

LARGE SCALE E_GOVERNMENT PROJECTS: THE NEED FOR TRANSDISCIPLINARY COLLABORATING TEAMS

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ABSTRACT

The paper presents the idea of the need for transdisciplinarity for large scale information systems projects such as e-government. We argue that it is not feasible anymore to look at those projects from isolated disciplines point of view, as large scale projects involve many stakeholders from various disciplines which create many interactions among them with issues of coordination becoming essential for the success of the project. E-government projects are subject to indirect bounds due to not easily identified problems that emerge when organizations start to exchange information across traditional organizational borders. We present a selected review of the current literature on the crossing disciplinarity to investigate the different models and their necessity and suitability to e-government. One of the most complex e-government project in Canada, namely the secure channel as a backbone to government to government integration is used as an example of a large scale project in need for a transdisciplinary collaboration. This paper concludes that the highest level of integration between disciplines, in e-governance projects calls for further research on matters of transdisciplinary collaboration in public sector projects.

Keywords: e-government, G2G, inter-organizational integration, transdisciplinarity

1 INTRODUCTION

The multidisciplinary nature of information systems has been extensively addressed through the literature. However, this has been extended in the last few years to include issues such as interdisciplinarity and transdisciplinarity (Galliers, 2004). To fulfil the e-government services, one of the most challenging e-government sectors is the digitally-enabled collaboration and cooperation perspective among different government agencies (Joia, 2004) —commonly referred to by the acronym *government-to government* (G2G). This adds to the complex and imposing challenges associated with IT management, development, and use, demand interdisciplinary approaches to their resolution (Benbasat & Zmud, 2003). However, one needs to differentiate between the three terms multidisciplinary, interdisciplinarity and transdisciplinarity. In the course of a series of projects studying interdisciplinary research processes, (Bruce et al., 2004; Williams and Tait, 1998; Tait and Lyall, 2001) researchers have investigated these differences.

The three common levels of integration between disciplines are multidisciplinary, interdisciplinarity and transdisciplinarity. The order in which we present these terms has a significant meaning in the context of the degree of integration between the different disciplines as going to be clarified below. As can be noticed, there is no exact consensus about the meaning of each term. This will be clear when we give some examples about transdisciplinarity models in particular. However, compared to the other two levels, there is an agreement that the degree of integration between disciplines is the highest in the context of transdisciplinarity, as can be seen below.

Bruce et al. (2004) clarify that *multidisciplinary research* approaches an issue from the perspectives of a range of disciplines, but each discipline works in a self-contained manner with little cross-fertilisation among them, or synergy in the outcomes. Multidisciplinary research involves low levels of collaboration, does not challenge the structure or functioning of academic communities and does not require any changes in the academic worldviews of the researchers themselves. As Galliers (2004) believes, the problem with the multidisciplinary is the distinct possibility of "mechanistic pooling" (Knights & Wilmott, 1997) of concepts and approaches, with little in the way of knowledge sharing between disciplinary traditions.

Galliers (2004) clarifies that *interdisciplinary* research concerns the transfer of methods from one discipline to another (Galliers, 2004). Thus, similar to multidisciplinary, interdisciplinary research approaches an issue from a range of disciplinary perspectives but in this case the contributions of the various disciplines are integrated to provide a holistic or systemic outcome. Effective interdisciplinary research, on the other hand, requires new modes of thinking by researchers and cuts across the traditional discipline-based academic structures and systems of reward and resource allocation that are found in most universities and many research institutes. Despite its important benefits in advancing and applying knowledge, the work of interdisciplinary integration involves intellectual and practical challenges and may thus be more difficult to achieve and hence less common than multidisciplinary research. (Bruce et al., 2004) The term has been clarified even more by Despres et al. (2004). They argue that interdisciplinarity came forth as the answer to the fragmentation of knowledge into disciplines. The research object being always more complex than its disciplinary representation, researchers then co-construct their research object across several disciplines. Most interdisciplinary research fits the following characteristics: 1) the object construction goes beyond a single disciplinary framework; 2) concepts from various disciplines are combined and partially translated in the research scheme; 3) methods are borrowed from various disciplines; 4) researchers with complementary disciplinary profiles are involved.

Lawrence and Després (2004) argue that *transdisciplinarity* is a word à la mode. However, few are aware of the context of its origins, of what it meant at that time, and how it has evolved as a concept in recent decades. While interdisciplinary research concerns several disciplines, transdisciplinary research implies crossing the boundaries between disciplines. It defines a mediation space between them. *Transdisciplinary research* focuses on the organisation of knowledge around complex heterogeneous domains, rather than the disciplines and subjects into which knowledge seems inevitably to become organised in academic settings (Nowotny et al., 2001), 'transcending' the academic disciplinary structure. Horlick-Jones and Sime (2004) believe that transdisciplinarity has been hailed as a potentially effective means of addressing increasingly complex societal problems, the nature of which cut across the boundaries between orthodox disciplinary knowledge. From Galliers (2004) perspective, transdisciplinarity is about joint problem solving among science, technology and society. In the 'ideal case', this problem solving process is preceded by an exercise of joint problem defining. The success of the transdisciplinary approach is based on the preparedness of all participants (all disciplines, the public, and the politicians) to work in an atmosphere of transparency, trust and openness, trying to balance personal interests with interests for the common good. This means that the transdisciplinary approach, on the other hand, requires careful preparation and a willingness to understand the language and underlying philosophies of one's colleagues (Newell & Galliers, 2000).

In this paper we explore the possibilities of transdisciplinary research in the case of large scale government projects. Thus, we present empirical findings from a study applied at Canada's Secure Channel (g2g backbone) e-government project. Section 2 provides an overview of transdisciplinarity, while section 3 is presenting transdisciplinarity models. Section 4 links e-government to transdisciplinarity, Section 5 provides an understanding of the empirical case and the paper concludes with a set of recommendations that we foresee will influence future research in transdisciplinarity in the context of information systems projects in general and e-government in particular.

2 OVERVIEW OF TRANSDISCIPLINARITY RESEARCH

2.1 Importance

Bruce et al. (2004) highlight Hicks and Katz (1996) arguments concerning increasing calls for more interdisciplinary approaches to problems, along with encouragement for greater collaboration and networking among institutions and researchers. Such encouragement is often based on the assumption that the research will contribute to more effective innovation and enhanced competitiveness. Pressure to encourage interdisciplinary research also comes from the need to solve complex socio-scientific problems, where one discipline on its own cannot provide an answer. However, this perceived need for interdisciplinary research, despite considerable financial encouragement and verbal exhortation is not being met by the research community, particularly when it comes to research which crosses the boundaries between natural sciences and social sciences (The Royal Society, 1996).

Lawrence and Després (2004) discuss some key questions about the natural and human-made environment, at whatever geographical scale; need to be understood by innovative concepts and methods. This stems from the fact that the capacity of human societies to deal with environmental questions (such as climate change, health, land-use, forestry management, renewable and non-renewable resources, housing, poverty and urban planning) are insufficient even though many professionals are convinced that they have the "right answers". The incapacity to deal with the above-mentioned problems is related to their complexity, to the compartmentalisation of scientific and professional knowledge, to the sectoral division of responsibilities in contemporary society, and to the increasingly diverse nature of the societal contexts in which people live. In addition, the lack of effective collaboration between scientists, professionals and policy decision-makers has led to the "applicability gap" in sectors that deal with both the natural and human-made environment. There is an urgent need for innovative approaches in many situations, such as the blatant failure of the wealthiest countries of the world to provide all citizens with secure employment, affordable housing and appropriate health care that meet at least minimal requirements.

Lawrence (1995) add that current shortcomings of traditional scientific research and professional practice are not necessarily the result of the lack of political commitment, or financial resources, or viable solutions. They are, above all, the logical outcome of the narrow vision of so-called experts who do not address fundamental issues but only topics isolated from their societal context. In order to deal with these limitations, various sets of obstacles need to be revised or dismantled: first, ontological frameworks that do not embrace the complexity of the natural and human-made environment; second, epistemological positions that value rational, utilitarian approaches to interpret the layout, use and management of human and natural ecosystems; third, specialisation, segmentation and bureaucratisation of knowledge and expertise; and finally, the lack of transfer and communication between professionals, politicians, interest groups and the public.

2.2 Transdisciplinarity Research

In this section, we are going to focus on transdisciplinarity from the point of view of different researchers applications. As mentioned above and as supported by Balsiger (2004), there is no complete history of this term or concept. Like interdisciplinarity, there seems to be no consensus about its meaning. Thus, we are going to provide Bruce et al. (2004) examples of the researchers' point of view in this domain.

First, transdisciplinarity tackles complexity in science and it challenges knowledge fragmentation (e.g. Klein, 2004; Ramadier, 2004). It deals with research problems and organizations that are defined from complex and heterogeneous domains (e.g. Horlick-Jones & Sime, 2004). Beyond complexity and heterogeneity, this mode of knowledge production is also characterised by its hybrid nature, non-linearity and reflexivity, transcending any academic disciplinary structure (Balsiger, 2004). Second, transdisciplinary research accepts local contexts and uncertainty; it is a context-specific negotiation of knowledge (e.g. Klein 2004; Ramadier, 2004). Third, transdisciplinarity implies intercommunicative action. Transdisciplinary knowledge is the result of intersubjectivity (e.g. Després et al, 2004; Klein, 2004). It is a research process that includes the practical reasoning of individuals with the constraining and affording nature of social, organisational and material contexts (e.g. Lawrence, 2004; Horlick-Jones & Sime, 2004). For this reason, transdisciplinary research and practice require close and continuous collaboration during all phases of a research project, what is called "mediation space and time" (e.g. Després et al., 2004), or "border work"(e.g. Horlick-Jones & Sime, 2004). Fourth, transdisciplinary research is often action-oriented (e.g. Pinson, 2003 Després et al., 2004). It entails making linkages not only across disciplinary boundaries but also between theoretical development and professional practice (Lawrence, 2004). Transdisciplinary contributions frequently deal with real-world topics and generate knowledge that not only address societal problems but also contribute to their solution (e.g. Lawrence, 2004; Horlick-Jones & Sime, 2004, this issue). One of its aims is to understand the actual world (e.g. Ramadier, 2004, this issue) and to bridge the gap between knowledge derived from research and decision-making processes in society. However, transdisciplinary research should not be restricted to applied knowledge (Balsiger, 2003; Després et al., 2004). This common interpretation is too restrictive, because there is no inherent reason why theoretical development - especially the analytical description and interpretation of complex environmental questions - cannot be achieved by transdisciplinarity. We argue that this is a basic necessity if advances are to be made in this vast and complex field of research.

Existing research on experience gained from transdisciplinary projects shows the challenges faced by the project teams. For example Antrop and Rogge (2006) present a case study in urban planning, where while integration worked smoothly amongst the researchers, the collaboration was much more difficult with the program team and local stakeholders. There were several reasons for this. The expectations of the program team were very high and it was not yet clear how the results of the study would be integrated in the whole of the project. The challenges could be summed up as follows:

- Too high expectations by the program team.
- The unclear definition of the end-users of the report.
- The lack of a common language: Difficulties in communication occurred mainly between the program team and research team and between the program team and the local stakeholders.
- Too limited time for communication.

Although the participants of the project were academically trained, the program team had a lot of problems in understanding parts of the scientific report. This can be explained by two observations: (1) most of the members never experienced interdisciplinary research and (2) their focus shifted from a pure scientific study towards a more popular result that could help to involve local stakeholders in their project, which is essential for its success and closely linked to the political ambition of the

provincial representatives. Some training in integrated working might be helpful at the outset before defining the common project goals.

Additionally, Treaa et al. (2005) identified additional barriers including the spatial distance between researchers, project meetings, and management problems. Researchers perceive a tension between the applied character of the projects and the scientific expectations placed on them. Consequently they suggest paying greater attention to the organisation and management of research to assure the necessary support for integrative research teams.

3 TRANSDISCIPLINARITY MODELS

During the last decade, transdisciplinarity has become the focus of important theoretical contributions, as several authors have reported. However, some questions arise in this context such as in what ways do transdisciplinary contributions differ from the more familiar interdisciplinary and multidisciplinary ones? Is transdisciplinarity applied frequently, and if so by whom? For what reasons and types of problems can it be used? Last, but not the least, how is transdisciplinarity operationalised in research and professional practice? (Lawrence and Després, 2004) In order to provide some answers for those questions we present some transdisciplinarity models and applications.

3.1 Purpose of Collaboration

Several studies and projects have investigated interdisciplinary research processes (Williams and Tait, 1998, Tait and Lyall, 2001). Bruce et al. (2004) describe the two typologies of interdisciplinarity - which in turn leads to transdisciplinarity- provided by Gibbons et al. (1994) developed a typology contrasting Mode 1 and Mode 2 research; the former corresponding broadly to traditional disciplinary specialities, and the latter referring to a 'new production of knowledge' that cuts across disciplinary boundaries in order to resolve complex societal problems. We have adapted this well-known terminology to draw a parallel distinction, within interdisciplinary research, between:

Mode 1 Interdisciplinary Research which brings together researchers from different disciplines in order to overcome a blockage to further development within a discipline, or to enable the discipline to move into new and productive areas of research. In the long run, it furthers the expertise and competence of academic disciplines, for example through developments in methodology and instrumentation, and may even lead to the formation of new disciplines or sub-disciplines. Mode 1 interdisciplinary research is thus one of the primary engines of the evolution of disciplines. Although in this sense, it supports rather than challenges the discipline-based structure of academic and research institutions, in the short-term (e.g. the timescale of an individual project) it can meet resistance from existing academic structures just as much as Mode 2 interdisciplinary research. Overall, the academic barriers to Mode 1 interdisciplinary research are not so strong as for Mode 2 and there are fewer difficulties in evaluating and administering projects.

Mode 2 Interdisciplinary Research, which addresses issues of social, technical, and/or policy relevance where the primary aim is problem-oriented and discipline-related outputs, which are less central to the project, design. The relevant mix of disciplines tends to be project specific. Researchers who develop a career working on such projects build up expertise on the integration of disciplines in a range of contexts and the management of other researchers from different disciplines working together, skills not highly valued in an academic context. Mode 2 interdisciplinary research is thus often regarded as undermining academic research, taking its evolution in a direction with which many academics are uncomfortable and is often seen by discipline based researchers as at best irrelevant and at worst threatening. The barriers to this type of interdisciplinary research are correspondingly greater, as are the difficulties of evaluating and managing it.

3.2 Domains of Collaboration

Zhu and Augenbroe (2006) address the issue of transdisciplinarity in the context of collaboration between project stakeholders, which is a continuous process of communication and information exchange between collaborating partners throughout the lifecycle of a project, therefore, parts of an intra-organizational information process may need to be more visible to collaborating partners. In this case, transdisciplinarity needs appear to integrate four major concepts, i.e., collaborating process segment information, sub-grouping information, organizational information and business document information, in order to complement to and augment the existing strategy that focuses mainly on the exchange of construction business documents.

Antrop and Rogge (2006) applied transdisciplinarity in urban planning, which is one of the e-government domains. A clear distinction is made from the beginning between the interdisciplinary and transdisciplinary domains. Both were developed simultaneously but in parallel paths although there was interaction at regular moments. The integration includes geography, history, and archeology in addition to the involvement of different stakeholders such as research team, steering committee, local stakeholders and others. The project also involved different types of integration including GIS integration, consisting spatial integration, chronological integration and legal instruments.

Depres et al. (2004) present the transdisciplinary research program undertaken by the Interdisciplinary Research Group on Suburbs or GIRBa (*Groupe interdisciplinaire de recherche sur les banlieues*, in French), as well as the collaborative planning process put forward to orient the future of Quebec City's first ring suburbs. Their work also justifies why and how the redevelopment of post-war suburbs called for a transdisciplinary and collaborative strategy. They look at transdisciplinarity from another perspective, namely scientific knowledge through academics and consultants, ethical knowledge through citizens and elected representatives, instrumental knowledge through civil servants and professionals, and aesthetic knowledge through elected representatives and citizens. This can be seen at in figure 1:

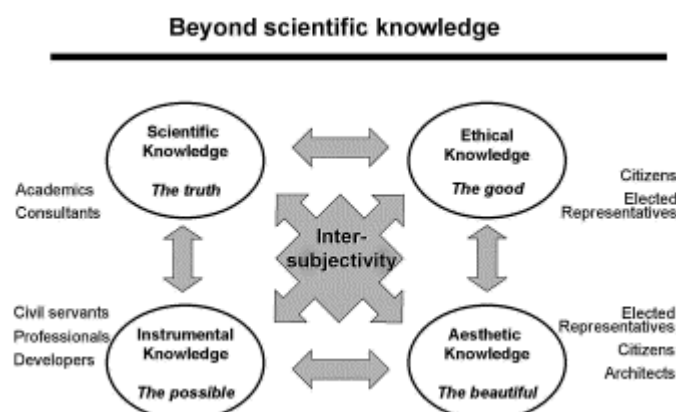


Figure 1. Intersubjectivity at work in collaborative planning.

Neef (2005) present another model for transdisciplinarity that takes several dimensions into consideration as can be seen in figure 2. He argues that there is broad range of approaches addressing issues in transdisciplinary as research has been developed. A lesson to be learned from these is not to get lost in diversity, complexity and variability. The first recommendation is about how to focus on selected problems to come up with the challenges of complexity. There are three basic questions about

issues to be addressed: (1) In which way do processes constitute a problem field and where are the needs for change? (2) What are better practices (targets in the sense of goals of sustainable development)? (3) How can existing practices be transformed? One can focus on one of these questions while taking into account that each of them is related with empirical, pragmatic, normative and purposive aspects.

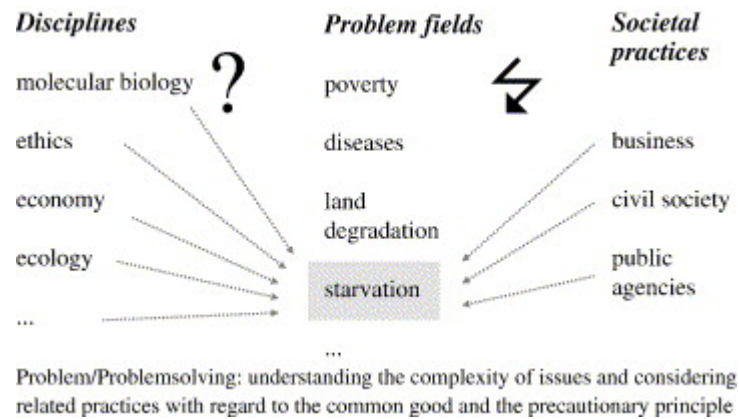


Figure 2. Identifying and structuring problems in transdisciplinary research.

3.3 Methods of Integration and Collaboration

Tress et al. (2005) state that interdisciplinary rural studies often lack a strategy on how to make integration work in their project. Two main types of design and management for integrative studies can be distinguished: the parallel design and the integrated design. In the parallel project design, disciplinary subprojects run parallel to each other. Subprojects come together late in the project process and try to integrate their results. Contributions of the single subprojects are still identifiable in the end-product.

In the integrated project design, the participants commonly define an aim for their project. They work together throughout the project process. Achievements are a product of all participants and the efforts of single disciplines or subgroups are difficult to identify. A common problem of the parallel design is that the most difficult part of the project—reaching integration—is left until the end. Achieving a high level of integration after working more or less independently throughout the project is a challenge seldom mastered. However, most projects studying rural landscapes apply a parallel design even though they aimed to work integrative.

3.4 Phases of Integration and Collaboration

Lawrence and Després (2004) present the mediation space in transdisciplinary research includes the following: 1) definition of complex research objects and problems; 2) definition of epistemological positions; 3) selection of operational concepts; 4) elaboration of the research strategy; 5) combination of research methods; and 6) construction of interpretative theoretical frameworks. On a day-to-day basis, transdisciplinary research requires a different way of conducting research. It namely calls for close and constant collaboration among co-researchers, at all steps of the research program, which translates inevitably into generous mediation time and space. This is undoubtedly easier to realize when geographical distance among co-researchers is not at stake. This is an important consideration because transdisciplinary research is hardly possible when researchers meet once a month or exchange e-mails or telephone calls once in a while.

Depres et al. (2004) have also identified a framework including the steps they went through. They have also shown the key stakeholder's involvement in each phase. It is obvious that there is a coordinating team for each phase to facilitate the interaction between the multiple stakeholders including experts from different disciplines.

Some authors such as Hochtelt et al. (2006), have applied a theoretical concept of transdisciplinarity by presenting the successive work stages of a research project conducted in the Piedmont Alps from 1998 to 2004. It demonstrates why and how transdisciplinary methodology was applied, and the experiences gained from its use. The transdisciplinary strategy was adopted since it enables researchers to cross disciplinary borders and to deal with extra-scientific "real world problems". This can be seen in figure 3:

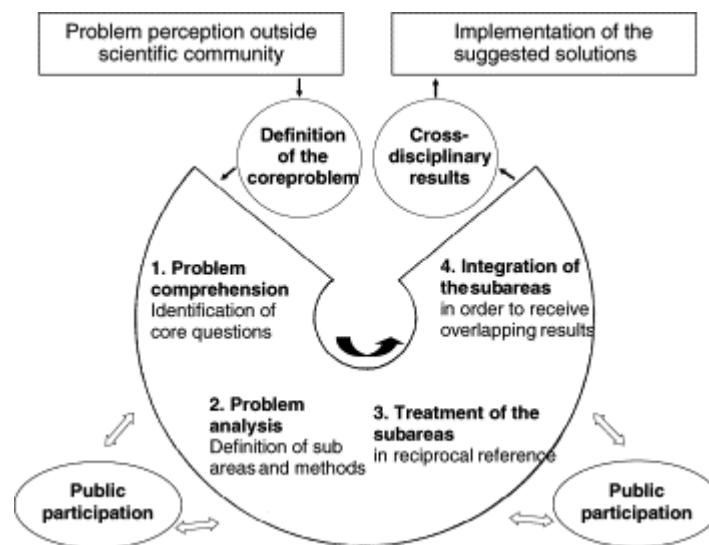


Figure 3. The problem solving strategy in transdisciplinary projects

4 TRANSDISCIPLINARITY AND E-GOVERNMENT

The problem of collaboration between different disciplines in large scale projects has been recognised in the information systems literature (Galliers, 2003; Malone and Crowston, 1994) in general and Internet research in particular (Hunsinger, 2003). Our focus here is the need for transdisciplinarity for e-government research. In the last few years, the applications of information systems in general and e-government in particular are widening with increasing complexity. Thus, in this section, we are going to provide an overview of e-government and one of its most important sectors we are going to focus on. This introduces the importance of transdisciplinarity in such large scale projects, to be extended within our case study presented.

The term e-government has been defined from different perspectives. These definitions range from making services available online: "Any usage of government online at all levels (federal, state, local)" (Sakowic, 2003: p.1) to general definitions describing e-government as another definition provided by Sakowic (2003: p.1): "the use of information and communication technologies (ICT) to transform government by making it more accessible, effective and accountable". This idea of inconsistency of e-government definitions is supported by Bonham et al., (2003) as they believe that e-government means different things to different people. As they clarify, some observers define e-government in terms of specific actions: using a government kiosk to receive job information, applying for benefits through a website, or creating shared databases for multiple agencies. Other observers define e-government more

generally as automating the delivery of government services. While perceptions of e-government vary widely, some common themes can be identified that capture its evolutionary nature.

The above mentioned definitions of e-government describe e-government from different perspectives and may complement the global picture of what an e-government is. Nevertheless, they are not comprehensive from our point of view, as they do not include the three sectors of e-government mentioned by Bonham et al., (2003) and also by the World Bank Group (2003): These include, as mentioned above, government-to-government (G2G), government-to-business (G2B), and government-to-citizen (G2C). The main sector we focus on within our work is G2G, due to its high collaboration and thus transdisciplinarity needs as will be clarified. The reason is that it includes the highest level of integration between stakeholders. As can be seen there are extensive research efforts in the domain of cross-organizational integration in the context of governmental applications. Although the progress of the supporting technology, we can note that none of the countries worldwide reached all e-government development phases (The United Nations, 2003) even without those emerging trends. Furthermore, compared to other e-government sectors, there are few studies that have reported G2G experiences. According to Relani (2004) Government-to-Government is a new discipline. The short experience accumulated in these few years isn't enough for the responsible groups to extrapolate widely accepted theories from the countless hypotheses made. Many theories are concerned only with the technical aspect of intergovernmental cooperation, others; on the contrary, try to give a broader vision including organizational and cultural issues. The different approaches to G2G come out of the heterogeneity to interpret the role of Government-to-Government. Up to now, a commonly accepted definition doesn't exist and the domain of G2G projects is still unclear. For example, The Swiss Federal Government bounds G2G as the vertical interaction between Federal Government, Cantons and local administrations. G2G includes the internal relation between different offices is defined as Government internal (G-I) and the relationship between the people that are involved in public administration and the "towering above" organization: Government to Employee (G2E). Some observers also identify G2E as a fourth sector e-government. Since G2E operations tend to focus on internal, administrative activities, they can be considered a subset of the G2G sector. Thus, we are going to use the term G2G E-Government in its wide meaning, including G2E (or G-I) aspects. The following table summarizes these sectors, highlighting that G-I and G2E are sub-sectors from G2G.

Table 1. E-Government Sectors

Sector	Brief Explanation
G2C	Government-to-Citizen
G2B	Government-to-Business
G2G	Government-to-Government
G-I	Government Internal: relationship between the people that are involved in public administration
G2E	Government to Employee: internal, administrative activities

The American definition of G2G emphasizes on its integrative nature: The US Electronic Government website gives a broader definition of Government-to-Government, that emphasizes on the integrative nature of G2G : "Many citizen services such as Homeland Security and verification of vital records require collaboration between Federal, State and Local governments. The goal of the Government to Government (G2G) portfolio is to forge new partnerships among levels of government. These partnerships will facilitate collaboration between levels of government, and empower State and Local governments to deliver citizen services more effectively" (The American eGov portal, 2004). Further, the domain of G2G includes several barriers, originating from different disciplines, which necessitate the interaction between different disciplines as can be seen by the table 2:

Table 2. E-Government Challenges

Barriers	Authors
Legislative & Regularity	(Jaeger, 2002 ; OECD, 2003; Courtney, 1997; Leitner, 2003)
Security	(Cyert et. al., 1998; . OECD, 2003; Courtney, 1997; Duck, 1998)
Resource Barriers	(Relani, 2004; OECD, 2003)
Cultural	(Riedel, 2001)
Technical Obstacles	(Layne, 2001)
Legacy Systems	(Leitner, 2003; OECD, 2003; Themistocleous et. al., 2004)
Organizational Structure	Frost (2003)
Resistance to Change	(Relani, 2004)
Information and Knowledge Interchange	(Relani, 2004)
Coordination	(Lenk, 2004)

We highlight the coordination, necessitating interaction between different experts. This is because as mentioned, E-Government projects involve many stakeholders. The coordination of everyone in G2G projects is a difficult task. The differences don't only come from different cultures or from the national pride, but particularly from the different points of view of the different categories of specialists involved in the implementation of Electronic Government systems, deriving partly from the egoism of the stakeholders and partly from their ignorance. For example, IT consultants have little idea about the Public sector while proponents of public governance reform continue to ignore much of potential of IT. (Lenk, 2004) Further, G2G necessitates information and knowledge interchange, which is one of the most ambitious tasks G2G tries to achieve is the national and international exchange of information between different public offices. The transmission of information involves many variables and many knotty problems to solve. The technical aspect, i.e. the transfer of digital data, is only one aspect. Organization, culture, language and many others are the obstacles to overcome. The reorganization of back-offices is the basis to enable a seamless government organization. For a strictly functional organization, IT can help transform back-offices to become process-oriented and more customer-centric.

To finalize this issue, we are going to clarify that we are going to classify the need for transdisciplinarity at two stages:

- 1- Development
- 2- Use

Within our case study, we focus on the development level, but also refer to the stakeholders being integrated while describing Canada's Secure Channel (backbone for G2G applications)

5 THE CASE OF CANADA'S SECURE CHANNEL

As the aim of this paper is to investigate the importance of transdisciplinarity for large scale e-government projects, we have selected an interpretive, qualitative exploratory case study approach to

conduct this research. Also, in the context of this research a qualitative approach is more appropriate as such approach can be used to: (a) investigate little-known phenomena such as transdisciplinarity and G2G; (b) examine the phenomenon in its natural setting and, (d) learn from practice. In doing so, various data collection methods such as interviews, documentation, and observation were used. This has been validated through triangulation.

The Secure Channel of Canada, which is the backbone for G2G, is the example of e-government large scale projects we have selected due to its complexity, number of partners, and various stakeholders interests. As mentioned earlier, we focus on the issue of transdisciplinarity at the development phase rather than the use.

In 1999, the Government of Canada issued a Request for Proposal (RFP) inviting the private sector to bid on the contract to design and build the Secure Channel and electronic service delivery platform as outlined in the detailed RFP documentation. Due to the size of the project and diversity of the expertise and resources required, the winning consortium consisted of 11 private sector companies. Their expertise included project managers; architects; engineers; network specialists; risk managers; business and policy analysts; communications and planning strategists; systems integrators; and standards, application, quality control, security, configuration, and network experts. In order to meet these requirements, the successful Secure Channel consortium consisted of Bell Canada, Bell Emergis, CGI, Microsoft, IBM, Entrust, Price Waterhouse Coopers, Cisco Systems, IT Net, Sierra Systems and Canada Post. Each of these companies had a different interest in successfully building the Secure Channel project; and much of the project management responsibilities, assigned to CGI, involved managing the various and competing interests of each of the private sector players while moving the total project forward to its successful completion.

In addition to managing the internal consortium interests, the Secure Channel project also required the delicate management of the competing interests of the government players. These included, in addition to specific application requirements, challenges relating to security, privacy, intellectual property, change management, legal aspects, and the pervasive and daunting organizational cultural differences. At the time the Secure Channel was being built, the Government of Canada elected to hold 34 federal departments directly accountable for the success of the Government On-Line initiative; and to this end, created a myriad of interdepartmental committees - some representing all 34 departments, some not. And, this added to the complexity and differing interests of the participating departments. For example, the Government On-Line (GOL) initiative was directed by a Deputy Minister committee entitled TIMS (Treasury Board Information Management Sub-Committee). This committee consisted of a sub-set of the 34 departments which created various levels of participation, authority and ultimate influence in directing the GOL initiative. TIMS consisted of Deputy Ministers from the Privy Council Office, Treasury Board Secretariat, the Tax and Revenue Agency, Agriculture, Health, Security, Human Resources Development, Industry, Statistics, National Defence, International Development Agency, Veterans Affairs, Library and Archives, Public Works, Communications, Fisheries and Oceans, National Resources, and Citizen and Immigration. The interests and influence between these departments varied widely, as did the interests of the full 34 departments, which extended to the complete 160 departments and agencies which made up the Government of Canada. In addition to balancing the interests of the participating federal departments, there were also frictions between central agency, policy and operational departmental interests and responsibilities. The relationship within the consortium and with the federal departments was exacerbated by citizen and business interests and inter-jurisdictional considerations which would become prominent down the road as the channel would ultimately serve different levels of government. These interests included differing organizational cultures, political influence, bureaucratic work styles, career agendas, knowledgeable resources, competing objectives and levels of contribution to the successful outcome.

It is the recognition of the myriad of interdependent interests and players that makes the Secure Channel an interesting case study to examine the transdisciplinarity elements embedded in these large and complex information technology projects that underscore the success of e-government, and of our interconnected environments.

The Gateways are the main points of entry to Government of Canada services. The key client segments are: Canadians and residents, non-Canadians, and Canadian businesses. Within each segment, information and services are organized by subject, audience or needs, rather than by program or department. The Canada Site is designed for intuitive navigation based on user needs. It is constantly evolving and development is based on client research (i.e. on-line comments, surveys and focus group testing of its users) and ongoing consultation with stakeholders and federal partners.

The Gateways and Clusters strengthen the Government of Canada's Web presence by:

- practicing an enterprise-wide and horizontal approach to service delivery;
- promoting common principles of the Government of Canada vision for service delivery (i.e. client-centricity, horizontality and accountability);
- assuming a leadership role in establishing common standards, tools and supports that build on partner and stakeholder feedback so that practices can be implemented uniformly across government. These practices include a common performance measurement accountability framework, a content management solution, a metrics solution, an on-line survey tool and coordinated marketing and client research;
- actively participating in several interdepartmental working groups and regularly bringing together the leads of each cluster to form a horizontal community of practice unique among governments;
- inter-jurisdictional partnering activities with the provinces of Ontario, British Columbia, Manitoba and Prince Edward Island, and through the Public Sector Service Delivery Council.

Examples of the participating department include:

Agriculture and Agri-Food Canada
Atlantic Canada Opportunities Agency
Canada Border Service Agency * Canada Customs and Revenue Agency and Citizenship and Immigration Canada
Canada Firearms Centre * Solicitor General
Canada Revenue Agency * Canada Customs and Revenue Agency
Canadian Economic Development for Quebec Regions
Canadian Heritage
Canadian International Development Agency
Canadian School of Public Service * Canada Centre for Management Development
Citizenship and Immigration Canada
Environment Canada
Finance Canada
Fisheries and Oceans Canada
Foreign Affairs Canada * Foreign Affairs and International Trade
Health Canada
Human Resources and Skills Development Canada * Human Resources Development Canada
Indian and Northern Affairs Canada
Industry Canada
International Trade Canada * Foreign Affairs and International Trade

Justice Canada
 National Defence
 Natural Resources Canada
 Parks Canada * Canadian Heritage
 Privy Council Office
 Public Safety and Emergency Preparedness Canada * Solicitor General
 Public Service Commission of Canada
 Public Works and Government Services Canada
 Royal Canadian Mounted Police
 Social Development Canada * Human Resources Development Canada
 Statistics Canada
 Transport Canada
 Treasury Board of Canada Secretariat
 Veterans Affairs Canada

As can be seen the participating departments come from heterogeneous disciplines, where collaboration efforts are necessary. See Appendix A for list of services. As other e-government projects the transdisciplinarity does not exist at the level of several experts only, but at different stakeholders' levels including citizens, academics, civil servants, and others. All of the above models apply.

6 DISCUSSION-CONCLUSIONS

One example of a process/ task from the above departments within the large scale e-government (G2G) project of Canada (Secure channel)' is environmental applications such as the support sustainable development in the form of environmental projects such as Integrated Coastal Zone Management (ICZM). The importance of coastal zones is justified by Isobe (1998) as they contain unique, irreversible ecosystems. At the same time, coastal zones are subject to intense by humans: for transportation activities, resources and energy extraction, industrial uses, and recreation. Moreover, coastal zones are the first line of defense against the ravages of tsunamis through waves, flooding and erosion. Thus there are three functional aspects which are part of the human relationship in coastal zones, namely 1) provision of ecological services, 2) disaster prevention, and 3) human utilization. ICZM will seek to integrate these three aspects. These three aspects are intricately links. Consequently, humans must monitor and manage each facet in an integrated manner to ensure that the human relationship to coastal zones remains harmonious.

One of the main challenges of ICZM for sustainable development as a problem is that it necessitates the integration not only between different sectors but also, the integration among: 1) different coastal and marine sectors, 2) land and ocean sides, 3) science-management, 4) different nations (international), and 5) inter-government. However, lack of co-operation between involved agencies is one of the challenges as this is far beyond the concept of integrated management. Thus we can see ICZM as a management and collaboration problem as we argue. It needs extraordinary management approach to deal with it. We argue that collaboration research efforts should be extended to the process centred view to manage country's resources, in the context of sustainability in general and ICZM in particular.

The question that we pose here is how can we integrate these different efforts, whether from the technological, managerial, and transdisciplinary point of view? Cecez-Kecmanovic (2006) argues that conceiving IS as a multi-disciplinary field is problematic. However, multi-disciplinarity nature necessitating transdisciplinarity in the case of IS may mean openness to the wealth of knowledge from other disciplines necessary to deal competently with the heterogeneity and complexity of the IS phenomena. It also may mean cooperative relationships with other disciplines, constructive dialogues,

and learning from others (the reverse may be the case as well). Most difficult of all, however, it will also imply an integrative capability, a capacity for understanding in the first place, then evaluating and synthesizing.

However, there is a need to set up some integrative framework to integrate the scattered work in this context. This includes the efforts of academic departments to build new centers supporting transdisciplinarity through collaborative techniques to make consultants ready for that high level of collaboration. Future research will focus on details of some of these projects to identify the techniques of collaboration.

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