

Diaspora Knowledge Network Project

(Third Intermediary Report)

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Distributed Collective Practices
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(July 2006)

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Work done in the final phase of the DKN study was organized around the following points:

- 1.) Columbia's perception of the need to build diaspora knowledge networks as a condition of brain gain;
- 2.) Empirical evidence showing the reality of the contribution that diaspora knowledge networks can make to country of origin development;
- 3.) The social informatic model for computer supporting the formation and consolidation of diaspora knowledge networks;
- 4.) Technical issues in the conception and implementation of the social informatics model;
- 5.) Socio-cognitive issues encountered in using the model
- 6.) Recommendations and perspectives for computer supporting diaspora knowledge networks in order to achieve country of origin development.

These six chapters will be developed into the final report of the DKN project which will be available in October, after a UNESCO meeting which will be held in the first week of October (see section 6 for the Agenda of this meeting)

1.) Building diaspora knowledge networks for brain gain: the ambivalence of Colombian institutional initiatives.

Scientific and technical diaspora are being engaged by governments and development agencies in order to assist in country of origin development¹. Ximena Castro Sardi's report in annex 1 examines measures taken in this sense by the Colombian government. She reveals an essential ambiguity about the *Diaspora Knowledge Network* concept.

In the DKN study, "brain gain" is seen as resulting from efforts to build and consolidate diaspora networks. Our work on this question is grounded in empirical evidence that the successful integration of highly skilled expatriates into the working world of a receiving country does not necessarily prevent them from having an equally strong commitment to work for the well-being of their country of origin. To the contrary, the facts show that the assumption underlying the brain drain hypothesis – namely, that emigrants are "there", actively involved in projects of interest to their host countries, and no longer "here", capable of investing in their country of origin – is not empirically justified. Expatriates can be simultaneously "here" and "there" now that information and communication technologies – Email, forums, wikis and blogs – are available for them to stay connected with their countries of origin.

That said, bridge building between the socio-technical networks of an expatriate's country of residence and those in his or her country of origin is often a complicated task. From a sociological point of view, bridge building means more than just being connected. It requires installing confidence in the possibility of doing things together as well as installing mechanisms for collective sense-making and social capital construction across national borders. Not only are these objectives known to be difficult to achieve when group members

¹ de Haas H., (2006), *Engaging Diasporas: how governments and development agencies can support diaspora involvement in the development of origin countries*, International Migration Insitute, University of Oxford, June

are distantly located from one another² but evidence shows as well that in a diaspora context, there is often an underlying suspicion about hidden agendas (personal and institutional intentions, motivations, goals and objectives)³.

Incentives are consequently needed if expatriates are to become actively involved in bridge building. X. Castro Sardi has identified different types of incentives and classed them in two groups: those that favour a *social capital approach to brain gain* and those that favour a *human capital approach to brain gain*. The first type of measure considers that expatriates are “there”, in their country of residence, actively engaged in a variety of socio-technical networks which are a potential source of knowledge and skills for use “here”, in their countries of origin. The expatriate isn’t an “individual brain” but more a “networked brain”, that is, a person who is capable of drawing upon the social capital available through his or her individual networks. This social capital approach benefits from growing recognition by receiving countries. For example, countries such as the Netherlands with its Front Office Program, France with its “*Forum des Organisations de Solidarité Internationale Issues de la Migration*” (FORIM) and Great Britain with its Connections for Development program are actively assisting diaspora members in their efforts aimed at network building for their countries of origin. X. Castro-Sardi wanted to know if corresponding measures are being taken in sending countries like Columbia. Is there an equal awareness of the need to mobilize networks and not just individuals behind development projects? Is one of the criteria for funding expatriate initiated projects the explicit engagement of host country actors and institutions to collaborate in the development project? Do calls for proposals addressed to diaspora networks oblige them to cooperate with host country institutions and actors in order to respond? Positive answers to questions like these would suggest the reality of a social capital approach to brain gain in Columbia. While some evidence does exist that this type of approach is gaining some momentum, X. Castro-Sardi found that the human capital approach remains very much the centre of attention. The accent is placed more on “gaining back the individual brain” by offering expatriates such things as consultancies, teaching engagements or expert assignments.

The DKN project is clearly organized to computer support a social capital approach to brain gain through the construction of diaspora knowledge networks. Computer supporting *diaspora knowledge networks* takes on meaning in a context where brain gain is understood in terms of expatriate efforts to be both “there”, in their country of residence and “here”, in their country of origin. It is less meaningful in a context where the idea of being “here” implies a direct contribution of individual brain power and skills through consultancy, teaching or some other form of immediate engagement which cuts people off from their socio-technical networks over “there”, in the country where they live and work.

² Hinds, P.J., and Keisler, S. (2002) *Distributed Work*, Cambridge, MA: MIT Press

³ Barré R., Hernandez V., Meyer J.B., Vinck D. (Eds) (2003) "Les diasporas scientifiques et techniques". *Expertise Collégiale*. IRD Editions, Paris,

2.) Diaspora Knowledge Networks and their contribution to Country of Origin Development

In annex 2, a paper by Jean-Baptiste Meyer presents empirical evidence that new information and communication technologies are being used to build and structure diaspora networks. He shows that diaspora networks contribute to brain gain in a number of ways:

- Exchanging scientific, technical, administrative or political information;
- Specialist knowledge transfer;
- “Scientific diplomacy” or promoting the home country in the R&D and business community of the host country;
- Organizing Joint projects, partly on a virtual basis (distant working);
- Training: attending home-country sessions and meeting/mentoring students abroad;
- Enterprise creation (including multinational subsidiaries) to assist the possible return of expatriates on a part-time or permanent basis;
- Ad hoc consultations, for example on research/development projects.

He argues that the level of this contribution will vary depending upon the level of connection of highly skilled expatriates with their country of origin. The different indicators he is developing to look at this connection are:

- the number of diaspora networks emanating from a given sending country (This indicator shows the *vitality of diaspora networks* and establishes them as a policy option for the development of a given country of origin);
- the life span of each network (This indicator shows the *viability of the diaspora option* as a policy alternative in the development sector; if diaspora networks die soon after being created their lack of sustainability would make them poor candidates for contributing to country of origin development);
- impact measures of their usefulness for brain gain (which are similar to the ones defined above).

His analysis ends with the sociological question mentioned earlier about the need to go beyond connections and study the social dynamics of confidence building and social capital construction. His goal is to explain why some diaspora networks contribute more successfully to country of origin development than others and to derive, on the basis of that analysis, a rationale for a technopolicy to computer support diaspora knowledge networks.

3.) The social informatic model for computer supporting the formation and consolidation of diaspora knowledge networks

The third axe of activity focused upon implementing the social informatics model adopted at the beginning of the DKN project and which can be usefully described using the following diagram:

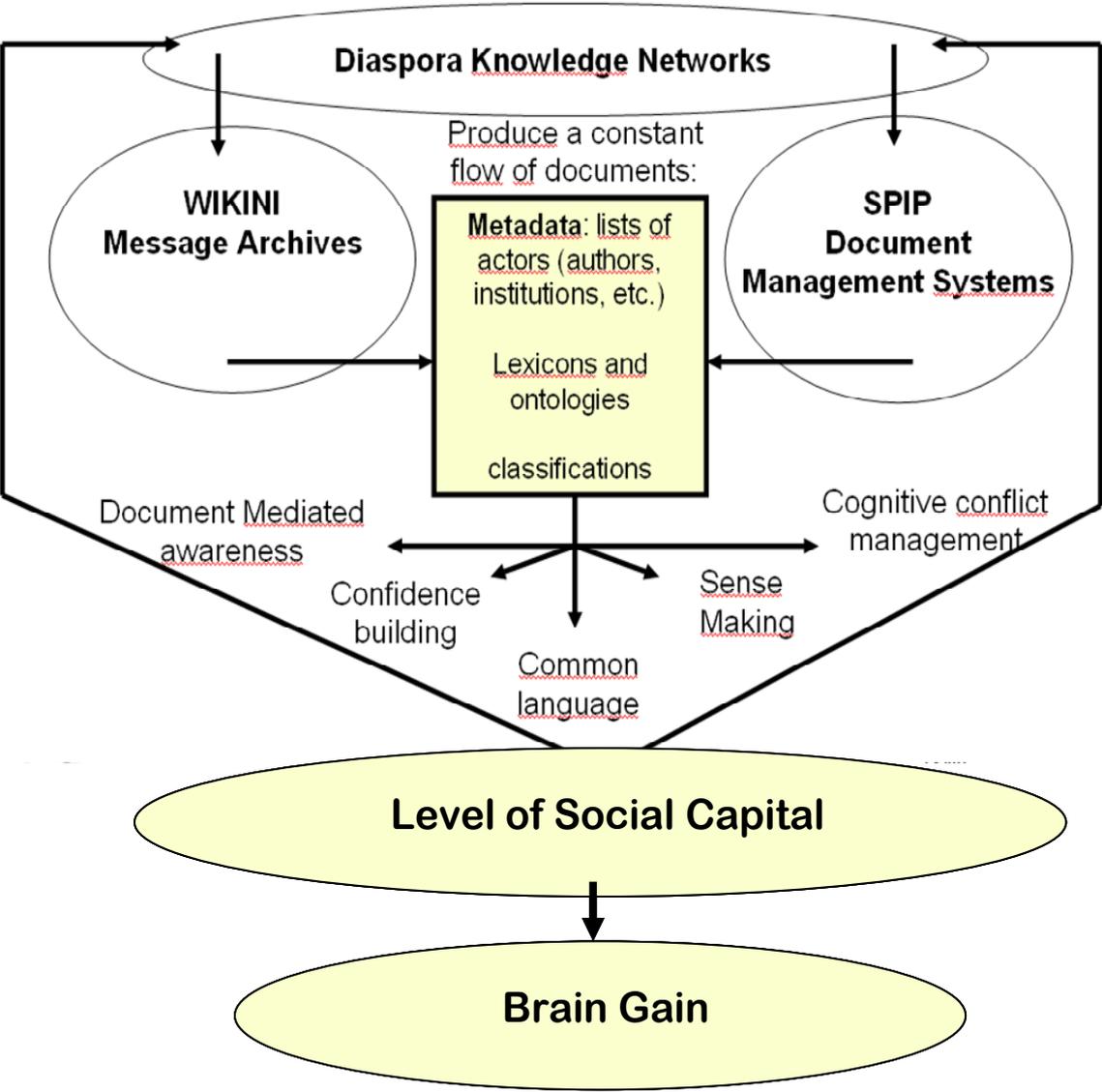


Figure 1: Information processing model for the DKN project

As figure 1 shows, our assumption is that brain gain results from collective efforts aimed at working out the cognitive, organizational and socio-technical problems encountered when attempting to knit social ties between home and host country networks. When these efforts are successful, the level of social capital available to the members of a DKN will increase,

thereby creating the conditions of brain gain. Five different types of investment are needed in order to produce social capital. They concern efforts aimed at improving:

- awareness of interaction opportunities (*document-mediated awareness*);
- the capacity of collectively constructing the meaning of on-going activity (*sense-making*);
- trust in group capacity to meet collective goals and objectives (*confidence building*);
- a group's capacity to frame issues and interpretations (*common language*);
- knowledge creation through debate and negotiation (*cognitive conflict management*).

Here then is the division of work for the software implementation and test of this model:

Partner	Task	Expected results
VECAM : NGO advocate of « Open Source” Solutions	Publication and cooperative writing software ; listserv and forum	WIKINI Message and SPIP publication archives for studying document mediated interactions
Topica Tech	Project management software	« Swift trust » procedures for confidence building
Université Technologique de Troyes (UTT)	Software for defining and updating ontologies	Ontologies as a device for managing cognitive conflicts
LIMSI – CNRS	Document classification software Graph analytical techniques for measuring the semantic coherence of a corpus	Classification as a sense-making technique Assistance in building a common language
Colciencias (Colombia) and LIMSI	Will implement the software and insure the coherence of document mediated interactions in the DKN context	
IRD and LIMSI	Are working on the relationship between brain gain and social capital formation	

Figure 2: the division of work for computer supporting diaspora knowledge networks

4.) Technical work done to implement the social informatics model

As figure 1 shows the DKN platform is designed as a system to support document mediated interactions, the idea being that efforts aimed at bridge building between countries of residence and countries of origin produce a constant flow of documents which needs to be managed in order to optimize a social capital approach to brain gain. The DKN strategy for adequately managing document mediated interactions derives from the definition of “brain gain” used in the study. As explained above, “brain gain” is defined in social capital terms as the capacity of expatriates to mobilize the resources which are available to them in their host countries networks for use by networks in their home countries.

Our focus on computer supporting this capacity to mobilize resources simultaneously raises:

- a cognitive problem: identifying the resources which can (should) be mobilized;
- an organizational problem: defining procedures for working together at a distance despite the economic, social, political and cultural differences in the science systems of the host and home countries;
- a socio-technical problem: learning how to do things together over Internet through document mediated communications.

Technical solutions for each of these problems are now available but, in analytical terms, they suppose different representations of document mediated interactions. We’ve decided to treat each analytical problem separately providing access to cognitive resources through SPIP technologies, access to organizational resources through WIKI technologies and access to socio-technical resources through software “plug-ins”.

4.1.) *The SPIP information space for knowledge and skills abroad*

ICTs are often considered as a way of adjusting the offer/demand relationship for diaspora engagement with countries of origin. Two symmetrical assumptions come into play: the first is that expatriates want to help their home countries but don’t know how because they lack information about projects, actors, funding opportunities, partners etc.; the second is that countries of origin would be happy to contact expatriate scholars, engineers or businessmen but lack information about who is doing what and where. In this type of a context, database programs are often developed with the goal of bridging the gap between offer and demand. Some examples from Colombia are:

Name	Purpose	URL	Institut.
Red Scienti Competitive Intelligence - Colombia	Free software platform (database) aiming at the follow-up of all scientific and technological developments in Colombia. (Initially developed in Brazil and replicated in all LAC). It includes more than 31000 CVs of scientists and professionals working in R&D.	http://pamplonita.colciencias.gov.co:8081/scienti/html/index.html	Colciencias Universidad Nacional de Colombia
Mapas – International Cooperation in Science and Technology	Online information tool providing information on funding sources, programmes, institutions worldwide and cooperation agreements in science and technology.	http://www.colciencias.gov.co/mapas/	Colciencias
Conexión Colombia	Created by an important weekly magazine “Semana”, this portal provides information on the	www.conexioncolombia.com	Revista Semana

	Colombian diaspora and provides a space for them to provide financial help to their compatriots.		
Colombia Nos Une - Portal	Created by the Ministry of foreign affairs, this programme aims at strengthening the links with Colombian communities abroad recognizing them as essential actors for the country's development and considering them as a target for public policies.	http://www.colombianosune.com/colombianosune/	Ministry of Foreign Affairs
Network of Colombian Students Abroad	Created by the Colombia Nos Une Programme of the Ministry of Foreign Affairs. There is a group mailing list redestudiantescolombianos@yahoo.com and a virtual forum on Diploma homologation and co-validation procedures	Group mailing list: Redestudiantescolombianos@yahoo.com Virtual forum on homologation of diplomas: http://www.colombiaaprende.edu.co/1592/article-74935.html	Ministry of Foreign Affairs Ministry of Education
Colfuturo	Non-profit organization aiming at opening opportunities for Colombian students to study abroad through a scheme of scholarship and loans.	http://www.colfuturo.com/index.php?page=1	Colfuturo

It is unclear as to the impact that these knowledge and skill databases have on structuring diaspora interactions with countries of origin. It often appears that they are underused given the costs that go into building them⁴. People often get involved in projects with their country of origin through word of mouth, informal meetings for cultural events or through blogs, wikis and forums which are set up on the fly and which offer people an easy technical solution for testing ideas and getting feedback on things to do. However, these spontaneous, uncontrolled sources of information can be regarded with suspicion because no control is exerted over information quality.

The DKN project recognizes the need for institutionally controlled, high quality information on sources of knowledge and skills abroad. Databases produced by professionals located in government services, international agencies, non-government organizations or the migrant institutions themselves offer the needed quality. SPIP software is being used for building this "Information resource on knowledge and skills abroad". This software allows professionals to, among other things:

- class resources in different categories like, for example, "Curriculum Vitae", "Sources of funding", "Projects underway", "Calls for proposals", "Contacts in XXX (where XXX is the list of expatriates in a given country)",...;
- provide a short written description clarifying the content of the information that is stored in each category,
- provide a http link to a specific Web resource (<http://www.colombianosune.com/colombianosune/>, for example)
- open the management of the Resource database to a group of contributors and to assign each one of them the task of updating the knowledge and skill database from his or her point of view.

⁴ For a discussion of this point based on a survey of SANSA members (South African Network of Skills Abroad) see the National Research Foundation 2005, SANSA Survey Results, Recognition, NRF, Pretoria.

Figure 1 above shows why this last function of co-managing an information resource through SPIP software is necessary in the DKN project. The figure implies that in addition to the “top-down” construction of a database a more “bottom up” process can be adopted as well. We have, in fact, used text mining techniques for “mining” the document flows produced by exchanges in a diaspora knowledge network in order to establish metadata lists of authors and institutions which are active in the fields covered by our case studies. Text mining is a specialized activity and not necessarily one with which development professionals are familiar. In order to accommodate this bottom-up approach in the DKN project, the SPIP co-management function, which allows a project leader to define task assignments for constantly up-dating an information resource, is extremely useful.

4.2.) The Wiki space for organizing a collective activity

Exchanging messages constitutes a second form of document mediated interaction. Its *raison d'être* lies less in adjusting offer and demand dynamics for diaspora involvement in country of origin development than in exchanging ideas and organizing on the fly about what needs to be done. A WIKI space corresponds to a “private space” in the sense that there is no institutional control over the quality of information posted in that space. The assumptions are that members of a DKN share a common concern for a specific subject of interest for a country of origin. To a certain extent their individual (training, working, social and cultural) trajectories overlap so that they feel comfortable with one another and are willing to make plans for future action together. Despite their different points of view, they are confident that they can exchange information constructively in order to overcome differences of opinion. The idea of a self-organizing diaspora knowledge network is therefore acceptable. Each member of the network is expected to contribute his or her knowledge and skills in a positive, concrete way. Document mediated interactions not only serve to establish contacts between people in distantly located places; they also install a sociability which is a prerequisite for social capital construction and brain gain as we've argued above. For example, it is expected that people interacting in a WIKI space:

- will only post information of interest to others in an on-going effort to build a collectively relevant course of action (they will avoid “polluting” an information space with unwanted and non-pertinent information);
- will be attentive to requests for help and respond rapidly to questions (manifest their awareness and openness to the needs of others);
- avoid harsh and unpleasant personal attacks on people should they not agree with their proposals or their actions (conflict management).

From what has just been said, it should be clear that we've placed the “private”, WIKI space at the heart of the DKN mobilisation scenario for brain gain. However, many of the assumptions set out in the previous paragraph are much too normative and theoretical. VECAM has shown to the contrary the need for a *user advocate* to install, maintain and develop the dynamics of social capital formation and consolidation in the document mediated environment of Internet. A user advocate deals in particular with two fundamental issues.

1.) Difficulties encountered in understanding and using the WIKI space

People need help in learning the WIKI language, which is relatively simple for writing and exchanging messages, but which nevertheless requires respecting a specific syntax. On-line user manuals are available and in the DKN project a specific “help line” was opened where

people could raise questions and collectivize answers. However, VECAM's presence in the system reinforced collective confidence in the viability of document-mediated interactions. People knew where to get help when they had practical problems technically using the WIKI. That said, mastering a WIKI is intellectually more demanding than communicating through Email exchanges so user advocates also have an important role to play in overcoming social and cognitive obstacles to using the interaction space.

For example, trade-offs have to be struck between technology push and technology pull types of solutions for building social capital. Push technologies such as Email or listserv types of applications are intrusive in the sense that the electronic mailboxes of community members are often inundated by a constant flow of messages. An abusive use of push technologies can have an adverse impact on collective action simply because people become annoyed with mailbox overflow and don't react. Sociability suffers but it also potentially suffers when pull technologies are used. WIKIs, for example, require that people log into the interaction space in order to find out what's new, and often they just don't do it. For many reasons, from difficulties encountered when navigating in a collaboratively constructed hypertext to a simple lack of time, they don't "pull down" the information needed for maintaining the momentum of on-going collective action. VECAM has been working in the DKN project to address these types of questions and move the trade-off borderline more in the direction of WIKI hypertext technologies.

2.) Membership and its evolution over time

As said above, social informatics research holds that people learn to resolve their cognitive, organizational and socio-technical problems through interacting together. Its perspective is that of a pragmatics of action, which is different to the approach generally adopted in computer science for modelling information processing requirements. This difference expresses itself through the adoption of different design strategies for supporting on-going collective activity:

- Traditional design activity is based upon the assumption that it is not only possible but necessary to proceed on the basis of technical specifications, user requirement studies, participatory prototyping and repeated evaluation exercises in order to build convergence between technological state of the art and user needs.
- Social informatics, on the other hand, argues for the need to build an interaction space in which people can debate proposals and interpretations, exchange information and define collective procedures (milestones, information processing protocols, task responsibilities) for doing things together.

The fundamental reason for these two different perspectives stems from the fact that in traditional design the limits of the system application is to a very large extent "given" by the definition of the project which is to be computer supported whereas, in the case of social informatics, delimiting a project raises what is called a framing problem. Theories of innovation show that when a group A, B, C initiates a project, it will take decisions that will have positive or negative effects on another set of actors X, Y, Z who were not initially consulted before the project began, either because they were not considered stakeholders or because they had not expressed any desire to take part in the decision-making process. It's only after a project is underway that members of the X, Y, Z set are able to perceive and evaluate how the innovation is likely to affect their interests. In the open world of design,

people who are identified as potential users of an application are not usually the only stakeholders that need to be consulted. The fundamental uncertainty of any design process lies in the trade-offs needed to resolve this framing problem. A design process has to be kept open to the outside world but at the same time, and symmetrically, opening it to newcomers implies constantly modifying the blueprint for design. So how open should a design project be?⁵

Managing memberships is consequently much more than just a technical issue. WIKIs have membership management protocols which allow people to engage in a DKN project and which serve to assign them specific rights as readers, writers or administrators. However, the user advocate's role implies more than this; it implies specifically addressing the framing problem defined above. Bringing new people into a project in order to ensure that all concerned stakeholders have a say in what should be done has proven to be the secret of successful innovation. For this, user advocates have at their disposal the information on knowledge and skills stored in the SPIP space of a DKN project, as well as the results of text mining exercises as explained above.

Making the consequences of a DKN project visible – in economic terms, ensuring that the positive and negative externalities of an innovation are made explicit – requires the action of a user advocate. As we said before, building social capital requires something more than just being connected. It requires that stakeholders with different opinions are identified, that their views are aired, that their opinions are respected and that confidence exists in the possibility of finding common ground for doing things together. A Wiki space allows people to air their views, but in no way implies that rules exist to define who should be allowed to use that space, why their opinions should be respected or why people should have confidence in a collective capacity to build common ground for joint action. Social informatics holds that these rules emerge out of discussion but recognizes that the pragmatics of action can get off track. Some people drop out, others dominate, others still delegate their rights of action to others. The role of a user advocate is to make all these actions explicit in order to ensure that the framing problem is treated efficiently in a way which will contribute positively to building social capital.

4.3.) Software plug-ins for building social capital

Document-mediated interactions can be augmented using software to produce information objects which enable people to position themselves with respect to the current state of on-going collective activity. This then is the third orientation of our work on document-mediated interactions. Examples of information objects produced in the DKN project are:

- *word lists* automatically extracted from a corpus using natural language processing techniques,
- *maps of social networks* showing who is doing what in a given field of activity;
- *maps showing the thematic structure of knowledge networks* from different points of view;
- and a *project management interface* allowing a group to collectively determine its objectives, fix milestones and define deliverables.

⁵ Callon, M. (1998). An Essay on Framing and Overflowing: Economic Externalities Revisited by Sociology. In M. Callon (Ed.) *The Laws of the Markets*. Oxford and Keele, Blackwell and the Sociological Review: 244-269.

Our work on using these information objects as learning aids is anchored in a double research tradition⁶. The first concerns evidence from sociology that “boundary objects” are often needed in order to define common ground for collective action. In document-mediated environments these boundary objects are often produced through the application of computer assisted information processing techniques (plug-ins). The second tradition is that of the Computer-Supported Cooperative Work community (CSCW). In this community, theoretical considerations guide the fabrication of information objects. For example, results of research in the CSCW community explain the model shown in figure 1 as well as the list of task assignments defined in figure 2. The information objects which were produced in the DKN project were designed to support the mechanisms of social capital construction.

- Word lists were used as a contribution to building a common language;
- Maps of social networks as a contribution to sense-making;
- Maps showing different points of view on the thematic structure of an activity as a contribution to specifying directions for knowledge creation and development;
- Project management techniques for producing “swift trust” in the capacity of a group to specify milestones, deliverables and collective obligations.

To summarize, the DKN platform contains three distinct document mediated interaction spaces: the SPIP space, the WIKI space and the information processing plug-in space. The SPIP space provides access to institutionally controlled information on knowledge and skills abroad. This information is useful in adjusting the offer and demand for expatriate involvement in projects for country of origin development. The WIKI space addresses the question of how messages exchanged to air ideas, supply information, provide interpretations, offer help or give instructions can be used to mobilize investments in country of origin projects. Finally, software plug-ins are used as a mean of aggregating individual differences in order to assist actors in finding common ground for doing things together. Coherent use of these three spaces requires the mediation skills of a user advocate as we will see now, when looking at the socio-cognitive issues encountered in computer supporting diaspora knowledge networks. (Annex 3 reproduces the third intermediary reports of VECAM, annex 4 that of Tech-CICO, annex 5 that of Topica Tech and annex 6 that of Limsi on the different points discussed in this section).

⁶ See Turner, W., Bowker G., Gasser L., Zacklad M. (ed.), “Information Infrastructures for Distributed Collective Practices”, *Journal of Computer Supported Cooperative Work*, Volume 15, Nos. 2-3, September 2006

5.) Socio-cognitive issues encountered in computer supporting diaspora knowledge networks.

Diasporas are increasingly being engaged by governments and development agencies to help in country of origin development. Although a number of studies have shown the precautions which need to be taken when moving in this direction, the DKN project takes as given the growing involvement of expatriates in development and raises the question of computer supporting this diaspora option. In other words, the project is most likely best geared to the needs of development professionals in government, international agencies, NGOs and migrant organizations. They are in a position to become user advocates of the application and, at the same time, they can capitalize on the investments needed to build each of the three document-mediated interaction spaces described above. In this section, we will look more closely at these two points.

5.1.) The use of computer techniques for supporting diaspora knowledge networks

As Jean-Baptiste Meyer argues (section 2 above), the vitality and the viability of the diaspora option as a policy measure for development depends upon the number and life span of individual networks. His study shows that the DKN attrition rate is quite high: of the DKNs identified in a 1999 survey, only about half were still in existence in 2005. However, statistics on start-ups in the United States show an even higher attrition rate: on an average 3 out of 5 new businesses fail within their first 5 years. The point is that many policy measures are being taken to encourage start-ups and contribute to their success, but a similar situation does not yet exist with respect to DKNs.

Improving upon DKN capacity to contribute to country of origin development implies recognizing the bottom-up, often ephemeral character of migrant projects. Often emigrants simply lack the time to pursue their ideas because of family constraints and work obligations in their country of residence. We consequently expect that development professionals will be in charge of a portfolio of projects, some more advanced than others. We consider that each project will be supported by a diaspora knowledge network but that networks can be at very different stages of development. Some will be new in the process of forming to support a project. Others will be old in the sense that a.) they have successfully undergone different evaluations from receiving and sending country perspectives; b.) their mandate for acting on behalf of a country of origin has been renewed once or several times; c.) their membership is fairly stable but actively includes new stakeholders, d.) members actively engaged not only in document-mediated interactions but face-to-face interactions as well. Capacity building in this type of context can be represented using the following diagram:

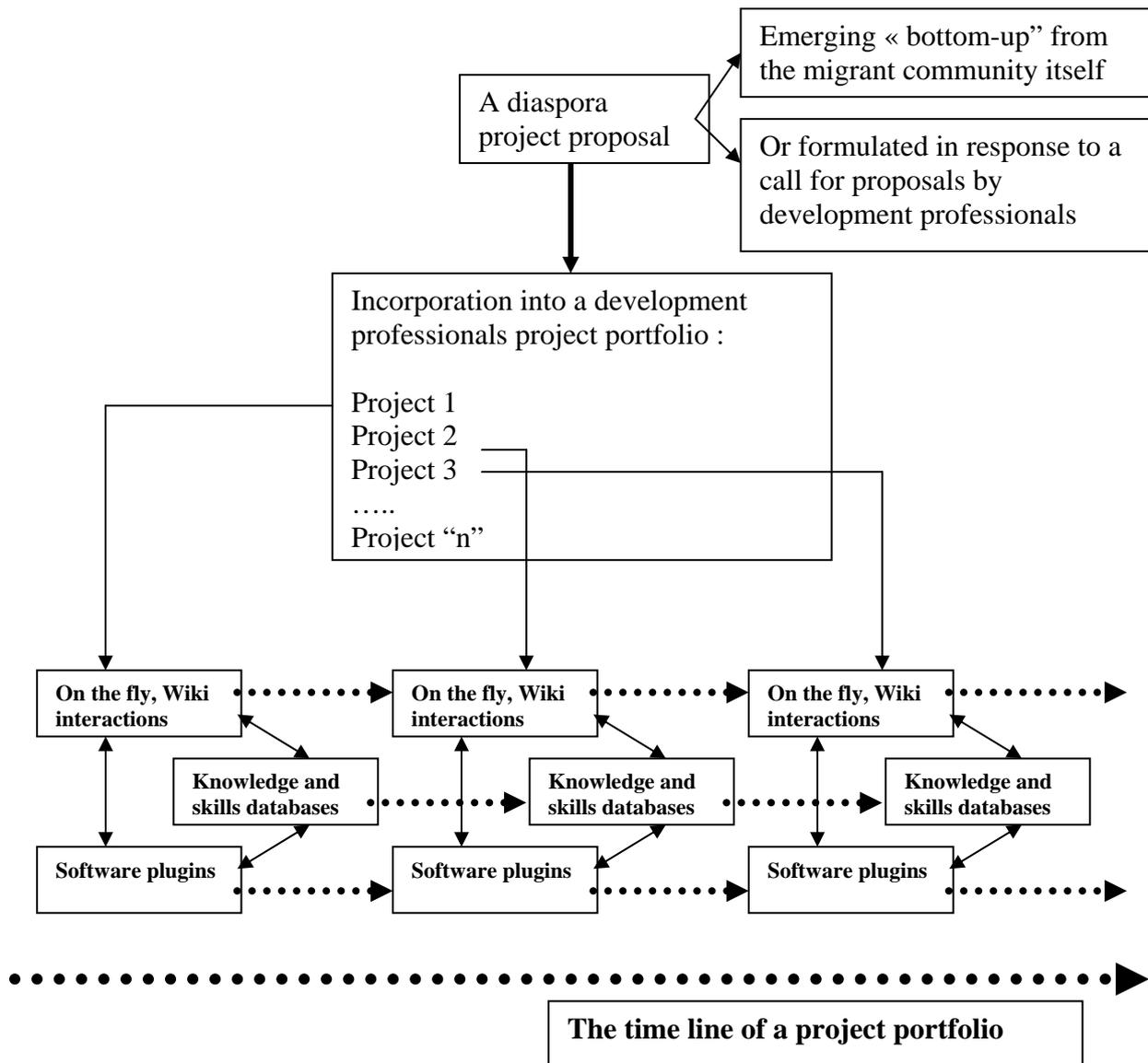


Figure 3: Using projects for building capacity to computer support the emergence and formation of diaspora knowledge networks: the structure of a DKN development portfolio

Figure 3 illustrates the following ideas about capacity building for brain gain through establishing DKN development portfolios:

- 1.) A diaspora project is formulated either as a “grassroots” initiative or in response to a solicitation from development professionals located in government services, international agencies, NGOs or migrant associations.
- 2.) A certain number of projects are selected for support by a development professional. Among the infrastructural support received by a project leader is access to the three DKN interaction spaces. Project leaders will not be obliged themselves to carry out the work needed to custom tailor these three spaces for use by the diaspora knowledge networks. We expect that a development professional will have a technical staff for that purpose.
- 3.) Project management produces results which are cumulative over time. This idea is represented by the heavy dotted horizontal line in figure 3. Because each project is structured around the three types of document-mediated interactions described in section 4 above, the

mechanisms for computer supporting these interactions can be reproduced in each new application.

5.2.) Capacity building for brain gain

In order to test the quality of the capacity building scenario described in Figure 3, four case studies were initially launched but have recently been reduced to the two which will be described in what follows. Nevertheless, even with the reduced number of projects, 14 people are taking part in the case studies making it a harder exercise to carry out than what was initially expected. Heavily charged personal agendas have been one problem but technical problems and misunderstandings in the use of the software have been encountered as well. The project is consequently running about two months being schedule. We expect to catch up on some of the delays over the summer and present the final report to UNESCO in October, after the international meeting on Migration and Country of Origin Development (see section 6). In this section we are reporting on work which is very much “in progress”.

Role definition and task assignments for the user studies:

- 1.) *members* of a diaspora network are expected to contribute actively by the messages they exchange in the WIKI space to structuring on going collective activity;
- 2.) the task of *project leaders* is to mobilize their networks and, for doing this, they should be able to use SPIP and plug-in resources as a means of identifying who should be mobilized and how to get them involved in on-going Wiki type of interactions;
- 3.) *development professionals* construct *DKN development portfolios* in order to resolve the inherent contradiction between a project-oriented activity which often implies an ephemeral, well focused activity for the country of origin and a brain gain activity which generally requires a multifaceted engagement in network building over a long period of time. As figure 3 shows, the portfolio concept implies using the experience gained in one project as part of a virtuous cycle that becomes more and more efficient as new projects are added to a development portfolio.
- 4.) Development professionals will have a *technical staff* for dealing with the general problems of getting a DKN infrastructure up and running on the computers of DKN members, assisting project leaders in maintaining the dynamics of on-going computer-mediated interactions and, finally, applying software plug-ins for generalizing results over individual projects.

More precisely, we consider X. Castro-Sardi to be the DKN development professional in our study. She works at the interface of Colombian institutions (Colciencias, Universities, Professional Institutions) and networks of Colombians abroad. The main thrust of her activity has been to analyse how Columbian institutions adjust the offer of knowledge and skills broad to the demands made on expatriates for country of origin development.

Diaspora knowledge network are exemplified by two research networks: one seeking to identify the genetic determinants of the pathogenic virulence of *Xanthomonas axonopodis* pv. *manihotis* (Xam), a bacteria responsible for huge cassava crop losses (project SEQXAM); the other aimed at better understanding the mechanical properties of volcanic ash, a type of soil frequently encountered in Columbia which is responsible for a great deal of property damage and loss of human lives because of landslides (project GRANSOILS). Members of these two

projects are located in France and Columbia. They have been interviewed in order to understand the organization of what we consider to be two diaspora knowledge networks.

The two projects SEQXAM and GRANSOILS are very different in nature. In carrying out this comparative study, our goal is to better understand the contribution of the DKN system to building capacity for brain gain through

- adjusting knowledge and skills in a way which takes into account what was called above the framing problem;
- organizing interactions through the WIKI space in a way which sustains the dynamics of document-mediated interactions;
- building information objects which reinforce the mechanisms for cumulating practice and experience over the multiple projects in a development portfolio.

We will briefly describe the work which has been done on each of these two points in what follows.

The framing problem

The two project leaders are Columbian students doing their doctorate in French laboratories. Both have maintained contact with correspondents in Columbia. The French and Columbian members of both the GRANSOILS and SEQXAM networks have been registered as users of the DKN platform. They are the “core members” of each project. The WIKI space and the SPIP space have been configured for use by these core members. This means that the menu serving to direct navigation in the WIKI hypertext contains the elements which the core groups have selected for signposting the pathways that they will follow in developing their specific projects.

With respect to the SPIP space, text mining techniques have been applied in order to identify actors who might have knowledge and skills complementary to those of the core group and who could therefore be considered as “stakeholders” who might be included in the project. In order to launch the text mining procedure, the two project leaders were asked to supply us with 30 full-text articles in their field. 10 articles were classed as “mainstream” contributions to their problem area; 10 were classed as peripheral; and 10 were classed as articles addressing issues of emerging interest. A search was then carried out in the “bibliostic” database of the CNRS in order to automatically identify articles falling into one of these three classes given the intersection of their vocabulary with that found in the 30 selected articles. Each of the three corpuses was then analysed by Calliope software developed by Mathilde de Saint Leger in order to identify and describe the emerging, mainstream and peripheral social networks in the SEQXAM and GRANSOILS fields. The results are considered to be an aid in managing the framing problem: enlarging a core group to include new members raises the fundamental issue of how a group wants to invest in its future; should it consolidate mainstream research or invest more in exploring issues which are today classed as being peripheral or of emerging interest but which could become central tomorrow?

Organizing collective action

Problems of sense-making and misunderstanding are common and some say that mechanisms for correctly managing them lay at the heart of social capital construction. A four step procedure was adopted for addressing this question, the idea being that at the end of each step the results would be posted for discussion on the Wiki.

The first step used ETIQ software developed by Oriane Matte-Taillez to automatically extract out the specialized vocabulary from the 30 texts provided by the project leaders of the SEQXAM and GRANSOILS networks.

Each word was then classed as belonging to a specific category so that in the end each category was defined by a list of instances. This particular classification procedure had two goals. The first was to avoid having experts “pull their categories out of their head”, a practice which is often criticized when experts are engaged in knowledge transfer activities and asked to describe what they do. In our procedure, experts were obliged to clarify their understanding of a concept by using a word extracted from the literature to describe the category’s content. The second goal was to achieve reproducibility. Using the same word list, another expert was asked to class the words as well so we could detect when the categories are not the same, or when a given word is classed in one place by one expert but in another place by the other expert. Classification is a subjective activity which has to be called into question and debated in order to avoid misunderstandings and work out differences of opinion. This then was a second step in a process aimed at assisting in collective sense-making.

The third step was to use AGORAE software developed by Jean-Pierre Cahier in order to map out the different points of view identified through the classification exercise (Annex 4). The goal of this software is to visualize “ontological disagreements” using a modified version of the TOPIC Map representation scheme under development for the Semantic Web.

Finally, the CSCW literature has shown the importance of project management software to build up confidence in the possibility of doing things together. The fact of making objectives, milestones and deliverables visible and, at the same time, providing clear task assignments keeps people on track. The PIC software developed by Topica-Tech serves this purpose. (Annex 5).

This work on organizing collective action has been much inspired by efforts aimed at building technologies for discourse structuring because we consider this to be the most obvious task of a development professional. Discourse structuring is the activity which seeks to identify and articulate different points of view, to possibly contest the meaning and significance of a proposal or an idea and then to find common ground for working things out⁷. It is a very intense activity, which takes considerable time and a great deal of diplomacy. It is precisely what is required in order to successfully managing a DKN development portfolio. Brain gain requires more than successful projects. These, of course, are necessary because “deliverability” is critical; the concrete results that programs yield are essential for making a DKN development portfolio visible and ensuring its sustainability. However, they are not enough. Brain gain means building up a common language for talking about the role diaspora knowledge networks can play in country of origin development; it means building up awareness of opportunities for linking networks in sending and receiving countries, it means

⁷ Buckingham Shum, S. and Selvin, A., (2000) “Structuring Discourse for collective interpretation”, Distributed Collective Practice Meeting, Paris.

managing conflicts of interpretation and evaluation in ways that encourage the construction of common ground. And this is a long term activity. Structuring a brain gain discourse takes time and installing the mechanisms to support it takes even longer. Nevertheless, it is generally recognized that it is worthwhile to invest in building the foundations of a social capital⁸. The life span of a DKN development portfolio, being in principle much longer than that of an individual project, provides the time needed to make such an investment.

Computer assisting the construction of a brain gain discourse can be done by contextualizing the flow of document mediated interactions. These interactions can only be observed at a particular point in time, a fact which raises a set of very interesting questions: What is the social, cognitive and practical situation at the time of observation and how does the fact of knowing that context at time “t” help in understanding the different points of view in presence and the common ground which emerges from discussions between “t” and “t+1”? What attributes can (should) be used to index a context, and what text mining techniques can (should) be employed to detect them? These technical questions often lie outside the realm of competence of development professionals and project leaders and necessitate the cooperation of technical staff.

In summary, the four-step procedure set out above for organizing the user study indexes the context of computer-mediated interactions at a given point in time from four different points of view. We use natural language processing techniques with ETIQ, social network analysis techniques with Calliope, knowledge engineering modelling techniques with Agorae and program management techniques with PIC. In other words, DKN provides contextual information about the dynamics of brain gain in the form of a list of terms extracted out of document flows; the structure of a social network; the structure of a Topic Map; a list of objectives, milestones, deliverables and task assignments. Over time, from “t” to “t+1” this contextual information will change and it is precisely these changes that development professionals can (should) discuss with members of a diaspora knowledge network. The lists, maps and social network displays are information objects which can (should) serve to sustain the dynamics of the document mediated interactions serving to build the brain gain discourse. That said, in order for computational support to be effective, users of the DKN system have to clearly perceive the advantages to be gained by indexing the context conditioning the brain gain dynamics of a DKN development portfolio. Conceptual, methodological and interface problems are intertwined and are requiring more attention than initially expected in order to work them out.

Capitalizing on past experiences

Figure 3 clearly sets out the objective of capitalizing on individual projects in order to improve progressively over time the quality of indexing the context of document mediated interactions. This objective can be achieved because changes in word lists, social network structures, topic maps and project management protocols will be discussed and debated. This of course is our strong hypothesis. Text mining, social navigation and computer assisted learning are just some of the disciplines which take this hypothesis seriously. We consequently assume that the information objects we generate by using different software plug-ins will help “keep the discussion moving”. They will notably help a development portfolio manager in his or her attempts to make a brain gain discourse meaningful. But they will also help project leaders because modelling takes place at the project level. Contextual

⁸ Grice P, (1975) “Logic and conversation”. In P. Cole et J. L. Morgan, eds, *Syntax and Semantics, Volume 3: Speech Acts*, New York: Academic Press, pp 41–58.

attributes will of course change between projects. Word lists, topic maps, network structures will obviously not be the same between SEQXAM and GRANSOILS. However, they can be compared. Mathematical techniques exist for comparing the content of word lists, the structure of networks, the relationships between different approaches to ontologies. It is very unlikely that we will make it to this level of computational support for building a brain gain discourse before our DKN project ends in October. But that is where we are heading.

6.) Perspectives and recommendations

This last chapter in the report will be written after the International Meeting which the DKN group is organizing at UNESCO in October entitled “Migration and Country of Origin Development”.