Understanding Interorganizational Collaboration:

The Intergroup Relational Identity Perspective

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Abstract

Research suggests that productive interorganizational (or intergroup) collaboration is not self-evident, particularly when it involves significant changes in work processes. This paper uses the intergroup relational identity theory as a guide to explain how this collaboration unfolds. Using a qualitative, inductive approach, we conducted two field studies (one in Finland, the other in Quebec) to compare and contrast the very different appropriation of an interorganizational system within the Architecture, Engineering and Construction (AEC) industry, known as BIM (Building Information Modeling). We leverage this data and theory to suggest a conceptual framework identifying sources of influence to intergroup performance. Specifically, we highlight the role of IT affordances, meso drivers, and macro drivers on intergroup relational identity, and in turn, on intergroup performance.

Keyword: Intergroup relational identity, interorganizational system, interorganizational collaboration, building information modeling.

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Abstract

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Introduction

Interorganizational systems are information and communication technology-based systems that transcend organizational boundaries (Kumar & van Dissel, 1996). Their transboundary nature often requires a high level of collaboration and commitment toward a shared goal. However, effective and productive interorganizational collaboration is not self-evident (Hogg, Van Knippenberg, & Rast, 2012), particularly when it involves significant changes in business processes or affects the business model. Such tensions may induce organizations (or groups[1]) to limit their implication in a common project, or emphasize their own objectives rather than the overarching (i.e., interorganizational or intergroup) one.

In the information systems (IS) literature, researchers focusing on interorganizational systems have developed numerous theoretical arguments to explain the effectiveness of interorganizational collaboration. Such accounts include conflict (Kumar & van Dissel, 1996), trust (Zolin, Hinds, Fruchter, & Levitt, 2004), culture (Yu-Ting Caisy & Nguyen, 2008), structure (Thomas & Bostrom, 2010), control (Gallivan & Depledge, 2003), roles (Hong, 2002) and decision making (Premkumar & Ramamurthy, 1995). However, despite the wealth of research on interorganizational collaboration, no IS research to date, to our knowledge, has adopted an identity perspective in the examination of intergroup performance in IT-based, distributed projects. Yet, this is significant for two reasons.

Firstly, IS scholars have acknowledged that the concept of identity, either at the individual, the group, or the organizational level, is a powerful means to explore and explain a range of social and organizational phenomena (Boudreau, Serrano, & Larson, 2014; Carter, 2015; Stein, Galliers, & Markus, 2012; Whitley, Gal, & Kjaergaard, 2014). The context of interorganizational collaboration is no exception; as workplaces become more globalized and diverse, interorganizational information systems are increasingly being used, and it is important to uncover how identity may promote (or hinder) their usage. Secondly, there is a growing body of research in management and social-psychology that focuses on the study of collaboration and intergroup dynamics (e.g. Murase, Carter, DeChurch, & Marks, 2014; Thomas, Martin, & Riggio, 2013). Within this research, an emerging stream is considering identity as a potent force in understanding intergroup collaboration (e.g. Hogg, 2015; Ibarra, Wittman, Petriglieri, & Day, 2014; Pittinsky, 2010). For the IS community, this body

[1] In the context of this paper, intergroup and interorganizational are considered similar.

of knowledge is an opportunity as it can provide a standing point to examine IT-based intergroup performance from an identity perspective.

For this research, Hogg's (2015) ground-breaking work introducing *intergroup relational identity* is of a particular interest as it considers *collaboration* as a key component of a specific group self-defining attributes (Hogg et al., 2012). Intergroup relational identity revolves around the collaborative relationship. While maintaining the distinctiveness of every group, *intergroup relational identity* typically defines a group in terms of its relationship with one or more other groups. If it is established, it is conducive to intergroup performance (Hogg et al., 2012).

With these considerations in mind, the overall objective of this research is to develop an understanding of collaboration in interorganizational systems from an intergroup relational identity perspective. Particularly, the study aims to address the following research question: *What influence the enactment of intergroup relational identity, which in turn enables intergroup performance?*

To answer this question, we consider interorganizational collaboration in the Architecture, Engineering and Construction (AEC) industry. Indeed, a wind of change is blowing through the AEC world, as stakeholders are increasingly required to use interorganizational systems termed *Building Information Modeling* (BIM). BIM, as we will explain later, is particularly appropriate to study because it changes the nature of work relationships between project participants and requires tight collaboration between them, from the early design until the project handover (Sebastian, 2011).

To investigate intergroup collaborations within a BIM context, and ultimately develop an understanding of the influences on intergroup relational identity and how it accounts for intergroup performance, we conduct field studies in two geopolitical areas that have had a vastly different experience with BIM. On the one hand, Finland was considered, as it has been particularly successful, country-wide, at leveraging the capabilities of BIM. On the other hand, Quebec was the other area considered, as most projects initiated over there have been challenged in terms of reaping the expected benefits from BIM. At both locations, we interviewed professionals involved in BIM projects, and have started coding and analyzing this data. As data collection is still in progress, this paper presents preliminary findings.

This paper is structured as follows. In the next section, we present relevant literature on interorganizational systems and discuss the novel concept of Intergroup Relational Identity. Then, we present our research method and share our preliminary results, which we represent in a conceptual framework. We later discuss these result, highlight this work's contribution, and discuss limitations and future work.

Theoretical Background

Interorganizational System

Simply defined, an interorganizational system (IOS) is a single system used collaboratively by two or more organizations; such a system is designed to join business processes, share a common database, and facilitate communications between partners. As organizations become increasing global, they have leveraged many IOS, such as EDI (Premkumar G., Ramamurthy, & Crum, 1997), Rosettanet-based systems (Venkatesh & Bala, 2012) and supply chain management systems (Zhang, Xue, & Dhaliwal, 2016). Constructions projects are also known to frequently rely on IOS because they involve multiple business partners with different business processes (Samuelson & Björk, 2013). IOS typically have profound effects on the processes underlying the relationships among partners, and often necessitate the reengineering of interorganizational business processes (Kambil & Short, 1994). Although they are promising of many positive outcomes, they are also rather disruptive in terms of their impacts on work processes and relationships between partners.

Research on IOS started in the early 80's, with the seminal work of Barret and Konsynski (1982). Since then, scholars have provided integrative assessments (e.g. Robey, Im, & Wareham, 2008; Saeed, Malhotra, & Grover, 2011) and frameworks (e.g. Bouchbout & Alimazighi, 2008; Chatterjee & Ravichandran, 2004) to take stock at the literature on these systems and suggest further work. These integrative works point to the importance of better understanding the specifics of the technological context related to IOS. Robey and colleagues go even further, suggesting for IOS researchers to engage with technology artifacts at a greater level. They assessed that in most IOS research, the IT artifact seems to possess "no material characteristics that differentiate it from any other innovation" (Robey et al., 2008). Accordingly, they challenge IOS researchers to develop theories that are more compatible with technologies in the post-EDI era (which are no longer the state of the art in IOS research).

Most IOS are implemented to facilitate collaboration (Kumar & van Dissel, 1996; Volkoff & Chan, 1999). Collaboration, and the mutually promotive relationship between groups, is at the core of a new theoretical lens called "intergroup relational identity" (Hogg, 2015; Hogg et al., 2012). Intergroup performance, it is argued and later supported in this research, rests on the establishment of an intergroup relational identity among the groups involved in the common use of an IOS.

Intergroup Relational Identity

Identity is the set of meanings that define who one is as a person, as a role occupant, or as a group member (Burke, 2000). At the group level, a rich vein of scholarship examines identity dynamics through the lens of *social identity theory* (SIT). This theory posits that individuals define themselves in terms of salient group membership (Tajfel & Turner, 1985). That is, people derive positive self-esteem viewing themselves as part of an in-group (us) in opposition to an out-group (them) (Billig & Tajfel, 1973). Although it proved to be valuable to explain social processes such as conflict, discrimination and competition, social identity theory remains somewhat silent on how to bring groups of people together toward a shared goal (Hogg, 2015; Hogg et al., 2012; Richter, West, Vvan Dick, & Dawson, 2006). Making an emphasis on a divided world (i.e., "us" versus "them") poses the challenge, as argued by Hogg (2015), to bridge intergroup differences in order to build cooperation and collaboration among members of different groups in the service of a single purpose.

To capture how groups may define their identity, not only in terms of their group membership but also in terms of their relationship with another group (or groups), Hogg (2015) proposes the *intergroup relational identity* theory. According to him, intergroup relational identity is a "self-definition in terms of one's group membership that incorporates the group's relationship with an outgroup as part of the in-group's identity. It entails a sense of identity that includes, or is defined by, the collaborative relationship existing with the other group and contributing to and promoting the overarching collective" (Hogg, 2015, p. 200). To put it differently, an intergroup relational identity revolves essentially around a collaborative relationship. It allows groups to maintain their distinctiveness while extending their identity to the intergroup relationships. This type of identity is less bound to a specific group but generally portrays the group as one that builds valued collaborative relationships with other groups in the pursuit of a common objective. Thus, effective intergroup performance rests on the establishment of an intergroup relational identity (Hogg et al., 2012).

In like manner, as most IOS are implemented to facilitate interorganizational performance (Kumar & van Dissel, 1996; Volkoff & Chan, 1999), effective collaborative performance is, in essence, bounded to the ability of groups to develop a more general sense of identity to include collaborative relationships with other groups. However, how to achieve intergroup relational identity in the context of a new IOS remains an unanswered question, which we seek to address in this paper.

Research Method

In this section, we present our research approach, detailing data collection, coding, and analysis. But first, we provide a succinct overview of the type of IOS at the core of our empirical work, i.e., Building Information Modeling (BIM) systems.

Building Information Modeling

Construction projects, particularly large ones, require extensive cooperation among organizations, with wide-ranging professional backgrounds and technical expertise (Gal, Jensen, & Lyytinen, 2014). To work together, AEC organizations have traditionally used spreadsheets, 2D and 3D drawings which have been long considered as building blocks of the information system. But in the last few years, the industry market has shown a growing interest for BIM technologies (*Building Information Modelling*). BIM is a modeling technology and a set of associated processes that allow architects, designers and builders to visually create, analyze, and share building models (Azhar, 2011). The digital representation of the building helps the project's stakeholders to make better decisions and improve the process of delivering the facility (Eastman, Teicholz, Sacks, & Liston, 2011) . However, the transition to BIM is not a systematic progression from pencil-based and computer-aided drafting techniques. BIM rather necessitates a dramatic shift into how building drawings and visualizations are created and alters the key processes of putting a building together; through BIM, fragmented tasks are integrated to allow for a collaborative work process (Eastman et al., 2011).

While some countries have been reaping great benefits associated with BIM, others have struggled with this technology, and for them, BIM based collaboration is more utopia than reality. Examining

IT-based intergroup collaboration in two contrasting settings offers a fertile ground to study the role of Intergroup Relational Identity, and we thus elected to conduct two field studies embodying this contrast. The first setting is the AEC industry in Finland and the second is in Quebec. In Finland, the AEC industry is considered as world leader in BIM adoption and use. In Quebec, AEC organizations are not succeeding with BIM despite the fact that they master the knowledge related to construction project management (Forgues & Staub-French, 2011).

Data Collection

To obtain a rich, contextualized understanding of interorganizational collaboration in these two contrasting settings, we interviewed 30 professionals working in the AEC sector: 18 in Finland (interviews were conducted in March, 2015), and 12 in Quebec (from June to October 2015). While data collection is still in progress, our sample is broad and diverse enough to gain some insights. Our informants were mainly BIM managers, architects, contractors and owners (see Table 1). We used a semi-structured interview guide with open-ended questions (Myers & Newman, 2007) (See Appendix). Interviews were all recorded and transcribed verbatim, so that the raw data could be systematically coded and analyzed. Interviews ranged for 1 to 1.5 hours, with an average duration of one hour. Transcription of these interviews resulted in 381 pages of text, which were coded with the help of a qualitative data analysis software.

Table 1. Respondents

Respondents	**Finland**	**Quebec**
Project Manager	6	5
CIO	-	2
Architects	3	-
BIM scientist	4	1
Contractor	1	-
Owner	2	1
BIM consultant	1	1
BIM Trainer	-	1
BIM Technician	1	1
Sub-total	**18**	**12**
Total interviews	**30**	

Data Analysis

Following a grounded, inductive approach for the data analysis, we iterated between data collection, data analysis, and exploration of the relevant literature, as suggested by Strauss & Corbin (1990). An initial coding scheme, based on a plausible set of topics from extant literature, was used to make initial interpretation of the data. Primarily, this first round included codes related to intergroup collaboration and social identity, and resulted in 78 in-vivo codes. As the coding process evolved, some codes were combined into higher-order concepts. Others, however, were ill-fitting with social-identity. A second round of literature review uncovered a new, particularly relevant lens: Interorganizational Relational Identity. The concepts associated with this theory fitted well with our interview data, and allowed us to combine the remaining identity-relevant codes into higher level concepts (2^{nd} order level). As the data analysis necessitated several other refinements and additions, we developed the concepts into constructs (3^{rd} order level), which we labelled *IT Affordances*, *Meso Drivers, Macro Drivers*, *Intergroup Relational Identity,* and *Intergroup Performance.*

The data structure resulting from our preliminary analysis is presented in Table 2, which is organized according to a three-level hierarchy. The first column presents some of the codes we used on the raw data; the second column includes theory-based concepts that emerged from combining codes together; and the third column, at the highest level of conceptualization, shows the constructs that constitute the building blocks of our conceptual framework. This conceptual framework, which highlights how these constructs relate to one another, is shown in Figure 1.

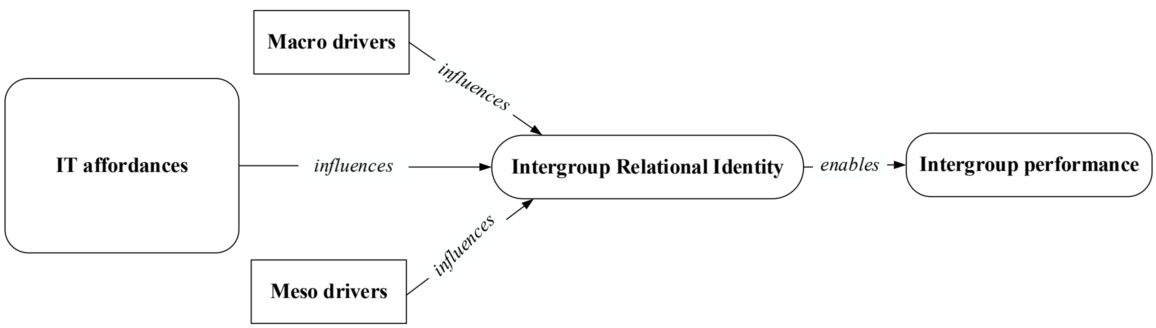
Table 2. Data structure resulting from preliminary analysis

1st order coding (in vivo codes)	**2st order coding (concepts)**	**3rd order coding (constructs)**
Project transparency	Ability to proactively reduce errors	IT affordances
Proactivity		
Visualization understanding		
Process efficiency	Efficiency in collaboration and communication	
Real-time information		
Strong management support	Management support	Meso drivers
Lack of management support		
Innovative spirit	Innovation	
Risk aversion		
Business model adaptation	Business model change	
Business model perpetuation		
Common ground	Business environment	Macro drivers
Unfavorable business environment		
Boundary spanning initiatives	Boundary spanning	
Lack of initiatives		
Incentives adaptation	Incentives	
Lack of incentives		
Valued partners	Ingroup/outgroup collaborative relationship	Intergroup relational identity
Co-opetition		
Territorial	Ingroup/outgroup dissociation	
Lack of consensus		
Positive performance	Performance	Intergroup performance
Negative performance		

Preliminary Results

Our data-grounded analysis revealed five distinct constructs, as presented in Table 2, namely: 1) IT affordances, 2) meso drivers, 3) macro drivers, 4) intergroup relational identity, and 5) intergroup performance. In this section, we discuss how data supports each of these constructs.

Figure 1. Conceptual Framework



IT Affordances

Although BIM offers a vast menu of functionalities to support the collaboration among AEC business partners, we noticed that our respondents did not exhibit the same intention towards the enactment of these functionalities. In other words, whereas a similar technology was made available to Finns and Quebecers, individuals from both groups differed vastly in how they elected to use (or not use) BIM. Given this observation, we turned to the concept of technology affordance, as it emphasizes the imbrication of human and material agencies (Leonardi, 2011). According to this lens, IT affordance is understood in the context of material properties made available by information technologies, which properties "afford different possibilities for action based on the context in which they are used" (Leonardi, 2011 p. 153). In addition to fitting our data, the concept of IT affordance was consistent with recent literature suggesting a relationship between IT affordance and group identity (Gal et al., 2014). We highlight two of such IT affordances next.

On way in which BIM technology afforded a functionally that was enacted differently among our respondents was through the provision for greater transparency and early discovery of potential problems. For example, via BIM, a project manager from a given firm can access the digital model created by an architect in another firm. BIM affords this visibility, making it possible for the project manager to uncover a problem in the blueprint before it is finalized (e.g. a wall that has an incorrect height). Whereas respondents from Quebec did not enact this affordance, Finns were strong proponents of its usefulness in supporting inter-group collaboration: *"It is very important to find problems as soon as possible, and with BIM based process you can… It's more transparent, so it's easy to find problems" [Project manager].* An architect from our Finnish field study corroborated*:* *"It is easier to recognize the errors and design coordination is a lot easier".* A third respondent, this one from Quebec, acknowledged how BIM could help in that capacity, although he did not take advantage of it: *"BIM allows to structure data and be more proactive… [potentially, if used,] you don't have to wait for errors to emerge to correct them".*

Another IT affordance that we identified had to do with the increased efficiency associated with the completion of an AEC-related project involving multiple business partners. Pre-BIM, collaboration was slowed down tremendously by the back-and-forth communications between partners. A Finn explained; *"I get like 75 emails a day and it doesn't make any sense [...] the emails are about the project. Most of those I just have to forward. I just forward to the people I am working with. That is a bit frustrating, that's not my job."* Finns recognized such inefficiencies and were prompt to adopt a technology that afforded a solution to this problem, by allowing them to exchange information via a common platform rather than messaging. A BIM consultant commented: *"It's cost-efficient to be able to cooperate and to exchange information, so I think that Finns are very rational. And I have seen even companies that compete together come up and agree to some certain standards and to* *collaborate. So, we have seen the value of that."* Another Finn added: "*It is about productivity and efficiency. And, it gets adopted where it needs productivity and efficiency to get benefits*". Conversely, in Quebec, efficiency was relegated as an afterthought, because the industry incorporated many players who were still using traditional technology (such as 2D modeling). Accordingly, Quebecers could not leverage greater efficiencies through the use of BIM, as there was often a need to convert BIM outputs to traditional models. A respondent explained: "*We need to prioritize documents... Every time there is a discrepancy (2D model versus BIM output), we need to prioritize the old over the new, and thus we will end up with the 2D model…Thus, the 2D model will remain, for us, the official one; the way we create models is just not the most efficient one".*

Meso Drivers

Meso drivers refer to the intragroup sources of influence on the enactment of intergroup relational identity. Three concepts were identified as being key enablers to interorganizational collaborative relationship, namely, *i)* management support, *ii)* innovation, and *iii)* business model change. Managerial support towards BIM were at different ends of a continuum in Finland and Quebec. A project manager in Finland explained his willingness to collaborate with other business partners by emphasizing that it was an expectation set from higher level: "*Top management has decided that this is the way we want to do it"*. Conversely, many respondents from Quebec mentioned the opposite, i.e., that management was not on board with the BIM technology, as pointed out by this Quebecer project manager: "*I wanted to use BIM for this project, but, for various reasons, upper management did not support the BIM initiative".*

An innovative disposition was another differentiator between both locations. Although both Finland and Quebec are known to have an innovative spirit (The Conference Board of Canada, 2015), in this particular context of BIM, where intergroup collaboration is necessary, such innovative spirit may deteriorate if business partners are incapable of trusting each other. Whereas this was not an issue in Finland, it appeared to be in Quebec, as indicated by this owner: *"It is a matter of distrust. They [business partners] don't want to take any risk. It is still there... taking risks and innovation are not in the cards."* Such distrust was often associated with risk aversion, as this respondent from Quebec highlighted: *"The construction environment is more of an environment where people are working against each other, than working together. It is not a collaborative environment. If you do not do what you are supposed to, I'll sue you. The owner tries to transfer the risks to the general contractor that tries to transfer the risks to the subs and nobody wants that risk. Then, whatever little thing, we'll be suing each other".*

Finally, inter-disciplinary collaboration in the context of BIM requires changes in business practices and business models. Again, a significant difference existed between our respondents on their inclination to transform the way they conducted their work with their business partners to match BIM's best practices. Whereas little resistance along these lines was manifested by Finnish respondents, many respondents from Quebec opposed it: "*Before you start changing the practices you've been doing for 20 years, consider this: you have offices, you make money, you always did, and then someone tells you 'hey, you have to change your practices, because we need to standardize' – this is too much asked, it is a lot of work, and it is a barrier".*

Macro Drivers

Building an intergroup relational identity, as suggested by our data, was influenced by a set of intergroup enablers that we termed *macro drivers*. As we moved back and forth identifying the similarities and differences between emerging codes, we categorized the Finnish and Quebec industries, again, in two opposite ends of a continuum. In Quebec, intergroup collaboration was hindered by an unfavorable business environment. For example, business partners still rely on the

Design-Bid-Build model, which is a traditional approach that consists of selecting partners based on the lowest bidder (Walker & Lloyd-Walker, 2016). The development process is similar the "Waterfall" life cycle traditionally used in the software industry, and consists of "phases and deliverables whereby at the end of each phase, the deliverables are handed – over the wall – with little or no integration or collaboration between the participants in each phase" (Eastman et al., 2011 p. 117). However, this process does not easily lend itself to supporting the use of collaborative technologies across groups, mainly because of the contractual divides and the information barriers between organizations. In this vein, a CIO from Quebec explained why it was difficult to bring different groups together to collaborate through BIM while functioning according the traditional mode of delivery: *"To make [BIM] works, you need to collaborate between the various parties, and as long as the contract will say 'Don't cross that line because it's at your own risk', it's not going to happen"*. In Finland, in contrast, the AEC players are moving away from the traditional *Design-Bid-Build* model to a *Design-Build* approach in which the development phases are overlapped and the partners are selected based on their predisposition to collaborate. A Finn architect summarized this shift as follows: "*You are not making ad hoc team where you are selecting all team members based on the lowest price, but you look at the competencies and especially at the team spirit and team competencies, [...] you should be looking at the whole team you are buying as one whole, instead of asking different bids from different participants. Because, if people have team spirit and if they want to collaborate then everything else is falling in place relatively easily"*.

In addition, in Finland, collaborative relationships are fostered by *boundary spanners* who are commissioned to promote the cooperative and collaborative interaction between business partners. According to Hogg (2015), boundary spanning is of crucial importance to the creation and maintenance of intergroup relational identity. The process helps, particularly, in bridging group boundaries, dismantling silos, and promoting collaborative work in pursuit of a shared goal. In line with this, many Finnish respondents commended the role of the government in the advancement of BIM-based collaborative work. A project manager explained *"The government is making BIM mandatory […] when people are using it, they understand that they have to collaborate*". Some government agencies also provide the necessary funding to support forums and programs that rally practitioners and academics. In Quebec, unfortunately, there was no such initiatives, as a project manager explained *"Personally, I don't see an initiative here in Quebec […] I would love to see a kind a forum that the government could organize, it would be interesting to invite the different parties to discuss BIM issues."* A Quebecer CIO further emphasized the lack of the government involvement in retraining the groups that showed interest into collaborating via BIM: *"Whenever you get people that are saying, I want to change, [i.e. collaborate through BIM], then their insurers are saying 'Do not do this', and the government is saying: 'No, don't do that'".*

Finally, our data suggests that engaging in interorganizational collaborative relationship requires incentives. The Finnish AEC players have created incentive mechanisms to motivate business partners to collaborate through BIM, A Finn Architect highlighted: "*I look at best projects, for example what [this company] has been doing; I think it is a perfect model showing how to motivate people [business partners] to change because there is a clear financial incentive for people to collaborate, and then they start doing it".* In contrast, there seems to be no clear incentives in the Quebec AEC industry to motivate groups to collaborate using BIM. An owner explained *"When you are in an organization, and the management tells you 'I cannot pay you for using BIM', that means there is no vision."*

Intergroup Relational Identity

Our analysis suggests that, in addition to IT affordances, meso and macro-level drivers influence the development of an intergroup relational identity. Intergroup relational identity, as stated earlier, defines the collective in terms of a group's collaborative relationship with one or more other groups

(Hogg et al., 2012). Evidence suggests that Finn stakeholders developed and nurtured an intergroup relational identity that transcended organizational boundaries and narrowed affiliations to traditional practices. Indeed, many of these respondents mentioned that they perceived other groups as valued partners in their collaborative relationship. For example, an architect explained how the relationship between engineers and owners was valued by both groups, and how the intergroup collaboration was essential to achieving positive outcomes: "*Engineers and clients are optimistic and looking for better models. There are no any barriers."* A BIM scientist added that organizations were aware that the whole is greater than the parts and that achieving outcomes depends on the distinctive and valued qualities that each group brings to the table, even between companies that compete with each other: *"Collaboration was never a problem here. People compete but collaborate at the same time: Co-opetition. We do actively collaborate at different forums, people openly share their know-how and data."* Another Finn corroborated*: "It was evident from the beginning that everybody wanted to collaborate between disciplines [...] I have seen even companies that compete together come up and agree to some certain standards and to collaborate."* In the same order of ideas, an owner described one particular project in which the involved business partners acknowledged the mutual benefits of intergroup collaboration and how it was vital to achieve the shared goal: *"In this […] project, we had the whole project team working together. I mean designers and contractors, construction companies were also very involved with BIM, and also the customers, I think that was very useful, they understood what they would get."* Overall, for Finns business partners, building an intergroup relational identity was beneficial, in more than one respect.

In Quebec, however, building an intergroup relational identity, in a BIM context, was rather problematic. Business partners were very reluctant to open their boundaries and operate in a non-linear world. One of our Quebec field study respondents clearly described the mindset prevailing in the Quebec AEC industry: "*I have my own territory, you have your own territory, I don't want to* *share information with you, I don't work with you, and just I do my job, do yours."* A project manager painted a similar bleak picture *"We could collaborate at least verbally, and even at this level there is reluctance. But then, to let you work on my own model, It's NO."* This is not to say that, in Quebec, no firm were motivated to build BIM-based constructive interorganizational relationships – many were. However, bringing partners to the threshold of change was deemed a difficult goal to attain. Building an intergroup relational identity in this context was indeed an uphill struggle, as this project manager explained: "*There are always some groups that don't want go for it. The problem with this, is that you have a wheel that does not turn, or one that turns 'square': it blocks all the other*s."

Intergroup Performance

Hogg and his colleagues (2012) suggest that intergroup relational identity is conducive to effective intergroup performance. Our field studies aligned with this idea, as we were told of multiple examples of such influence. By emphasizing intergroup collaboration, Finn organizations actually achieved a superior group performance than their Quebecer counterparts. A BIM scientist commented: *"Different stakeholders of a project have found benefits from looking at combined models and discussing with the help of that."* In Quebec, although BIM was perceived as an IT artefact that could support collaborative activities, this was an idealized outcome that organizations strived to (but could not) achieve. Traditional communication and work methods indeed remained predominant for multidisciplinary collaborators, which limited the benefits of BIM. A project manager mentioned: "*We're stuck with the traditional model. We got constraints making projects a success with BIM".*

In Finland, our data shows that each party was committed to the other's interests as much as its own, and this commitment impacted the quality of deliverables: *"There have been success stories, and the use of BIM is growing,"* commended a Finn owner. Among these success stories, an architect described the example of a university construction project in which interorganizational collaboration, through BIM, was the hallmark: "*That was a really successful project. It is really. It was modelled quite precisely [with BIM]".* In Quebec, an owner provided an opposite example in which BIM technology was dropped early in the project, because of the lack of commitment of business partners: "*If I take the example of the [XYZ] project, in which I was personally involved, in the beginning, BIM was required and was part of the tendering process, but it was soon dropped. The partners all agreed to drop BIM, and so, BIM was dropped."* For many AEC players in Quebec, BIM was perceived as a threat to the groups' value, and therefore to their group identity. An owner explained: "*They don't see global; they serve their own interest."* Such a threat led to resistance towards BIM, as highlighted by this project manager: "*There is resistance, a misunderstanding; there are still people who do not understand how beneficial BIM can be."*

Discussion and Conclusion

In this paper, we leverage empirical data from field studies conducted in Finland and in Quebec, along with theoretical insight from intergroup relational identity theory, to propose a conceptual framework identifying sources of influence to intergroup performance. Specifically, we highlight the role of IT affordances (i.e., ability to proactively reduce errors and efficiency in collaboration and communication), meso drivers (i.e., management support, innovation, and business model change), and macro drivers (i.e., business environment, boundary spanning, and incentives) on intergroup relational identity, and in turn, on intergroup performance.

Research Contribution

The results presented in this paper have broadened and supported previous research on interorganizational systems research by identifying, in a comprehensive and integrated manner, the relationship between IT, identity, and intergroup performance. This investigation is one of the first to provide empirically-grounded insights using Intergroup Relational Identity as a theoretical perspective. At this stage, the proposed conceptual framework promises to be valuable in the examination of intergroup collaboration.

All too frequently, interorganizational collaborations end up in debacles (Jarvenpaa and Majchrzak, 2016), and research has been slow to provide insights into this particular challenge. Whereas IOS are expected to be enablers of such interorganizational collaboration (Gal, Jensen, and Lyytinen, 2014), this simplistic relationship has often failed to be observed. Few researchers have considered the lens of identity in the context of interorganizational collaboration. Among them, Hogg and colleagues (2012) focused on the role of leadership to foster intergroup relational identity (which is conductive to intergroup performance), but they also called for additional research to uncover what, aside from leadership, may impact this relationship. Our conceptual framework offers an initial answer to this call for additional research.

It has been argued that theories of interorganizational collaboration should consider multi-level influences (Jarvenpaa and Majchrzak, 2016). We believe that we are also responding to this recommendation by identifying both meso drivers (which refer to intragroup sources of influence) and macro drivers (which refer to intergroup sources of influence) in our conceptual framework. Indeed, most research that has leveraged the concept of identity did so at the individual level; our focus on the collective, looking into both the intragroup and intergroup dynamic, offers a more comprehensive understanding of how intergroup relational identity can be fostered.

Moreover, our research fills a gap in terms of shedding light on the role that information technology (and more particularly, BIM) plays in the process of identity creation (Boudreau et al., 2014). Whereas Robey and colleagues (2008) increased our sensitivity to the importance of the IT artefact per their call for greater mindfulness of the material characteristics of IOS, our field study was in fact quite revelatory of the extent of BIM affordances in both research settings (Finland and Quebec). Indeed, our data emphasizes that it was not only the BIM features, but how organizational members, in practice, leveraged these features, that contribute to the development on an intergroup relational identity. We framed this concept as IT affordances (per Leonardi, 2011), as it incorporates not only the objective properties (or features) of BIM, but also the organizational members' ability and predisposition to act on these features, within their work environment (Markus & Silver, 2008). The relationship between IT affordance and identity has been acknowledged before. Bernardi and Sarker (2013), for example, posited identity as the "missing link" between IT affordances and institutions. But the work of Gal and colleagues (Gal, Jensen, & Lyytinen, 2014) aligns the most closely with ours, as they also suggested a relationship of influence between IT (which they posited as inclusive of the interorganizational context, IT characteristics, and IT affordances) and the type of identity orientation an organization may adopt. Our work thus extends theirs, in term of not only supporting this relationship with our preliminary data, but also by identifying such affordances that are particularly beneficial to the development of an intergroup relational identity.

Practical Implications

As shown above, AEC professionals in Quebec faced a number of significant hurdles in building an intergroup relation identity that empowers the use of BIM technologies. There are, however, some mechanisms that our research suggests, which could help overcome that challenge. Two key strategies can aid in the building of such an intergroup relational identity and support an effective intergroup performance. First, developing a *boundary-spanning leadership coalition* may be necessary (Hogg, 2015). This coalition, whose mandate is to emphasize the mutual benefits of intergroup cooperation through BIM technologies, can include industry leaders and key players. By delivering a consistent message across organizational boundaries and through different platforms (e.g. seminars, forums, round tables, and so on), such a coalition can ignite the process of transforming groups self-interest into collaboration and cooperation that optimize intergroup performance. The idea of coalition is appropriate as it becomes a joint effort of all groups involved rather than a project championed by a single entity or group (the architects for example). Establishing such a coalition may not be easy and it may take time to make it effective, yet it is a unique way to create a climate of mutual trust necessary to intergroup relational identity.

Second, it is important to have a *sponsor* designated to champion the project; in the context of BIM, the government is well suited to play such role. The sponsor provides the necessary support to ensure that everyone involved is on board, for example by making BIM mandatory, adapting incentives, or funding rallying projects. When the message of collaboration is conveyed, other bottom-up mechanisms may be triggered, particularly among the organizations who see an opportunity to collaborate with BIM. Some of these mechanisms have been documented in this study, such as management support and work processes changes.

Limitations and Future Work

As in all research projects, this one has limitations. First, we used a convenient sample, in that we recruited our respondents from a list of contacts known by some of our research colleagues. We did not rely on a random sample in either field study. Second, interviewers were not the same across both field studies. Consequently, even with an interview protocol in hands, the way interviews were conducted in Finland differed (in terms of style and flow) from the interviews conducted in Quebec. Third, coding was done by only one person, and therefore we cannot report inter-coder agreement. Moving forward, we plan to conduct additional interviews (both in Finland and in Quebec) with the help of an instrument inclusive of more targeted questions related to identity, collaboration, and BIM usage. We also intend to involve a second coder to increase the rigor of our coding effort, and to report inter-coder agreement.

Finally, in this research, we laid the groundwork for future theoretical development, and thus hope that other researchers will add empirical credence to the suggested conceptual framework by investigating more fully how the constructs we identified enable intergroup relational identity, and in turn, intergroup performance. We trust that the theory developed herein will be taken up by other researchers and used by practitioners to continue expanding our understanding of interorganizational systems.

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Appendix: Summary of the Interview protocol

Each interview begins with making contact (presentation of the researcher, the research objectives, the consent form, the rights not to answer, presentation of the respondent). Then the questions were grouped as follows:

- History of the general use of IT in the construction business ecosystem and the emergence of BIM

- Barriers, benefits and challenges of BIM as experienced by the informant to the occupied level

- Proposition of mechanisms able to accelerate the implementation of BIM in the business ecosystem.

First question: *Mrs. Y, Mr. X, can you tell me about the importance and evolution of IT in your industry and your organization from the years 1990-2000 and until the arrival of BIM?*

Second question*:* *Back to your first experience with BIM, can you tell me how this technology has become important to your organization? What are the barriers, benefits and challenges associated with BIM?*

Third question: *If you believe that BIM provides both tangible and intangible benefits, what are the mechanisms to put in place in the industry in order to promote and accelerate BIM implementation?*

During the exchange, the researcher maintains contact with the interviewee by spontaneous or planned prompts. Scheduled prompts are classified as suggested by McCracken (1988) : **contrasts, categories, memories of incidents and planned stimuli.**

Contrasts
What is the difference between what you call "X" and the other category "Y"? (X and Y were introduced by the informant)

Categories
Can you make me an account of all the formal characteristics of the point under discussion (e.g. key players, key actions).

Memories of incidents
What was striking? Why surprised you? This contradicted what? (to be developed when an incident is mentioned as "strange event" shows the cultural categories and their interrelationships)

Prepared stimuli
A sketch showing the different components of a business ecosystem