a virtual platform as IMS can offer; unexpected information encounter- in the process of ideation , users of IMS are exposed to a highly concentrated flow of information, insights and knowledge coming from various sources; relationships- an IMS is built to enhance collaboration and interaction among the participants, thus enabling users to build new networks.

As oxymoronic it may sound, scholars agree that serendipity management is possible. *(Kakko & Inkinen, 2009)* . Serendipity management refers to a practice that will enable the occurrence of serendipity by adopting two principles by the organization: open collaboration for innovation and internal incubators. Also, a high emphasis should be putted on designing the workspace to provide inspiration for co-discoveries, building the culture of accepting and evaluating serendipitous ideas, connecting people to each other and make them collaborate and share their insights and knowledge, thus employ on trust building activities.

5.CONCLUSION

If drawing a conclusion to the interviews would be that it is not that IMS is not built to support serendipity occurrence, but it is rather a matter of organizational approach towards the use of this system.

Also it is a shared belief among innovation managers that serendipity in the innovation process is a concept that needs further attention; therefore improvement on a system that facilitates it happening is a must.

RQ: Can IMS provide the means for a serendipitous discovery of opportunities in the innovation process of the organization?

From the analysis, a conclusion can be drawn and that is: IMS is used preponderantly as a support in the front-end phase of an innovation process, but mostly for supporting continuous innovations. Users of the platform are steered by their top management towards sharing their insight regarding specific challenges the company faces. Their insight, knowledge, experience and skills are embodied in the ideas that flow in the built-in socialization platform of an IMS. It is thus a matter of transforming tacit knowledge into explicit knowledge through socialization and externalization.

Serendipity it is said to spark innovation, and yet another acknowledged fact is that radical innovations are activated by serendipitous ideas. In other words radical, disruptive innovations have serendipitous origins.

Serendipity happens when specific conditions collide. When an individual encounters unexpectedly a piece of information which triggers bisociations in his mind, when this event it is shared to his peers and when other factors intervene in order to maximize the potential value of that piece of information, when the outcome of this encounter is of great value for the individual and for the organization, then serendipity unfolded in a propitious environment.

If the outcome of the serendipitous encounter is an opportunity to innovation, than the organization should nurture the facilitating conditions of serendipity occurrence.

In this paper I have highlighted the characteristics of IMS, as a platform for collaboration between employees of an organization and linked those to the conditions necessary of an auspicious setting for serendipity to grow.

Empirical data showed that IMS holds the means to nurture serendipity systematically if that would have been the case. Given the reluctance of established companies to embrace radical ideas, then the use of IMS is limited to generating only incremental ideas.

Within this thesis I have identified that a digital environment has the potential to facilitate serendipity. There is intense research undertaken to design an environment that will systematically facilitate serendipity. For example, the project SerenA-Chance Encounters in the Space of Ideas is a 1,87 millions Pounds, funded by UK Research Council, aimed at understanding the role that serendipity plays in research and innovation in the digital economy. (Makri)

I have concluded that even though the awareness of the value of serendipity in relation to innovation is high among managers, too few organizations are keen on embracing it.

How do organizations perceive the usability of IMS? Do organizations embrace serendipitous discoveries of opportunities?

This chart shows the percentage of ideas that are related to technology, i.e. incremental ideas, and Out of the box Ideas, i.e. serendipitous ideas submitted to the idea management system each quarter from September 2004 until August 2007 in SCA. It is an obvious trend in the usability of IMS, as the users are not keen on submitting serendipitous ideas, nor is the organization in embracing serendipitous discoveries of opportunities. The empirical findings, corroborated with secondary data, showed that this trend tends to generalize among the users of IMS.I conclude that a reason might be the business myth of planning.

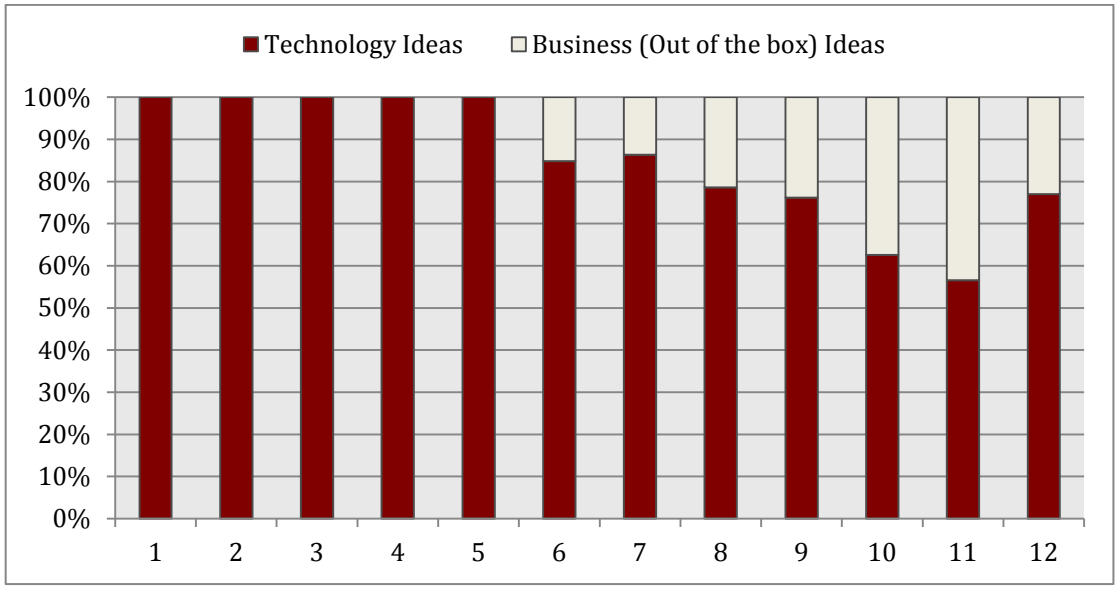


Fig. 10 – SCA ideas submitted 2004-2007

It is the business myth of planning that gravitates around analysis and rational decision-making that makes the organization disregard serendipitous ideas. Because of a highly competitive business environment, companies understand that managing continuous improvements and incremental innovations in existing product or processes (cost efficiency and quality improvements), is an incomplete approach, but few manage to capitalize on this. Scholars suggest that the escape plan in this particular setting is to embrace radical innovations. These breakthrough innovations have the potential to "change the game". *(O'Connor & Price, 2001)*

Though, at the base of many breakthrough innovation in the history of science and technology, is a serendipitous discovery.

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7.APPENDIX

Appendix 1. Interview Protocol

1.Domain/work tasks

1.1. Could you describe for me the type of work that you do?

1.1.2 How long have you been working in this field?

1.1.2 Have you worked in any other fields? If so, how have these previous work experiences influenced your current work?

1.2.Could you describe your typical work tasks or projects?

1.2.1.Where do the idea for projects come from?

1.2.2 Would you say that you primarily work independently or collaboratively?

1.2.3 Do you typically rely on technology to complete your project?

1.2.4 Do you ever draw on previous work when you start a new project? Or is each project a separate entity?

2.Defining Serendipity

2.1 Ask the interviewee to think of a moment in his/her life when they experienced serendipity related to work but also define serendipity in business.

Serendipity in business/ The Economy of Serendipity-definition (…)

2.2 Would you agree with these definitions?

2.3 What would you describe as the key component or qualities of business serendipity?

3.Examples of serendipity

3.1. Can you think of a specific time in your work life when you experienced serendipity?

3.1.1 Could you described what you were working on at that time?

3.1.2 At what stage were you in the project you were working on at the time (e.g., idea generation, preparation, elaboration, analysis and writing, dissemination)?

3.1.3 What was your understanding of this concept(s)*(referring to the project) before this time?

3.1.4 What was it that initially caught your attention (e.g., textual passage, a visual, conversation)?

3.1.5 How did it catch your attention (e.g., did someone initially bring it to your attention)?

3.1.6 Why do you think it caught your attention at that particular time?

3.1.7 Do you remember what you were thinking when you saw it?

3.1.8 How would you describe what you felt when you came across this concept (e.g., surprise, shock, relief).

3.1.9 Was this a concept with which you were previously familiar or was it new to you (i.e., had you noticed the concept before but perhaps ignored it)

3.1.10 If you were familiar with the concept, what made you stop and pay attention to it at this time? Had you paid attention much attention to the concept

before?

3.1.11 If you were unfamiliar with the concept, what made you stop and pay attention to the concept at this time?

3.1.12 What associations, if any, did you make between this concept and your previously held beliefs, notions and knowledge? How did you see it connecting with your work?

3.1.13 Did you stop what you were doing to pursue this new concept or did you come back to it later?

3.1.14 If you stopped what you were doing, what was it that you did (e.g., thought about it, ask someone questions, research independently)?

3.1.15 If you came back to it later, how did you do this (e.g., relied on memory, made a note, reminded by someone/something else)?

3.1.16 How were you able to make sense of this concept? For example, did you need to do further research to confirm your understanding or did you need time to think it through logically?

3.1.17 What was the product or outcome of this serendipitous discovery?

3.1.18 How would you describe the value of this serendipitous discovery?

3.1.19 Were there any barriers to your serendipitous discovery? How did you

overcome these?

3.1.20 How long do you think it was between the time you were first exposed to this concept to when you actively took notice of the concept?

3.1.21 How long do you think it was between the times you actively took notice of the concept and when you disseminated the product of this serendipitous discovery?

4. Serendipity in general

4.1 Thinking about your own experience with serendipity in general, is there a common environment in which it occurs or common conditions?

4.1.1 Is it a matter of right time and right place?

4.1.2 Is social networking a common factor – do colleagues spark serendipity?

4.1.3 Do you find you are actively working on something (e.g., analyzing, research) when serendipity occurs?

4.1.4 Does serendipity happen during periods of great activity or during a lull in activity?

4.2 How would you describe the product of serendipitous discovery in relation to your field of work (e.g., new to you or new to human history)?

4.3 How would you describe serendipity in relation to your field of work? Is it an important component? Is serendipity common?

5..IMS charactersitics

What inspires your ideas?

What triggers your ideas?

When/Where does this happen?

What mind-state does on need to be in?

What techniques or methods have you used?

Do you respond to challenges?

When you immediately come up with the idea what do you do.

How do you capture an idea?

Do you write it down, draw it or do otherwise?

Who do you share your ideas with?

Who won't you share your ideas with?

Have you had an idea 'stolen'?

How do you share your ideas?

What prevents you from sharing?

What promotes sharing?

How do you revisit your ideas?

How do you categorize and search them?