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Knowledge management for sustainable development in the web 2.0 era: the Triangle of Dichotomies

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The purpose of this paper is to present a conceptual framework that will support the international development community in its efforts to establish web-based knowledge management platforms that maximise the opportunities offered by the recent surge of web 2.0 technologies. In order to develop such a framework, the paper reviews the key concepts that define knowledge management practices, and attempts to understand the constraints that currently limit the application of these practices in the development sector, as well as the emerging opportunities offered by the growth of web 2.0 technologies. The result of this effort has been the establishment of the Triangle of Dichotomies. By moulding the strengths of web 2.0 technologies to the uniqueness of the development sector, the Triangle of Dichotomies offers development practitioners a lens to assess strengths, weaknesses and latent opportunities of web-based knowledge management structures according to specific user needs and contextual particularities.

> You can't manage knowledge – nobody can. What you can do is to manage the environment in which knowledge can be created, discovered, captured, shared, distilled, validated, transferred, adopted, adapted and applied. (Collins and Parcell 2007, pp. 24–25)

Introduction[1]

During the past two decades, knowledge management principles have been successfully applied in the private business sector, and have lead to improved performances and competitive advantages. Within the development sector, knowledge management is also gaining increasing popularity, but nevertheless remains a relatively new concept.

The purpose of this paper is to present a conceptual framework that will support the international development community in its efforts to create web-based knowledge management platforms that maximise the opportunities offered by the recent emergence of web 2.0 technologies. In order to achieve this objective, the paper will: outline some basic knowledge management concepts; describe the complexity of applying knowledge management principles in the development sector; present the 'Triangle of Dichotomies' conceptual framework; and illustrate possible applications of this framework within the development sector.

Knowledge management concepts

Although a complete disquisition on the nature of knowledge and knowledge management is far beyond the scope of this paper, the concepts briefly summarised below provide an

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overview of some of the key elements that characterise knowledge and knowledge management, and help to set the scene for the subsequent analysis of knowledge management as a tool for sustainable development.

Defining knowledge

The exact definition of knowledge represents a seemingly endless debate that dates back to ancient Greek philosophers. In recent years, scholars have defined knowledge by distinguishing among knowledge, information and data. The most widely recognized view is that data is constituted by raw numbers and facts, information is processed data, and knowledge is information authenticated by individuals (Dretske 1999). Knowledge can be classified as either tacit or explicit. Tacit knowledge is tied to individual mental models and may be difficult to express or communicate to others. On the other hand, explicit knowledge is codified, articulated and can be communicated in symbolic form (Nonaka 1994).

Understanding knowledge management processes

The vast majority of studies on knowledge management are framed within an organisational context. Within this context, most knowledge management initiatives attempt to: (1) encourage the sharing of knowledge; (2) make knowledge more visible; and (3) use knowledge to improve organisational performance (Davenport and Prusak 1998, p. 6). In order to achieve these objectives, knowledge management frameworks are structured around inter-related processes. By reviewing the existing literature, it is possible to identify the following five key processes: creation; filtering; configuration; dissemination and application.

With regard to knowledge creation, two main models must be highlighted. According to the 'knowledge spiral' model of Nonaka and Takeuchi (1995, p. 20), new knowledge is created through four phases. First, through *socialisation*, tacit knowledge is shared at the group level; second, through *externalisation*, tacit knowledge is explicated; third, through *combination*, explicit knowledge units are shared and combined; and fourth, through, *internalisation*, the explicit knowledge of the group is internalised by individuals and transformed into tacit knowledge. According to the 'expansive learning' model of Engeström (1999, p. 383), groups create new knowledge through seven stages: they criticise existing practices; analyse the situation; model a new solution; examine the new model; implement the new model; evaluate the process, and consolidate the new practice.

The second process is knowledge filtering. During this process, all the information previously generated or captured will be filtered based on pre-determined criteria. Within an organisational setting, the criteria used during this process should be in line with the vision, mission and objectives of the organisation (Gupta and McDaniel 2002).

The third process is knowledge configuration. During this process, knowledge is stored for future use. When storing knowledge, it is important to include contextual information in order to facilitate its future application (Senge 2006).

The fourth process is knowledge dissemination. During this phase, knowledge is communicated and transferred to others. Gupta and Govindarajan (2000) have identified five key elements that characterise knowledge transfer: perceived value of the source's knowledge; motivational disposition of the source; existence of transmission channels; motivational disposition of the receiving unit, and absorptive capacity of the receiving unit. In the literature, a lot of attention has been paid to the transmission channels, which may be personal or impersonal, formal or informal (Holtham and Courtney 1998).

The fifth and final process is knowledge application. Alavi and Leidner (2001) argue that this is where the true competitive advantage of an organisation lies. Moreover, the greatest successes come not to those who possess the best knowledge, but to those who use it best.

Knowledge management for sustainable development

It is widely recognised that knowledge is at the heart of sustainable development (van Doodewaard 2006, p. 40), and that it is among the primary resources that can facilitate progress towards the Millennium Development Goals (United Nations 2004). In this light, knowledge management has recently been acknowledged as a critical asset to meet the international development agenda (United Nations 2006), and as such has received increasing attention by the development sector during the past few years.

Framing the current status of knowledge management in the development sector

Knowledge management in the development sector is still in its very early stages (United Nations 2006, p. iii). Although there has been a proliferation of knowledge management initiatives across many UN agencies, assessments have found that there is no common understanding of the concept of knowledge management (United Nations 2007, p. 2). In many cases, knowledge management is understood solely in terms of information broadcasting, and is viewed simply as part of broader ICT strategies (United Nations 2006). The latter represents a very significant misconception, whereby 'the phenomenal advance and availability of ICT. . . has led to confusion between what is shared (knowledge) [and] the means used to share it (ICT)' (United Nations 2007, p. 7).

Unveiling the Internet myth

There is a growing myth in the development sector whereby it is believed that the Internet can deliver the right knowledge, at the right time, on the doorstep of the poor (Soeftestad 2001, p. 5). In order to unveil this myth, it is necessary to understand the uniqueness of the development sector, and of its challenges and constraints.

The challenges faced by most Internet-based initiatives in the development sector can be summarised into three broad categories: digital divide; capacity, and cognitive divide. With regard to the digital divide: first, computers and Internet services still constitute considerable investments for families in the developing world, and hence are not immediately accessible by everyone (UNESCO 2005); and second, Internet connectivity and electricity can be highly unstable commodities in both rural areas and urban slums (van Doodewaard 2006, p. 41). As underscored by Matsuura (2005), former Director-General of UNESCO: 'the number of Internet users is increasing all the time, having reached close on one billion. Yet two billion people are not connected to an electricity grid and three-quarters of the global population have little or no access to basic telecommunication facilities.' Furthermore, connectivity is not only an issue to be considered vis-à-vis rural populations and slum dwellers but – especially for the purposes of this article – also needs to be understood with respect to the constraints faced by development practitioners working 'deep in the field.' For example, unreliable Internet access remains a serious limitation for many UN officers deployed in remote locations. These issues constrain the dissemination process of knowledge management initiatives. With regard to the capacity of large portions of people living in developing countries: first, some are illiterate or struggle to cope with

English; second, many have difficulty in assessing, deciphering, distilling and absorbing large quantities of information and data; and third, many have limited computer skills, as well as being unfamiliar with advanced Internet functionalities (Peña-López 2007, p. 39). These issues constrain the filtering, configuration and application processes of knowledge management initiatives.

Finally, there are also issues to be considered with regard to the cognitive divide, which includes cultural, political, ethical and educational obstacles (United Nations 2009). In spite of the growing popularity in developing countries of web 2.0 resources, such as social networks, research suggests that the cognitive divide still 'constitutes a major rift between North and South' (Matsuura 2005). First, the nature of the Internet is mostly framed around Western cultural and social norms, meaning that it is egalitarian, open, informal and based on the written word; whereas some cultures in the developing world are more hierarchical, formal and based on oral tradition (van Doodewaard 2006, p. 43). Second, multi-linguism can become a seemingly insurmountable obstacle when dealing with complex websites, characterised by a constant stream of dynamic, user generated content (Kampa 2007, p. 86). Third, where some cultures may have a more 'collectivist' nature, others may have more 'individualistic' mentality. It is hence ill fated to expect all societies to manifest the same level of engagement in web-based initiatives (Hulsebosch *et al.* 2006).

Pinpointing the importance of knowledge management in the development sector

Most if not all of the above mentioned constraints can be considerably mitigated, when not completely overcome by managing knowledge in a tailored and strategic fashion. As summarised by Peña-López (2007), web 2.0 technologies offer the possibility to develop websites that: demand low connectivity quality and computing power; require minimal technical expertise to navigate; and adapt to different cultural and linguistic scenarios. In other words, the tools are available – it is a matter of using them adequately.

To harness these opportunities, now more than ever, it is imperative for the development sector to establish a framework capable of tailoring the strengths of web 2.0 technologies to the uniqueness of the development sector. To achieve such objective, this paper will now present the 'Triangle of Dichotomies.'

Triangle of Dichotomies

The Triangle of Dichotomies is presented herein as a conceptual model. The objective of this model is to offer development practitioners a lens to assess strengths, weaknesses and latent opportunities of web-based knowledge management structures according to specific user needs and contextual particularities. The Triangle should not be understood as a template that offers ready-made solutions to practitioners. The Triangle does not offer answers, but helps to ask the right questions by allowing practitioners to assess and measure what a knowledge management structure is or is not tacitly or explicitly achieving, and to understand why. In summary, the Triangle should be used as a flexible, analytical tool to help improve existing knowledge management structures, and to guide the development of new ones.

Methodological approach

The methodological approach taken to develop the Triangle of Dichotomies was characterised by five phases: first, to identify they key conceptual purposes that drive web-based

knowledge management platforms (these structures will be mainly referred to as websites); second, to study the factors and key variables associated with the different levels of success of each purpose; third, to investigate the possibility of measuring the success of these purposes; fourth, to analyse the individual relationships between these purposes; and fifth, to synthesise the overall relationship among all the purposes.

Conceptual framework

The Triangle of Dichotomies is composed of three segments called Dichotomy Lines. Each Dichotomy Line represents a dichotomy between two antithetical points, which are called Knowledge Poles. Each Knowledge Pole represents one circumscribed purpose of a website, and measures the extent to which this purpose is being achieved. The objective of each Dichotomy Line is to visualise the balance between its two Poles, and hence understand which purpose is predominant between the two. By connecting the Dichotomy Lines among each other, the Triangle describes the overall balance between the three sets of antithetical purposes, synthesizing the extent to which they are being met and how they relate to each other. Figure 1 illustrates the bare conceptual framework of the Triangle of Dichotomies.

A dichotomy can be defined as 'a division or contrast between two things that are or are represented as being opposed or entirely different' (The Oxford English Dictionary 1989). Within the Triangle of Dichotomies, this contrast is embodied by each pair of Knowledge Poles. The Knowledge Poles are conceptually opposed, insofar as the purposes that they represent are antithetical, and are also entirely different, insofar as the combination of elements that characterises them is unique. Although several Knowledge Poles may share similar elements, the way in which these elements are combined is what renders each Knowledge Pole unique.

In spite of being antithetical and unique in their combination of elements, Knowledge Poles are not mutually exclusive. There is no reason why a website cannot satisfy all purposes, balance the three Dichotomy Lines, and in doing so achieve six purposes.

It is also critically important to underscore from the outset that this framework does not carry any judgmental value in terms ranking websites according to the use they make of knowledge. All purposes are equally valid, and achieving multiple purposes does not

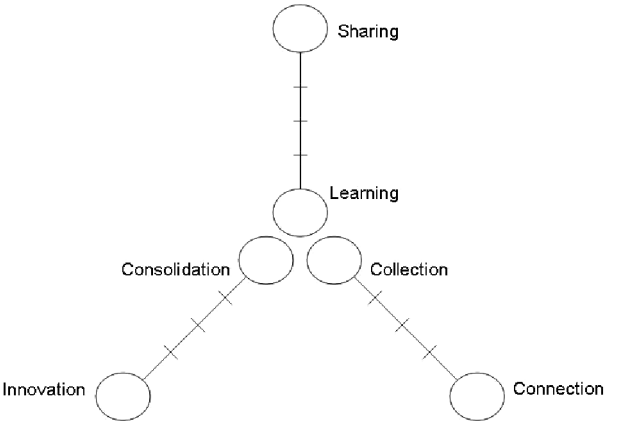

Figure 1. Triangle of Dichotomies, conceptual framework

necessarily make a website 'better' or 'worse.' Moreover, what is really important is not to list the number of purposes achieved by a website, but to understand how the relationship between various purposes relates to the stated objectives of a website and – most critically – to the needs of its users. This is especially important since the purposes of a website and the needs of its users are often tacit; meaning that a website may not meet all its explicit objectives because it is unknowingly not utilizing the best tools to achieve the right tacit purposes.

The following paragraphs present the essential characteristics of the three Dichotomy Lines by focusing on their respective Knowledge Poles. Each paragraph discusses the purpose of one Knowledge Pole, and explain the unique ways in which knowledge is used to achieve it. It is important to remember that simply putting in place the right web-structures is not sufficient to successfully achieve the purpose of a Knowledge Pole. For this reason, the following paragraphs also analyse the key variables that might strengthen or weaken individual Poles.

Dichotomy Line one: 'learning' – 'sharing'

The first Dichotomy Line is composed by the 'learning' and 'sharing' Knowledge Poles. Within the framework of the Triangle of Dichotomies, the purpose of 'learning' is to provide knowledge to users, while the purpose of 'sharing' is to receive knowledge from users.

Learning

If 'learning' is the primary purpose of a website, the focus is on a unilateral transfer of knowledge, whereby users acquire knowledge from the website, but are not able to contribute their own. The knowledge displayed by the website will have been gathered from external sources, processed (e.g., summarised), complemented with additional knowledge produced by the website itself, and finally used to create a new, original message.

In the literature, there are three metaphors of learning: acquisition; participation; and knowledge-creation. The concept of learning described above is in line with the acquisition metaphor, according to which learning is a unidirectional process that transfers ready-made knowledge into the minds of those who learn (Safard 1998, p. 4). In the framework of the Triangle of Dichotomies, the participation and knowledge-creation metaphors are more akin to the 'connection' Knowledge Pole.

Sharing

If 'sharing' is the primary purpose of a website, the website will enable its users to share their own knowledge on its web pages. Through this simple process, the website will ensure that that all users have access to what each member contributes, but will neither process the knowledge that appears in its pages, summarising it, nor complement it with additional information of its own, nor facilitate the direct interaction or direct exchange of knowledge among users. In this respect, the website acts solely as a gateway of shared knowledge.

The three key factors and variables that will influence the successfulness of a website in achieving the purpose of 'sharing' are: the motivational disposition of those who share knowledge; the trust that those who share knowledge have in the website and its virtual community of users; and the social and expert status that the individuals who share knowledge have within the website's virtual community of users.

If a website wants to ensure that its users share their knowledge, it is fundamental to understand what motivates people to share. A first distinction is between intrinsic and extrinsic motivation. Motivation is intrinsic if the act of sharing provides in itself direct satisfaction to the contributor, whereas it is extrinsic if the satisfaction is indirect, e.g., if those who share are rewarded (Calder and Staw 1975, p. 599). The advantages of intrinsic motivation are that it produces greater creativity (Deci and Flaste 1995, p. 47), and enables the transfer of tacit knowledge; whereas its main disadvantage lies in the difficulty to control, manage or rely on its outcomes (Osterloh and Frey 2000, p. 540).

A second key element that affects the quantity and quality of knowledge shared is trust. Edwards and Kidd (2003) identify two main dimensions of trust: cognitive and motivational. The cognitive dimension of trust is characterised by rational, opportunity-cost choices (Williamson 1993, p. 453). The motivational dimension focuses instead on the social and affective components of trust whereby, for example, the perception of being part of a group that works towards a common goal may increase an individual's willingness to share knowledge (Schoorman *et al*. 2007, p. 348).

Since knowledge is shared in websites among members of virtual communities, a final element to take into consideration is the effect of social and expert status on knowledge sharing. With regard to expert status, based on a study by Thomas-Hunt, Ogden, and Neale (2003), there is a positive correlation between the perceived expertise of a member within a group, and his/her participation and willingness to share knowledge within that group. With regard to social status, socially isolated members will not only contribute more than connected members (Ibarra 1995, p. 679), but are also more likely to share unique knowledge that may substantially differ from the mainstream thinking of the group (Phillips *et al.* 2003; Williams and Sommers 1997).

Dichotomy Line two: 'collection' – 'connection'

The second Dichotomy Line is composed by the 'collection' and 'connection' Knowledge Poles. Within the framework of the Triangle of Dichotomies, the purpose of 'collection' is to gather knowledge, while the purpose of 'connection' is to gather users.

Collection

If 'collection' is the primary purpose of a website, the website will gather the vastest quantity of knowledge possible that relates to its topic(s) and theme(s) of interest from a variety of external sources. The website will offer its users facilitated and simplified access to this knowledge in its original form, but will neither process this knowledge, nor complement it, nor offer users the possibility to contribute their own.

According to empirical evidence, although groups and orgaisations are able create knowledge and to learn from it rapidly, just as rapidly they are able to forget it (Argote *et al.* 1990). The never-ending turnover of knowledge on the Internet exacerbates and typifies what could almost be considered a 'digital Alzheimer,' especially since 'the average lifespan of an Internet page is forty-four days' (UNESCO 2005, p.53). Hence, 'collection' is of vital importance insofar as it enables the re-utilization of past knowledge.

Connection

If 'connection' is the primary purpose of a website, the website will provide its users with tools to connect and constantly interact with each other. However, the website will only

ensure that those directly or indirectly involved in the exchange of knowledge are aware of what is being contributed, as opposed to the whole community, and will neither process nor be directly responsible for archiving the knowledge shared among its users.

The key element for a successful 'connection' website lies in its ability to create networks. In this regard, an initial distinction needs to be made between personal and knowledge networks. Personal networks have no focus, sense of common identity or boundaries, but are nonetheless useful for finding and connecting to peers (United Nations 2006). On the other hand, knowledge networks emerge from a common interest in a specific topic; they develop a sense of identity, provide services to their members, and encourage members to learn from each other's knowledge (Hulsebosch *et al.* 2006, p. 40).

Although one must never forget that successful networking is about managing relationships (Creech and Willard 2001, p. 9), web 2.0 technologies offer unprecedented tools, such as social networking sites (SNS), which exponentially increase networking opportunities. During recent years, social networking sites have experienced phenomenal growth (Kishore 2007). The literature identifies four factors that affect the affiliation of users to SNS: Internet self-efficacy; need for cognition; need to belong, and collective self-esteem.

First, users who are confident 'in their ability to successfully understand, navigate and evaluate content online' (Daugherty, *et al. 20*05, p. 71) are more likely to join SNS. Second, the need to 'engage in and enjoy effortful cognitive endeavors' (Cacioppo, *et al.* 1984, p. 306) motivates users to join SNS to capture the wealth of rapidly-changing contributions made by recognised peers. Third, SNS allow users to satisfy all three basic group-seeking needs, i.e., inclusion; affection, and control. Fourth, a recent study by Harsha (2008) highlighted a positive correlation between willingness to join SNS and high levels of collective self-esteem (CSE).

Dichotomy Line three: 'consolidation' – 'innovation'

The third Dichotomy Line is composed by the 'consolidation' and 'innovation' Knowledge Poles. Within the framework of the Triangle of Dichotomies, the purpose of 'consolidation' is to crystallize knowledge, while the purpose of 'innovation' is to change knowledge.

Consolidation

If 'consolidation' is the primary purpose of a website, the website will collate, process and summarise the vastest quantity of knowledge possible that relates to its topic(s) and theme(s) of interest. The main function of the website is to help its users to assimilate vast quantities of knowledge by offering it to them in digested, ready-to-use formats. This knowledge will be gathered from a variety of sources external to the website, including from the users of the website. It is important to remember that although the website will process the knowledge it collects, it will never complement it with original knowledge of its own.

Since information technologies have made access to information so simple, there is a growing current trend now towards filtering and consolidating knowledge into simplified formats (Bukowitz and Williams 2001, p. 1).

Innovation

If 'innovation' is the primary purpose of a website, the website will collect and process existing knowledge and attempt to use it to move beyond the status quo, challenging

existing assumptions and generating new ideas, perspectives and findings. The exact characteristics of 'Innovation' will depend on the choice between radial and incremental innovation.

Three key differences between radical and incremental innovation can be distilled from the findings of Majchrzak, Cooper and Neece (2004). First, incremental innovation involves a degree of continuity with previous performance, whereas radical innovation bears no line of continuity with the past (O'Connor and Dermott 2004, p. 11). Second, incremental innovation may build on previous best practices and lessons learned to develop new ideas, whereas radical innovation will acquire knowledge across disparate, previously unknown sources (Allen 1977). Third, the knowledge reused for incremental innovation will likely have linear case-effect relationships, whereas that reused for radical innovation will probably be mostly tacit, ambiguous and partially codified (Leonard and Senspier 1998).

Key variables that will influence the successfulness of a website in achieving 'innovation' lie in the distinction between an innovation and an innovative idea and the propensity of an individual or a group to reuse specific knowledge to achieve innovation.

The first distinction is between an innovation and an innovative idea. An innovative idea per se does not produce change; it is only when a group recognises the need for change, that an innovative idea can be used to translate change into reality and thus create an innovation (UNESCO 2005, p. 58).

As for the main criteria that affect the propensity of an individual or a group to reuse specific knowledge to achieve innovation, these are are: relevance; credibility (Szulanski 2000); and adaptability. In particular, with regard to adaptability, Majchrzak, Cooper and Neece (2004, p. 184) found that an idea is more likely to be used as sources of innovation if it is linked to agents (called 'adapters') willing to help adapt the idea.

The Triangle of Dichotomies at the service of the international development community

The previous sections of this article outlined the need for a knowledge management framework capable of maximising the opportunities offered by the Internet – and especially web 2.0 technologies – vis-à-vis the unique challenges of the development sector. It is now time to understand how the Triangle of Dichotomies can be used to guide the development of new web-based initiatives in the development sector.

Applying the Triangle of Dichotomies

Analysing a website through the lens of the Triangle of Dichotomies is a simple, three-step process. The first step is to focus on the Knowledge Poles. Using the characteristics of each Pole described in the previous paragraphs, one should assess whether a website is fully, partially or completely not achieving the purpose of each Pole. A website will fully achieve the purpose of a Pole if it utilises all the features that characterise that Pole, e.g., 'learning' is fully achieved if a website collects, processes and complements external knowledge to create its own message(s). A website will partially achieve the purpose of a Pole if it utilises only some of its features, e.g., 'learning' is partially achieved if a website collects and processes knowledge but does not complement it. A website will completely not achieve the purpose a Pole if it utilises none of the features that characterise it. Within the diagram of the Triangle of Dichotomies, a fully achieved Pole is marked by the number 3, a partially achieved Pole with 2, and an unachieved Pole with 1 (see Figure 2).

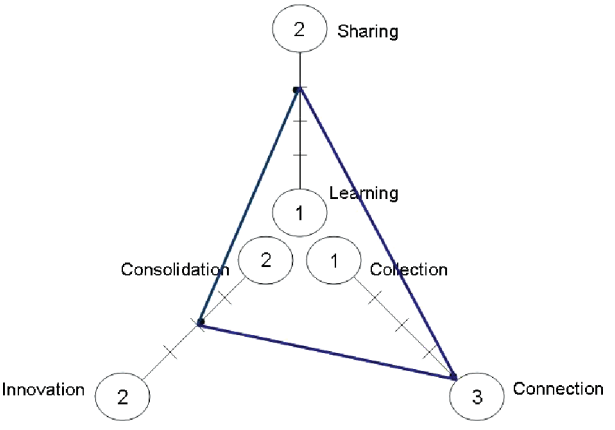

Figure 2. Triangle of Dichotomies, example

The second step is to measure the balance between the three pairs of Knowledge Poles along each Dichotomy Line. For each pair, there are five possible combinations: one, absolute prevalence of Pole 'A' over 'B,' if 'A' is fully achieved and 'B' is unachieved; two, relative prevalence of Pole 'A' over 'B,' if 'A' is partially achieved and 'B' is unachieved, or if 'A' is fully achieved and 'B' is partially achieved'; three, balance between 'A' and 'B,' if 'A' and 'B' share the same level of achievement; four, relative prevalence of 'B' over 'A'; and five, absolute prevalence of 'B' over 'A.' In the example illustrated in Figure 2, there is partial prevalence of 'sharing' over 'learning,' an absolute prevalence of 'connection' over 'collection,' and a balance between 'innovation' and 'consolidation.'

The third step is simply to connect the various points along each Dichotomy Line, thus creating the Triangle of Dichotomies.

As well as synthesizing the relationship between the Knowledge Poles and the extent to which they are being achieved, the Triangle also describes the overall balance between 'inward knowledge' and 'outward knowledge.' 'Inward knowledge' refers to the ability of a website to collect, store and consolidate knowledge in order to produce an accurate picture of the existing status quo. On the other hand, 'outward knowledge' refers to the ability of a website to facilitate the sharing of insights, the establishment of relationships, and the generation of innovative ideas among its users. 'sharing', 'connection' and 'innovation' are all indicators of outward knowledge, whereas a prevelance of 'learning', collection and 'consolidation' are an indication of inward knowledge.

Understanding unique challenges

Three clusters of challenges were previously identified as being unique to the development sector vis-à-vis the use of the Internet: digital divide; user capacity, and culture. The scenarios described below offer a few brief examples of how the lens of the Triangle of Dichotomies may help development practitioners address these issues when creating or revising web-based projects.

If the problem being faced is unstable Internet connectivity, it is advisable to avoid building burdensome web-structures such as those that may characterise 'connection.' Instead, one might focus on 'collection' insofar as it provides users with simplified and instantaneous access to a multitude of external sources, considerably reducing navigation time. If the problem is user knowledge, it is advisable to avoid introducing radically

new, complex and elaborate concepts such as those that may characterise 'innovation.' Instead, one might focus on 'consolidation' insofar as it provides users with customised and digested insights, which can be tailored to specific audiences and particular circumstances. If the problem is the acceptance of knowledge that may be perceived as being imposed, it is advisable to avoid feeding users content that has been gathered, processed and modified without their inputs, such as that which characterises 'learning.' Instead, one might focus on 'sharing' as a means to allow users to contribute their own knowledge in a structured fashion that may reflect their own cultural norms. On the other hand, 'learning' or alternatively 'consolidation' may be useful in multi-lingual environments, given the importance of producing standard content that can be easily translated in several languages. Finally, with regard to the distinction between 'individualistic' and 'collectivist' groups and societies, the former should be provided with web-tools that foster 'inward knowledge,' whereas the latter should be offered web-tools that enable 'outward knowledge.'

Although several of these issues apply to developing and developed countries alike, the complexity of addressing them is often amplified in the latter. For development practitioners working in the field, having to manage unfamiliar cultural norms and ever-changing degrees of political sensitivities in a context where access to knowledge and information may be hindered not only by age, education and IT skills, can constitute a significant effort. Not to mention having to deal with connectivity limitations.

Being able to translate these challenges, which may often be tacit, into explicit purposes of web-based knowledge management structures through a standardised framework is very important. This is what the Triangle of Dichotomies attempts to do. In order to do this, the Triangle pinpoints the critical elements that define the purposes of web-structures vis-à-vis the environmental milieu and community of users, offers a key to understand why certain purposes may vary, and most importantly helps to understand how different purposes might relate to each other within a given context.

Naturally, these are only a few very superficial examples of how the Triangle of Dichotomies may guide development practitioners. A complete, thorough and in-depth application of the Triangle vis-à-vis all possible development scenarios is beyond the scope of this paper, especially since – as previously stated – one of the major strengths of this conceptual model is its ability to be flexibly tailored to unique situations that cannot and should not be generalised.

Moving from theory to practice: the UNDP model

The United Nations Development Programme (UNDP) offers interesting examples of web-based knowledge management initiatives. What is of particular interest is to understand the transition from the past Community of Practice (CoP) approach to the 'Teamworks' model.

The Community of Practice Approach

CoPs were first established in UNDP in 1999. Each CoP served as a tool for sharing experiences and was facilitated by a central moderator. The main role of the moderator was to allow UNDP staff to post a query, collect responses to the query from other staff members, and provide a consolidated reply. The objectives of this approach were to serve as a bridge between headquarters and the field, and to help promote South-South exchanges among country offices (Henderson 2005, p. 19).

The following considerations emerge when looking at the CoPs through the categories of the Triangle of Dichotomies. CoPs offered users a sufficient quantity of 'sharing'

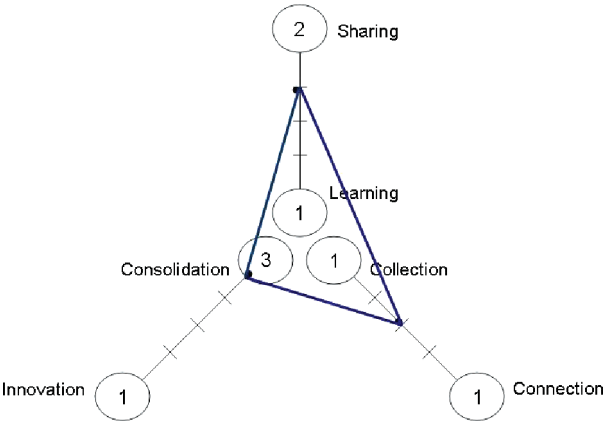

Figure 3. CoPs in UNDP

opportunities, but did not focus on 'learning' since their information was mainly gathered from the contributions of internal users as opposed to coming from external sources.

The greatest strength of CoPs was to be found in their 'consolidation' capacity. However, the lack of tools to allow users to provide instant feedback on knowledge contributed by others limited the opportunities for 'innovation.' With regard to 'connection' and 'collection,' 'collection' was weak within CoPs (Henderson 2005, p. 22), while 'connection' was unachieved due to the centralised management of the various CoPs, as well as the lack of real-time online communication tools. Figure 3 illustrates the prevalence of 'inward' knowledge in the CoPs model.

The Teamworks approach

UNDP is now fine-tuning a new system called Teamworks. Teamworks developers have focused on the 'connection' sphere by applying decentralised community management structures, and even more so by introducing instant 'chat' messaging features and allowing users to share multiple file formats. Other important new features include: the establishment of a common integrated system that enables the creation of wikis and blogs, thus greatly increasing 'sharing' opportunities; the ability to invite and register external agencies and partners, thus increasing 'learning' and 'collection' opportunities; and the possibility for users to provide instant feedback on knowledge and expertise shared by others, thus increasing 'innovation' opportunities. Figure 4 highlights the evolution from the CoPs model towards the Teamworks approach, underlining a shift from 'inward' to 'outward' knowledge.

Conclusions

The Triangle of Dichotomies enables websites to tailor the strengths of web 2.0 technologies to the uniqueness of the development sector, whilst at the same time remaining sufficiently flexible to adapt to the variety of its many challenges. In particular, by applying this framework to a knowledge management system, stakeholders in the development sector will gain a far deeper and better understanding of: (1) what the system currently offers its users; (2) the relationship between the strengths of the system, the areas it has not

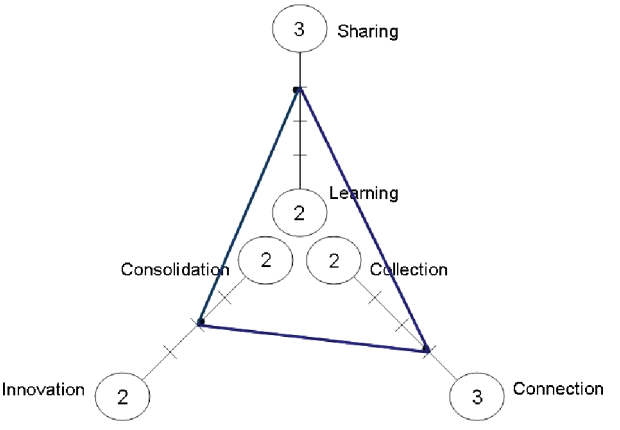

Figure 4. Teamworks in UNDP

yet fully exploited, and the needs of its user community; (3) the gaps and missed opportunities for growth; (4) the scope for change vis-à-vis the unique constraints that affect the context in which the system operates; (5) the impact that further developments may have on the existing structure and key elements of the system, and (6) the results achieved by introducing new elements.

Note

1. The views and opinions expressed in this article are those of the author, and do not represent the views and opinions of the United Nations Department of Economic and Social Affairs (UN/DESA).

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