Information Sharing at National Borders:
Extending the Utility of Border Theory

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Abstract

Research has identified the potential and challenges of information sharing in government settings mostly within the context of a single country. The challenges facing inter-governmental information exchanges that take place across national border governments, however, are thought to be different. To date, research has failed to provide theoretical guidance in understanding the complexities that the cross border environment brings to information sharing initiatives. This paper brings together Brunet-Jailly's theory of borders [10] and definitions of cross-boundary information sharing from Gil-Garcia et al. [39] to develop a framework that incorporates the information sharing and technology dimension with the economic, political and cultural contextual factors impacting border regions. This study is an initial step toward understanding the challenges that the border environment brings to information sharing initiatives. Future research is necessary to empirically test the utility of the proposed theory as a tool for understanding this new area of both practical and theoretical importance.

1. Introduction

Globalization priorities are driving many countries to work together in new ways. New partnerships are being formed around common economic and social issues as well as shared challenges. Border regions, in particular, represent an important and unique context for transnational government collaboration. Current efforts to create transnational processes in the European Union and in North America that facilitate recent report released by the Center for Technology in Government (CTG). This study reports that research on transnational efforts in e-government comprises only 4% of the total research in e-government [7]. Findings also suggest that existing studies have been mostly conducted by European Union States [8, 9]. Research is this domain overall is clearly scarce and an

benefits management for cross-border workers are examples of these new modes of operation. However, efforts to collaborate within national border regions face unique challenges such as diverging national, as well as state, provincial, and local agendas, different legislation and regulation systems for providing services, accessing, and sharing both citizen and government information, cultural differences (e.g. language barriers, resistance to technological innovation), and technological problems related to the integration of the deployed systems.

In recent years, increasing research attention has been paid to information sharing across multiple government agencies found to be central to these problem solving strategies; in particular the role information and communication technologies (e.g. the Internet) [1]. This research regularly emphasizes that the effectiveness of inter-organizational information exchanges depends on the interplay of several technology and non-technology related factors—e.g. quality of the organizational and technological structures that support information sharing, policy environment, level of jurisdictional authority to promote integration and interoperation among agencies, among others [2-6].

However, despite the significant advances in knowledge about this phenomenon within the context of a single country, we still know little about the factors underlying inter-governmental collaboration across borders, in general, and even less about the borders of the three countries of North America. The shortage of research studying information sharing in the transnational context has also been discussed in a

analysis of the interactions of political, economic and cultural contexts and the information needs of cross-border interoperable systems is fully missing.

1.2 Information Sharing and the Borders of North America

Information sharing can be understood as "building systems, instituting formal standards, and changing business processes to allow organizations to share data and information with many other organizations" (p. 1) [5]. In the border regions of the three countries of North America, economic, political, cultural and social differences create a complex environment for collaboration and information sharing. Distinctive legislation, issues of sovereignty, language barriers, different working environments and conditions as well as unique policies regarding access to information are among a few of the many factors that contribute to this complexity [13-15]. To ensure that information can be effectively shared, governments require high levels of interoperability of policy, management and technology systems including standardization. Increasingly agreements between the countries make specific the kinds of information that will be shared and how that information will be used (See Table 1). Border control, as an example, is an area where much attention is paid to these issues both by practitioners and researchers.

The border control is complex and deeply institutional, and requires a high level of capability for information sharing. But capability for information sharing within border regions is also critical in a number of other policy domains such as public health and environmental management. In these domains information sharing and collaboration across borders in can be more complex due to the involvement of many more actors within the border regions. State or provincial governments are certainly involved, but so are local governments and other non-governmental organizations working at the local and state or provincial level.

Table 1. Selected areas of collaboration in two bi-national agreements in North America

Agreement	Areas	Description
U.S.-Canada Smart Border Action Plan	Biometric Information Collection, Storage and Processing	Develop common standards for biometrics, and adopt interoperable and compatible biometric technologies
	Refugee and Asylum Processing	Share information regarding refugee/asylum applicants
	Joint Passenger Analysis Unit	Cooperate on identifying potentially high-risk travelers
	Fingerprint Information Sharing	Exchange of fingerprint and criminal records information
	Integrated Border Enforcement Teams	Shared training and cooperation among border security and law enforcement agencies
U.S.-México Border Partnership Action Plan	Advance Passenger Information (API)	Establish a joint API system for US-México flights
	Visa Policy Consultations	Continue consultation on visa policies and visa screening procedures
	Compatible Databases	U.S.-México Border Partnership Action Plan
	Screening of Third-Country Nationals	Enhance cooperative efforts to detect, screen, and take appropriate measures to deal with potentially dangerous third-country nationals

Sources: Foreign Affairs and International Trade Canada
http://www.dfait-maeci.gc.ca/anti-terrorism/actionplan-en.asp and
U..S. Department of State
http://www.state.gov/p/wha/rls/fs/8909.htm

The focus of this paper is to integrate insights about the cross-border dimension with findings from studies of inter-governmental information sharing. Specifically, we draw on Brunet-Jailly's theory of borders [10] and extend it by incorporating an information and technology dimension. The extended theory joins the political, economic and cultural contexts as laid out in the Brunet-Jailly's conceptualization of borders with what is known about information needs of cross-border interoperable systems. This integration provides a robust foundation for the study of information sharing and collaboration

in border regions. Using this extended theory to explore the exchange of public information in border regions will broaden our understanding of the antecedents of information sharing in the transnational context and provides a framework for an examination of the factors important to the success of information sharing initiatives in those regions. Further, the new theory allows us to extend what is known about information sharing and collaboration in terms of cross-boundary contexts, in particular in country to country.

The paper is organized in four sections, including the foregoing introduction. Section two outlines the literature review approach used in the study followed by a summary of the findings of the review. Section three presents the extended framework. Final thoughts on the new framework are presented in the conclusion.

2. Information sharing and borders: What is known?

This section presents the results of our literature review and is organized in four sections. First, brief summary of our literature review process is presented. This is followed by a summary of the predominant theory of interest, Brunet-Jailly's theory of borders. Following this we present a review of studies about information sharing and borders. The last two sections highlight two of the most important topics found in the literature review; technological aspects of transnational information sharing and cross-border intergovernmental relations and agreements.

2.1. Finding relevant literature

An extensive review of the current literature was conducted to identify English-language theoretical and empirical research investigating the use of information technologies for information sharing, collaboration and interoperability in the border regions of North America. A systematic search of online library databases in the Social Sciences and Computer and Information Science areas (e.g. Academic Search Premier, ABI/Inform, ACM Digital Library, Web of Science, OmniFile, Emerald Databases, Academic Search Premier), proceedings of the major conferences in Information Science and e-Government (e.g. dg.o, HICSS, AMCIS, DEXA) and the e-government library compiled by the University of Washington (2,200 articles approx.) was performed.

The small amount of published research indicates that little has been done in the area of information sharing in the transnational context. Moreover, previous studies do not provide a formal approach

helping to understand the complexities that the cross border environment brings to information sharing initiatives.

Based on the insights gained from the analysis of the literature, this paper proposes a framework for an initial understanding of information sharing across border regions. Section Four presents the proposed framework and the results from the literature.

2.2. Brunet-Jailly's Border Theory

In this section, we present the theory of borders described in Brunet-Jailly's study [10]. We demonstrate how this theory can be adapted to include a new dimension on information sharing.

Border or frontier has been defined in different ways across several disciplinary perspectives (e.g. Geography, History, Political Science, Law, Public Policy, Economics, Psychology, Anthropology, Borderland Studies). For the purpose of this study, border is defined as the limit of territorial possessions of nations, countries or states [10]. Borders also delineate cultures, races, economies, and the boundary of governmental institutions that have sovereignty over a definite territory and population.

Adjacent border cities/towns or 'borderland communities' [10] share duties to each other in tackling cross-border issues ranging from migration to environmental issues. The integration of borders must be considered in terms of two directions of intergovernmental relations; the horizontal relations between similar government organizations (governance issue), and vertical relations which are seen as intergovernmental relations. This integration means that agencies from both sides of a border communicate with each other. A communication means an exchange of information, or a sharing of information, between agencies. However, the local political, social, cultural and economical environment of adjacent border towns can be a barrier to governmental collaboration and interactions (e.g. different institutional, human and technological capacity, drug and human trafficking, political instability) [40].

Brunet-Jailly developed a theory of borders to understand the complexities that the local environment in borderland regions pose to the interactions of multiple levels of government The theory of borders comprises four dimensions: 1) *Market forces and trade flows* that refers to the flows of good, people and investments across borders; 2) *Policy activities of multiple levels of governments on adjacent borders* which focus on the link that must be established between, in one hand, local, provincial, state, and central governments, and in the other hand, task specific public and private sector organizations; 3) *The*

particular political clout of borderland communities which focuses on the local civic and political organizations and individuals on the border. It includes the local level relations, local policy network, local policy communities, symbolic regime, and local border institutions; 4*) The specific culture of borderland communities* that refers to the sense of community, common language, religious and socio-economic background of a specific border region. Table 2 summarizes the four dimensions of this theory.

This theory provides a way for developing a model that delineates an offset of variables along the four dimensions described previously. These dimensions can be used to frame the analysis of borders at two levels: 1) agency, which refers to the activities of individuals and how their intentions, motivations, beliefs and values shape social life, and 2) structure that is understood as the social processes that frame and contain individual action.

Table 2. Theory of borders dimensions [10]

Dimension	Description
Market forces and trade flows	Flows of good, people and investments
Policy activities of multiple levels of governments on adjacent borders	Link that must be established between local, provincial, state, and central governments, and task specific public and private sector organizations
Political clout of borderland communities	Local civic and political organizations
Culture of borderland communities	Sense of community, common language, religious, and socio-economic background

This model provides space for agencies and structures to interact by assuming that each analytical dimension can work either at the structural or at the agency level. Each analytical dimension aims to capture how the relative power of structural forces such as market forces and trade flows in the Canadian-American borderland and of agents, vary across time, space, and according to specific political, geographic and cultural conditions. Each dimension provides a historically variable expression of agent power. So the core of the theory of border studies is "the implicit recognition that agency and structure are mutually influential and interrelated in the shaping of emerging and integrated borderlands" (p.644) [10].

The four dimensions of the theory of borders complement one another and characterize cross-border relations. For example, the 'market forces and trade flows' dimension can impact the way local agencies work together. That is, the dimension 'policy activities of multiple levels of government'. The more the flows exchanged in a specific border (e.g. goods, skills, labor) are important, the more border agencies interact with each other, and the more they need a legislation that facilitates their interactions, and vice-versa. The Cascadian regime in the Vancouver-Seattle region (U.S.-Canada border) is a clear example of how economic interdependence has led to greater trans-governmental relations, cooperation and collaboration between communities in both sides of the border (e.g. [41-42]).

Public policy activities can also impact the culture or social processes of borderland communities. International borders can delineate the political organization of nations; however, borderland communities can remain unified across borders by their ethnicity, language and/or religion [10]. For example, the border cities of San Diego and Tijuana in the U.S.-México border are characterized for cultural and economical differences. Nevertheless, local governments and civic organizations in the two sides of the border are creating partnerships to tackle common problems related to housing, migrant education, employment, public health, environmental issues (e.g. water supply), among others [44]. This manifestation of shared social capital has reinforced the sense of community in these two borderland cities, and created a regional cross border culture ultimately influencing the way local agencies or other structures (e.g. NGO's) work together and evolve over time. Thus, the culture of borderland communities can impact the 'cross border political clout'.

Finally, the political clout of border adjacent communities can influence the economical integration and of border regions. If border agencies, work in an appropriate way, with a legislation in place that facilitates their interaction and collaboration, then investors and people can choose this border as a point for trading or traveling. For example, the security measures implemented in the U.S. borders after the 9/11 can disrupt trade and commerce in the U.S.-México borders (e.g. long waiting times in the ports of entry in the Tijuana-San Diego region) [44].

In the next section, we present a review of the literature on information sharing and borders specifically to lay the foundation for how the border theory of Brunet-Jailly can be augmented by adding a dimension on information sharing.

2.2. Cross-boundary information sharing and interoperability

In recent years, increasing attention has been paid to the study of the role information and communication technologies play (e.g. the Internet) in supporting collaboration and information sharing across the boundaries of government agencies [1]. Most of the current research looks across the boundaries of governments within a single country, primarily in a comparative way. Some of this work, still only a small amount, focuses on transnational collaboration within the context of a single country. The research that is available has emphasized that the effectiveness of inter-organizational information exchanges depends on the interplay of several technology and non-technology related factors—e.g. quality of the organizational and technological structures that support information sharing, policy environment, level of jurisdictional authority to promote integration and interoperation among agencies, trust, governance structures, and leadership, among others [1-5, 16, 43].

However, despite advances in this area, we still know little about the factors underlying the inter-governmental collaborations that occur across borders. An analysis of relevant literature suggests that research in this domain is scarce and in its early stages of development. The shortage of works addressing interoperability and information sharing phenomena at the transnational level specifically has also been reported in recent studies [7].

In North America, research has focused primarily in the technical aspects of interoperability and information sharing. Studies describe the experiences of universities, government agencies and international organizations in the Unites States and some Latin American countries (e.g. Belize, Dominican Republic) in the creation of technologies and systems that support inter-governmental collaborations. For example, studies have identified some technical barriers in the integration of cross-border information systems such as incompatible infrastructures, heterogeneous communication networks, complex web of information systems, diverse database designs, and variable data quality [17-21]. In the European Union (EU), scholars have discussed the common interests and efforts of the EU members states in the standardization of processes and information for the delivery of cross-border public services to governments, citizens and enterprises (e.g. Interoperable Delivery of European e-Government Services Program) [22].

The policy aspects impacting cross-border intergovernmental initiatives have also been addressed in the literature. For example, research in the International Relations, Public Policy and Political Science fields suggests that issues such as diverging national agendas (e.g. homeland security, information technology policy), different legislation and regulation systems for accessing and sharing intelligence information (e.g. information privacy legislation, issues of sovereignty), financial and personnel constraints (e.g. budget limitations), cultural differences (e.g. language barriers, resistance to technological innovation) can impact interoperability and information sharing phenomena in the transnational context [14, 15, 23-30].

To date, however, there is no study providing an integrative perspective of the multidimensional aspects involved in the cross-border interactions of systems, processes, data, and relationships of multiple agencies of government. Previous research provides evidence of the interplay of several technical and non-technical variables (e.g. legal, jurisdictional, organizational, managerial, cost, technological) on inter-organizational collaboration among government agencies within a single country [1].

2.3. Technological aspects of transnational information sharing

Studies were found that describe the collaboration efforts between universities, government agencies and international organizations in the creation of technology tools for supporting the exchange of information across national borders. [17-21, 31, 32]. Fortes et al. [19] report the creation of a transnational information system (TIS) for detecting and monitoring activities related to illicit drug production, traffic and consumption across borders. This project is a collaboration effort between several universities, government agencies, and international organizations in the U.S., Dominican Republic and Belize. The authors argue that the transnational information system attempts to overcome barriers for information sharing such as: 1) incompatibility of information infrastructures and systems and 2) multilingual information. The TIS system has several features including: (1) a distributed system that allows intra- and inter-government agencies to share information; (2) an information system that manages and contains current information that is of interest for each agency and/or country, (3) a tool for translating sentences from English to Spanish and vice-versa (4) a conversational system for extracting information from spontaneous speech; maintains dialogue context and history; and builds database queries; and (5) a distributed system that provides distributed queries for information retrieval.

A second system found in the review for the creation of technologies for transnational information

sharing is in the Earth Sciences field. Gates et al. [20] describe the experience of a group of researchers in the development and the use of a technological infrastructure that facilitates information sharing of geophysical and geographical data stored in different formats and data structures, and that can be used for exchange of information across countries. The authors suggest the technological infrastructure, based on web-services techniques will facilitate the interoperation of incompatible computational resources and data.

2.4. Cross-border intergovernmental relations/agreement on information sharing

Several works in the literature address the issue of cross-border intergovernmental relations/agreement on information sharing. This research study is limited to the public policy implications of agreements that involve the collection and sharing of electronic information across the U.S.-México and U.S.-Canada borders. These works can be classified on issues addressing security [13, 15, 24, 33-37], transportation [37, 38], immigration [24], and commerce [15, 34-36].

Hosein [33] presents an analysis related to the collection of passenger information for the US-VISIT system (United States Visitor and Immigrant Status Indicator Technology). This analysis proposes that policy discourse and deliberation related to the protection of personal information needs to be informed by 1) International dynamics (e.g. different legal systems for the protection of data privacy, international responses to U.S. policies about passenger information sharing), 2) Regulatory dynamics (e.g. deliberation is not limited to governments and citizens. Non-state actors (carriers) also play an important role in the deliberation process), 3) Legal dynamics (conflicting laws between the U.S. and European Union (EU) about the treatment of passenger data, limitations in the use of data, periods of retention of data) and 4) Technological dynamics (understanding the role of technologies play in information protection help to make better policies).

Rudolph [24] provides a detailed description and analysis of two bilateral agreements between the US and Canada, and the U.S. and México: 1) the U.S.-Canada Smart Border Declaration (SBD), and 2) U.S.-México Border Partnership Action Plan (BPAP). SBD and BPAP involve themes of cooperation on areas related to: a) Secure flow of people (e.g. biometric identifiers, compatible immigration databases, refugee and asylum processing, permanent resident cards, visa policy coordination, , passenger information/passenger name record), b) Secure flow of goods (commercial processing , joint border facilities, customs data, in transit container targeting at seaports), c) Secure

infrastructure (intelligent transportation systems, critical infrastructure protection, aviation security), and d) Coordination and information sharing in the enforcement of these objectives (integrated border and marine enforcement teams, joint enforcement coordination, integrated intelligence, fingerprints, removal of deportees, counter terrorism legislation).

In Brunet-Jailly [13], border security policies are analyzed, particularly, the North American Smart Border Declaration. This study argues that after 9/11 there are two different models of security co-operation which have resulted in significantly different policy outcomes. Specifically, while the EU has implemented a relatively inexpensive border policy regime, the North American "smart border" model may have to amend in the long term because it is very expensive. As the evidence presented in this paper indicates, when states co-operate in security matters they are able to establish economies of scale. In North America, the Canadian and the U.S. governments dominate the key financial and regulatory decisions on security and they sign international agreements. They depend on local networks of public security agencies linking local and central governments and on cross-border security networks encompassing public and private security agencies. The partnerships networks cross the border and overlap, thus, rather than being able to redistribute resources on external borders, all governments must reinvest in border security policies. In the EU model, although member states still control the implementation of border security policies, they also co-operate and redistribute resources at the periphery in order to increase border surveillance and coordination. EU funds are used to finance and organize pan-European networks of security agencies, information sharing, and best practices and training for and coordination of common security activities. Costs are increasing but proportionally less when compared with those in North America.

In Brunet-Jailly [35], a comparison between cross-border relations under NAFTA in the Canadian-American border is conducted. This study is based on the cases of three Canadian-American border regions: Niagara-Niagara, Windsor-Detroit and Vancouver-Seattle. This comparison argues that economic integration in the U.S.-Canada border has not led to the creation of border policies or institutions for cooperation. On the contrary, economic development strategies cause communities to compete (for tourists and investors).

Finally, in Brunet-Jailly [10], a theory of borders based on the analysis of literature on borders, boundaries, frontiers, and borderland regions is proposed. However, this theory of border can be improved by adding an information sharing dimension.

As stated in this section, information sharing at borders is a challenging issue for governments and should be included in a border theory.

In the next section, we discuss the theory of borders in the context of this literature and present an extended framework including the information sharing dimension.

3. E-government, information sharing and interoperability at national borders: An extended framework

Brunet-Jailly [10] asserts that the interplay of all four analytical lenses, markets, policy, politics and culture is useful, both in time and space. At question is the utility of the level of generalization found in this theory to understanding the dynamics of information use and sharing in border regions. The foregoing sections have outlined the great importance of information sharing to the efforts of governments to move their programmatic and service agenda forward in non-traditional jurisdictions, i.e., globally and regionally. This focus has increased the criticality of understanding the influence of borders on the operations of government programs and services, in particular, in the sharing of information across boundaries as a key enabler to cross-boundary programs and services. The utility of this extension seems clear. However, it can be better illustrated through a brief discussion of the four components of cross-boundary information integration put forward in recent work [39]. These components represent the four core constructs comprised in this extension, since information sharing is the new element in our proposed theory and should be well understood.

Gil-Garcia, Pardo, and Burke [39] provide preliminary definitions of the four components of cross-boundary information sharing based on an extensive study of eight case studies of public health and public safety initiatives in the U.S. These components when considered as the core elements of the information and technology dimension extend the utility of the Brunet-Jailly theory of borders to the context of cross-border information sharing. Following, we briefly describe the four components, which cover both technical and social aspects.

1. **Trusted Social Networks.** Networks of social actors who know each other and trust each other.
2. **Shared Information.** Sharing of tacit and explicit knowledge in the form of formal documents, informal talks, e-mail messages, faxes, etc.
3. **Integrated Data.** Integration of data at the level of data element standards and/or industry/community data standards (e.g. XML).
4. **Interoperable Technical Infrastructure.** Systems that can communicate with each other at the hardware/operating system level.

The components provide a foundation for both research and practice discussions about cross-boundary information sharing and as a point of departure for seeking others as of yet undiscovered core components of this phenomenon. The four components, when integrated with the current border theory under the umbrella of information sharing, extend the utility of that theory to examine questions such as the relationship between divergent national policy agendas on the four components of cross-boundary information sharing (See Figure 1). For instance, for one country the social components (trusted social networks and shared information) may be more important than for other countries, in which interoperability is still a main challenge and, therefore, their goals in terms of information integration and sharing represent mostly technical aspects. It is clear that in practical terms all four dimensions are highly interdependent. However, disentangling these dimensions is necessary to provide researchers and practitioners with a better way to understand each of the components and to focus attention on them. For analytical and practical purposes, the separation of these four elements can lead to improved understanding of their interdependencies and related complexities. The consequences of this new understanding are likely to include more informed decisions about building interoperability, integrating data, sharing information, and fostering trusted social networks among relevant actors at border regions.

The extended framework can inform additional questions such as:

Q1. What region specific characteristics such as culture, policy environment, and language, are challenging the transnational inter-governmental information sharing found in the cases?
Q2. What mechanisms are being used to deal with these challenges?
Q3. What techniques are being used to integrate work processes of the agencies involved in cross-border collaboration and information sharing cases?
Q4. What information technologies are being adopted to facilitate the exchange of information across borders?
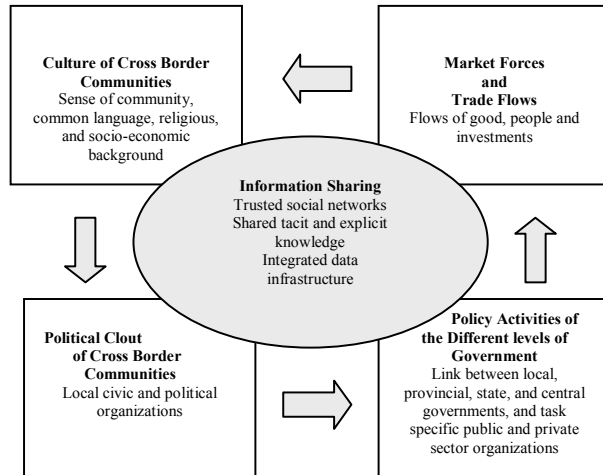
Figure 1. Extended theory of borders. Adapted from Brunet-Jailly [10]

The proposed framework can be used to examine the influence of a variety of contextual factors such as market forces and trade flows, policy activities of multiple governments on adjacent borders, and the political clout and culture of borderland communities on information sharing and collaboration initiatives.

4. Conclusion

Globalization and regionalization are drawing the attention of practitioners and scholars alike. Governments at all levels working within border regions borders, in particular, are finding it necessary to work together in new ways to leverage the benefits of working globally as well as regionally. Working together across boundaries and borders rests on sharing information. This paper has contributed an extended border theory that integrates current research in cross-boundary information sharing with widely accepted theory on borders. Future research is necessary to empirically test the utility of the proposed theory as a tool for understanding this new area of both practical and theoretical importance.

5. Acknowledgements

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