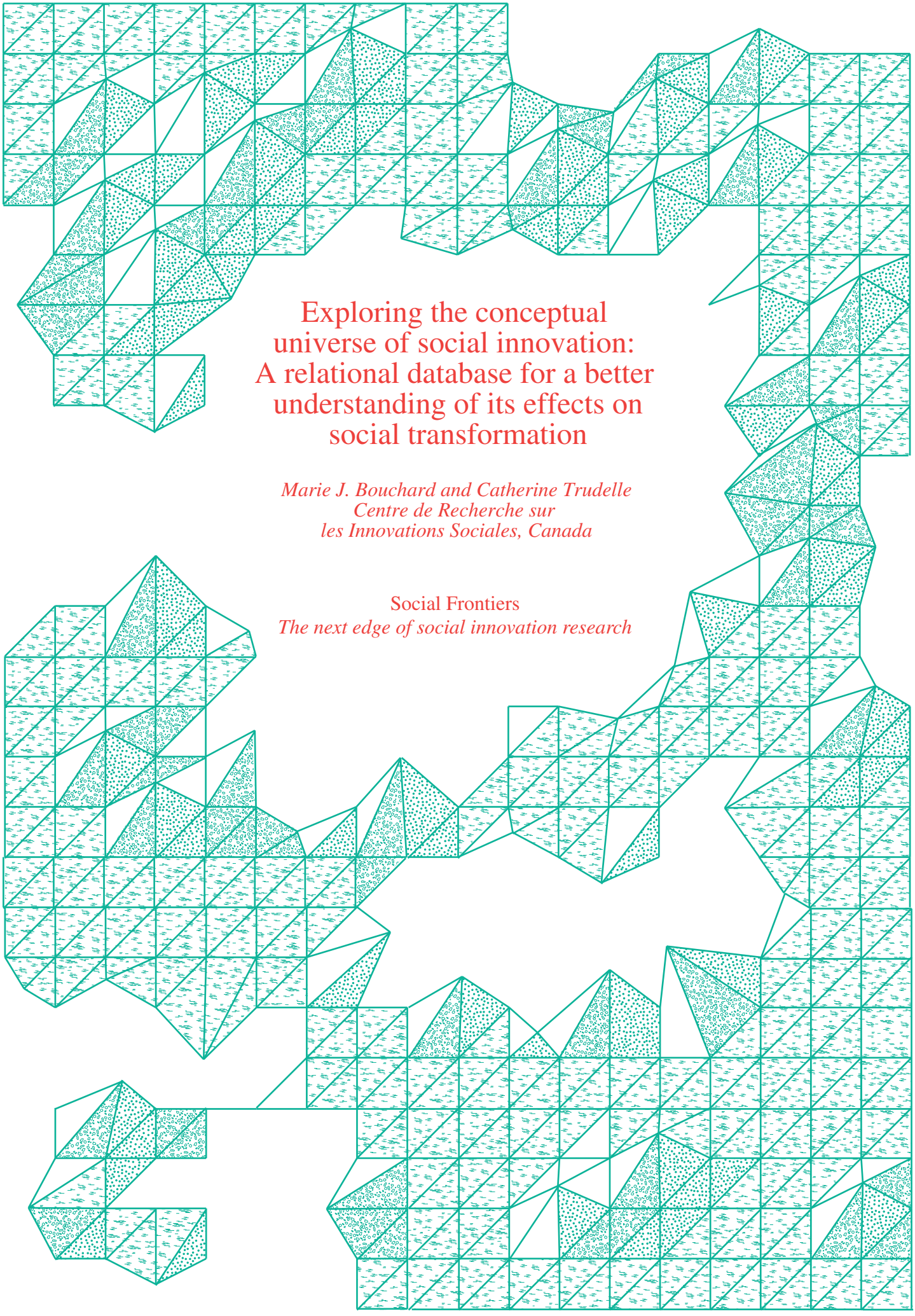

Exploring the conceptual universe of social innovation: A relational database for a better understanding of its effects on social transformation

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A Relational Database For a Better Understanding of the Impacts of Social Innovation on Social Transformation

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Abstract

Research on social innovation is generally conducted through case studies. This is explained by the unique character of innovations upon their emergence and by the fact that the concept of social innovation remains poorly codified. As a consequence, information on social innovation often remains isolated, restricting macro-sociological analysis of the social transformations that accompany these innovations, in addition to limiting the generalization of results. In order to fill this gap, the Centre de recherche sur les innovations sociales (CRISES) began in fall 2011 to build a database on social innovation. As a statistical observatory of more than 300 case studies conducted in Quebec, this database will enable the longitudinal, sectoral and spatial analysis of social innovation in this given regional context. Moreover, the project of building the database itself also constitutes an innovation. This paper addresses the challenges facing this innovation at the theoretical, methodological and epistemological levels.

1 Introduction: A database on social innovation

Research on social innovation is mainly carried out through case studies. This is due to the unique character of innovations, at least when they emerge, and the fact that the concept of social innovation is still poorly codified. A cross-analysis of many case studies can shed light on the links between different forms of social innovation and their configurations, evolution and distribution in time and space. However, the ultimate value of such an analysis is quickly exhausted due to the limited amount of information it can process in a qualitative way. Moreover, a cross-analysis fails to establish links between much of the data from case studies, which impedes knowledge building. This observation prompted a team of researchers from the Centre de recherche sur les innovations sociales (CRISES) to build a data warehouse—the CRISES Database on Social Innovations—dedicated to the analysis of data that has thus far been limited to the case method. The working hypothesis is that a quantitative analysis of a large number of cases will reveal aspects of social innovation that had not been observed to date while also informing about the relationship between social innovation and social transformation. The CRISES Database on Social Innovations will initially focus on an already existing body of research on social innovation that was produced in the Quebec context. However, the goal is to eventually expand the work to include other provinces and countries. To allow for this type of research, which requires multivariate statistical analyses of a large volume of information, the data warehouse must be able to offer flexible data storage options. This paper discusses the different stages of building a data warehouse based on case studies ($n \geq 300$) on social innovations, in particular those that emerged in a social economy context, conducted in the province of Quebec (Canada) over a period of 20 years (1986 to 2011). With a focus on the methodological, theoretical and epistemological challenges of such an undertaking, this paper also discusses the potential scientific contribution that such an initiative will provide to the study of social innovation and social transformation.

2 The formalization of a research field

2.1 The recognition and codification of social innovation through case studies

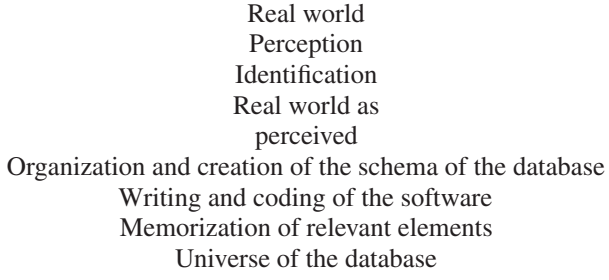
Social innovation is often the product of improvisation, serendipity and tacit knowledge acquired through experience (Bouchard 1999). In addition, most social innovations are not labeled as such. In that context, one of the primary functions of research is to identify and recognize these innovations, referred to as codification and formalization. For this task, the preferred methodology of CRISES researchers has been based, since the founding of the Centre in 1986, on case studies. Nevertheless, the methodology of case studies has certain limitations. First, case studies seek to understand a particular phenomenon occurring in a given context. In epistemological terms, this means that they generally follow an idiographic rather than nomographic perspective (Smith, Harré & Langenhove 1995, p. 159). Such an approach helps to understand the meaning of a specific phenomenon but is not intended to establish evidence or formulate general and causal laws on an object under study. For this reason, this methodology does not lend itself to the generalization of knowledge. Secondly, works conducted in a multidisciplinary research center such as CRISES reflect a diverse range of interests and theoretical stances (Tardif 2005). This calls for the formalization and systematization of the research results in order to advance knowledge. As a relational database compiled of source material from case studies, the CRISES Database on Social Innovations would serve as a complementary tool for creating new research opportunities and for overcoming, at least in part, these limitations.

2.2 The modeling of social innovation and the creation of a relational database

A database is a collection of data that is structured in a certain way, while a database model is what determines that structure. Among the most commonly used database models are the hierarchical, network, object and relational models. The CRISES Database on Social Innovations is based on the relational model, which allows to structure data in a way that formalizes the logical relations, or interdependencies, between the data.

As a general rule, relational databases are created according to a schema (Figure 1) (Flory & Laforest 2005, Meier 2006) that describes how we retain, or discard, information based on our overall perception of the real world.

Figure 1. Schema for a relational database



Source: Flory and Laforest (2005, p. 6)

The creation of a relational database proceeds in three stages of modeling: conceptual, logical and physical. The first stage, laying the foundation of the overall process, is the creation of the conceptual model, or schema, for the formal and systematic organization of data.[1] It also involves the defining of entities, or core concepts, used to describe phenomena related to social innovation. In the subsequent stage of creating the logical model, these entities are then operationalized through a series of attributes, in turn allowing to retrieve data from the case studies and to organize them into logical relations (see Appendix 1). The third stage constists of the actual programming of the database into a physical model. In addition, the creation of a relational database is an iterative process in which changes made at a later stage, such as during the development of the logical model, may lead to a revision of work done at an earlier stage, such as during the building of the conceptual model (Mata-Toledo & Cushman 2002, p. 257). In the case of CRISES, the conceptual modeling led to the creation of a thesaurus compiling some 59 entities of 3 to 14 attributes each, all of which are linked together through relations. In fact, relation is the basic concept of the relational model and represents the association of elements from the real world. The logical relations are based on relational algebra and allow to perform detailed mathematical calculations.

For the CRISES Database on Social Innovations, given that it is based on case studies that have already been conducted, the design methodology differs slightly (Figure 2). More specifically, the conceptual model here is deduced from theory in addition to being induced from empirical data. Eight steps mark the process of building the relational database model on social innovations.

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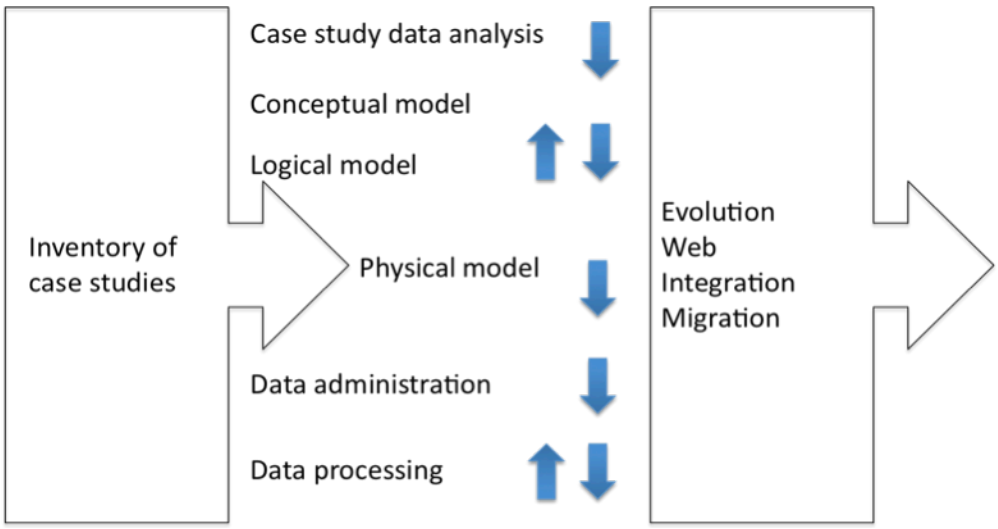
1 The work of formalization must comply with the main methodological principles, which are the relevance and the operationalization principle (Flory & Laforest 2005, Meier 2006).

Figure 2: Steps for building the relational database on social innovation



2.3 From qualitative data to quantitative analysis

The formalization allows for the transformation of qualitative data, which are textual in the case studies, into quantifiable data (i.e., nominal, ordinal, interval or ratio) that can then be subjected to statistical analyses. Thus, the database can perform multi-dimensional comparative analyses on social innovation using both descriptive and explanatory statistical methods.

For example, the CRISES Database on Social Innovations will allow to measure innovation from three spatial-temporal components, namely location, time and theme (Sinton 1978). To study a phenomenon, we fix one of these components, vary the second one in a controlled manner and measure the third (Figure 3). Given the structural framework of the data, the relational data model allows to perform quantitative analyses than can capture all of these types of profiles. Multidimensional comparative analysis opens the possibility to study social innovation in a systematic way and to spot or confirm trends that were difficult to identify using the case method. However, the results generated by this systematic quantitative analysis may also be counter-intuitive or run counter to prevailing ideas in the field of social innovation and social transformation.

Figure 3. Sinton matrix. Possible types of analyses from a relational database with spatial reference.

Loci/places Themes Times *Spatio-temporal profile*	Time	Theme	Profile
Fixed	Controlled	Measured	*Longitudinal*
Controlled	Fixed	Measured	*Transversal*
Controlled	Measured	Fixed	*Temporal*
Measured	Controlled	Fixed	*Spatial*
Fixed	Measured	Controlled	*Historical*
Measured	Fixed	Controlled	*Regional*

Source: Sinton, 1978

3 The challenges of database design

3.1 The theoretical, methodological and epistemological challenges of building the relational database

In the process of building the CRISES Database on Social Innovation, the conceptual approach to social innovation at CRISES became more rigorous and in-depth (Bélanger & Lévesque 1992; Favreau & Lévesque 1995; Favreau 1995; Lapointe 2000a, 2000b; Comeau et al. 2001; Klein et al. 2011; Bouchard & Lévesque 2011). For example, given the nature of the sources—namely case studies based on non-probabilistic sampling and not designed for integration into a database—a hybrid approach that was both inductive and deductive was adopted to identify, define and operationalize the key concepts relevant to the study of social innovation. This approach allows to base the conceptual model on theories mobilized in the framework of CRISES research (deductive approach) and to delimit the data that is effectively provided by the case studies (inductive approach). This approach raises the challenge of building, a posteriori, a coherent conceptual model. Despite their convergence and complementarity, the conceptual tools used in CRISES studies had not been fully integrated into a common framework (Tardif 2005). Building the conceptual model of the database thus strengthens this theoretical integration. Nevertheless, many challenges remain with regard to the definition of concepts and their operationalization using attributes allowing to retrieve and correlate data from case studies.

One of the difficulties is the polysemic nature of certain concepts, including the phenomenon that variability of meaning depending on context is assumed. Some concepts, such as social innovation or social economy, still have a poor theoretical basis. Research has also advanced conceptually, such as by developing the notion of *regressive* social innovation, which emerged more recently in some CRISES work. Other concepts are polytheorized, such as the concept of *governance*, used both in the standard economic and financial approaches as well as institutional sociology and social geography. Here as well, more recent studies have contributed different meanings of the concept (Cornforth 2005, Bernier, Bouchard & Lévesque 2006). One impact of the creation of a relational database is the clarification of the scope and limits of the conceptual field of CRISES.

A further task concerns determining the relationships between the concepts such that these are clear and unambiguous. Here, some concepts may have some degree of redundancy, albeit without lending themselves to be classified into categories and subcategories. For example, the concept of *partnership* could be synonymous with the concept of *network* in the case of public policy networks that involve the participation of civil society organizations in the delivery or co-production of services (White et al. 1992). However, *partnership* may also be a conceived of as a system of governance for a territory or sector that engages government and non-governmental actors in the co-design and co-construction of public policies, or alternatively as hierarchical, community-based, corporate or competitive types of governance systems (Enjolras 2008). Some concepts may also appear as sub-categories of more than one concept (or category). Thus, a *network* might be a form of organization (e.g., the Desjardins Movement, a large cooperative federation) or a form of governance (distributed power networks).

Choices must therefore be made such that the conceptual model permits a continuous and coherent analysis of the data without a critical loss of their analytical significance. Finally, each of the notions must be described with attributes that are sufficiently accurate to be unambiguously identifiable in the data, as well as mutually exclusive so that their classification is done uniformly, irrespective of the person who codified. This requires specifying the concrete factual and observable dimensions of the mobilized concepts rather than attributing them to a single concept. For example, when codifying "triggers of social innovation," one may choose to group problems that were perceived or experienced at a collective level (e.g., devitalization of a territory or the high school dropout rate) into the "problems" category; problems experienced by people (such as need for housing or employment) into the "needs" category; and wishes for change at the values scale (such as self-management), self-realization (empowerment) or social demands (e.g., justice or fairness) into the "aspiration" category. These choices must be coherent throughout the operationalization of the database and comply with the principle of relevance, calling for coherence with the original nature of the material analyzed, of the case studies.

While the work of creating the CRISES Database on Social Innovation is not yet completed, it is already clear that this approach will have an impact on the renewal of the conceptual, analytical and programmatic framework of CRISES, not only by clarifying and refining it but also by expanding its analytical potential.

The database also has limitations that must be taken into account. The first concerns the source of the data. The case studies were conducted according to analytical frameworks that, although sharing a common basis, often varied from one research team to another or evolved over time. As we have indicated, the conceptual model of the database reflects the many meanings and notions associated with nature of social innovation (such as "new governance") as well as the evolution of the overall analytical framework (the crisis as seen in the 1980s compared to how it is interpreted today). A second limitation concerns the fact that the data, largely based on interviews and organizational document analysis, has already been filtered and codified by researchers. In other words, the database on social innovations is populated with "real world" data that have been selected and filtered on the basis of a specific research object. The counterpart is that this systematic data analysis reveals the subtle evolution of the CRISES research program since its creation in the 1980s. That said, the CRISES research program does give way to a coherent set of analysis tools that allow studying social innovation in a variety of cases (manufacturing companies, social economy, public policy networks, etc.). In addition, the majority of case studies realized by CRISES are based on a non-probabilistic sampling of social innovation. Essentially, the samples are composed of a series of non-random samples based on criteria that vary depending on the research program. Given this limitation, care must be taken in interpreting the comparative analyses, the results of which cannot be generalized to all social innovations produced in Quebec. However, this does not detract from the ability of comparative analyses to identify trends, which, as spatial, temporal or sector phenomena, could not be detected otherwise. The comparative analyses will allow to build typologies, possibly even models, and to test them with a hypothetical-deductive method. In this way, the generalizability of results is increased relative to the case method.

4 Potential contributions: from micro to meso and macro

Research studies realized by CRISES are inspired by different approaches to social innovation that highlight organizational (Schumpeter 1932), institutional (North 1992, Scott 1995) and governance-related (Enjolras 2008) innovations; national systems (Freeman 1991, Lundvall 1992, Nelson 1993) and innovation regimes (Nelson & Winter 1982); as well as social entrepreneurs (Caulier-Grice et al. 2010, Young 1983) and social enterprises (Defourny & Nyssens 2013), in particular within social (Vienney 1994) and solidarity-based (Laville 1994) economies. Moreover, innovations are qualified as social based on their purpose (responding to aspirations and to social, cultural territorial needs), their processes (new social relations, new combinations) and their reach (having been taken up within institutions). Lastly, studies conducted by CRISES on social innovations are correlated to development paths or paradigms. In other words, social innovation is conceived of with the view toward social transformation (Klein et al. 2013).

According to the CRISES approach, social innovations and social transformations take shape along three dimensions—method of organization, institutional form and social relationships—by way of which the three levels of analysis—macro, micro and meso—are correlated, with macro pertaining to social structures and regulations; micro to social agency, identity rationales and action; and meso to organization and networks.

These three dimensions are usually analyzed in a contingent manner, with social innovation (micro or meso) being driven by social movements in times of crisis (macro) in a given territorial, sectoral and historical context (meso or macro). The CRISES case studies have indeed been conducted mainly at the local level on organizations that implement innovations. According to Tardif (2005, p. 25), the approach is based on the notion of the emergence of social innovations

> as a localized process initiated by different actors who seek to change the interactions taking place between themselves as well as with their organizational and institutional environment—the whole with the aim to counteract the impact of crises while attempting to reconcile the different levels of individual interest, public interest and common good. [translation]

The statistical analysis of data will allow passing from a micro to a meso and macro approach of social innovation. The assumption is that there are objects of study of relevance for social innovation that are not observable at the micro scale. At the meso level of analysis, such a database will allow for a new reading of social innovations in terms of the mechanisms, configurations, evolution and modes of dissemination in time and across locations and sectors of activity. The approach will moreover allow to focus on phenomena hitherto little studied in the Quebec context, such as

the emergence and dissemination of innovation clusters, including their patterns and paths of institutionalization or even their configuration into an innovation system, and to examine their impacts on social transformation, in particular with regard to the Quebec development model. This framework, once applied to Quebec, may be extended to other areas in order to conduct international comparisons. There are indeed times and territories where social innovations tend to multiply, taking the form of innovation clusters, especially at the onset of crises or in economies with plural tendencies (Klein et al. 2013). Innovations are then oriented along emerging socio-technical paradigms, such as new representations of problems and possible solutions or experiments that were successfully carried out in organizations and local communities. For example, during the 1980s and 1990s in Quebec, when the crisis of Fordism and the welfare state became apparent, social innovations arose in the areas of labor, people services and local development (the three areas of CRISES). The CRISES Database on Social Innovations will here allow to trace the dynamics of the emergence of these innovations as well as their spread into clusters and impacts on society. For example, we might study the proximity effect, which is a phenomenon that promotes collective dynamics with the potential to modulate or reject the dominant forms of social control or even to propose innovative institutional solutions for a given organization, industry or territory (Gilly & Pecqueur 1995).

The database will also allow to study the processes leading to the institutionalization of social innovations. These issues have been addressed through various approaches, including institutionalist and neo-institutionalist theories, theories of regulation as well as economic sociology inspired by theories of conventions and social movements. The idea of an innovation system draws from the institutionalist approach to building national and regional innovation systems (see Lundvall 1992). The neo-institutionalist approach places emphasis on the effects of dependencies that limit institutional changes (path dependency), explaining institutionalization as adaptation and diffusion (Nelson & Winter 1982, 2002; Schumpeter 1932; Porter 1990). However, the notion of dependency can be complemented by that of path building, or community path, which refers to the ability of collective actors to break up the regulatory framework in order to create a new one. Path building also reveals how social innovations can serve as tools for social transformation (Klein et al. 2013, p. 382; Fontan et al. 2008). Theories of regulation, for their part, have insisted on the deterministic relation between institutions and innovations at the organizational level, albeit characterizing institutions as historical and political organizations that result from contingent conflicts between social actors (Aglietta 1990, Boyer 1986). The theories on social movements have taken into account the effects of institutions on collective mobilization and conflict. Among these are the political opportunity structure (McAdam 1982), the repertoire of collective action (Tilly 1976, 1986), the agency of social actors and actionalist approaches (Touraine 1996, Mellucci 1985) and the resource mobilization theory (McCarthy & Zald 1973). Finally, theories on conventions have studied the dynamics of building compromises that lead to the institutionalization of innovations (Boltanski & Chiapello 1999, Boltanski & Thévenot 1991). These theoretical approaches thereby offer a variety of explanations of the institutionalization process of social innovations, ranging from adaptation to institutional constraints, changes in the face of conflict dynamics, to the compromises between actors on the basis of conventions. The statistical analysis of a large amount of data will reveal patterns in the processes of institutionalizing innovations and the relationships between these patterns and different governance regimes.

Finally, at the macro-analytical level, the relations maintained by social innovation with the Quebec development model can be examined. This would lead to a more in-depth understanding of the characteristics of the Quebec development model, including its evolution over time, as well as the effects of social innovations on social transformation. Social innovation could even be examined with regard to its possible capacity to influence or transform the development model itself, and conversely, the effects of such a modified model on social innovation. Moreover, this approach would allow to characterize the Quebec development model based on the concept of a "national system of innovation" (Lundvall 1992, Nelson 1993), whereby Quebec innovation would be portrayed by its modes of governance, some being partnership-based, its inclusion of civil society in the co-construction and implementation of public policies, and the establishment of a plural economy (Klein et al. 2013). It would also be possible to study regional innovation systems in the context of smaller territories or sector-based innovation systems (Lévesque 2011).

4.1 Questions and future avenues of research

Here a few examples of research questions that can be addressed by the CRISES Database on Social Innovation :

- To what extent does the state institutional framework influence the means—collective action and social innovations—used by organizations to respond to the needs and aspirations? An answer to this question might be found in the analysis, for a given territorial context, of the relationships between a) the legal and regulatory framework in which organizations operate, b) the public policies and government programs that apply to the organizations, and c) the factors of emergence, in particular the needs and aspirations, of the collective action and social innovation.

- How does geographic proximity influence the development of social innovation clusters and which sectors of activity are the most conducive to the development of social innovation clusters?

- To what extent do the different types of interactions between organizations have an influence on the development of certain types of social innovation? This pertains to the question of networking between organizations, and network analysis calls for a spatio-temporal analysis of data. More concretely, the composition and structure of networks, as manifested in interactions, can be studied by means of the graph theory and associated analytical methods. In fact, graphs are the most widely used theoretical tool for modeling and identification of properties of structured sets (Beauquier et al. 1992). They are essential to anyone wishing to study and represent a set of links between elements of a finite set of objects (Xuong 1992). In the CRISES Database on Social Innovations, a detailed analysis of networks of organizations will be realized on the basis of spatio-temporal measurements of the density, eccentricity and centrality of these networks. The characteristics of organizations and interactions (relations) will serve as discriminating factors for providing a better understanding of certain types of social innovations.

Thus, by expanding the level of analysis and by allowing for comparative analyses, the database can strengthen and build the existing links between social innovation and social transformation. In this way, it will allow for a thorough examination of a central assumption of CRISES, namely that room for innovation and experimentation widens when the macro-social regulations (market, state, collective agreements) are shaken. In such a context, micro-systems can serve as places from which to identify the processes in which new social patterns emerge. By building clusters (Schumpeter 1932, Porter 1990) and by institutionalizing along different logics, they can form systems and eventually shape new national trajectories of growth (Hollingsworth & Boyer 1997, Strange 1996, Crouch & Streeck 1996).

5 Conclusion

In summary, the project of developing a database on social innovation and on the Quebec development model was prompted by the limitations of the case method in terms of the systematization and generalization of the knowledge produced on social innovation at the micro-analytical level, in particular concerning the local emergence of innovations within organizations.
At the methodological level, the purpose of building the relational database is to allow the transformation of qualitative data on social innovation into quantifiable data, in one information system, in order to facilitate the structuring and management of a large volume of data and the creation of multiple data sets. The systematic and formal organization of data allows for rigorous multidimensional and comparative statistical analyses and, therefore, enhances the generalizability of results. The implementation of such an approach at CRISES calls for a more in-depth conceptual examination, if not a re-conceptualization, of social innovation in order to expand the scope of study to new objects. The transition to a meso-level of analysis would allow studying social innovation phenomena that are in the process of emerging or spreading, particularly in the form of clusters, alongside their institutionalization in the context of differentiated governance regimes. Finally, the expansion of analysis to the macro-level would allow to explore social innovation systems, be they regional, sectoral or national, and thereby the impact of innovations on the social transformations of the Quebec model of development.

In closing, we should also mention three epistemological issues raised by the development of the CRISES Database on Social Innovations, which relate to the nature, validity and interpretation of data. The case studies are mainly based on qualitative research methods that take into account the (inter)subjective interpretation of the phenomena under study (Anadon 2007). This is reflected in the predominance given to the interviews as a way to learning about the point of view of the interviewees. To overcome this limitation, the proposed database is designed to allow to transition to the quantitative analysis of data, namely by reducing and formalizing the information. Yet, how can it be ensured that their intended meaning does not get lost in the process? On the other hand, the creation of a database of case studies raises the question of the triple interpretation of data: that of the interviewees who provided the information to the researchers conducting the case studies; that of the researchers who collected, organized, analyzed and published the data; and the interpretation of the team of researchers who re-conceptualized and organized the information from the case studies for the creation of the database. Given these multiple interpretations, what reading might we give of the results of the comparative analyses generated by the database? Finally, faced with these multiple levels of interpretation, how can we prevent the codification of normative evaluations, in other words, those comprising value judgments rather than facts?

Nonetheless, the case studies all have a common purpose, social innovation. Moreover, the three or four data collection templates used share many common concepts and dimensions of analysis. The case studies concerned observations that were relatively limited in time (30 years) and space (Quebec). A number of contextual (institutional, demographic, socio-political, etc.) variables are therefore common to many of them. In short, the many case studies realized by CRISES constitute a source of knowledge and information that has been underutilized to date. Aside from representing a unique opportunity for research of its kind, the project to create a relational database requires formalizing the conceptual framework of social innovation and to advance the theoretical analysis underlying our work.

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Annexe 1 Simplifed model of the CRISES relational database on social innovations (provisional)

The following diagram shows a simplified view of the relational database model on social innovations, as developed so far. It is therefore a provisional model. The diagram takes up the basic concepts of the social innovation database (see Figure 2) and organizes them so as to structure the information in a relational manner. The model allows to operationalize the entities, or concepts and ideas (titles in the boxes), by defining their attributes (itemized elements below the titles in the boxes) that will be documented on the basis of the data gathered in the case studies. In addition, the model will allow to structure the logic relationships (represented by the circles) between the entities.