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ORIGINAL RESEARCH ARTICLE

When Three Is Better than Two: How Culture Can Bridge Collaboration in Globally Distributed Teams

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Abstract

Globally distributed teams (GDTs) have become essential tools for organisations to expand, quickly adapt and restructure to remain competitive in the current economic climate. The theoretical literature has been discussing the advantages, but also the barriers, limitations and challenges in GDTs' internal practices and processes. However, scholars have not yet sufficiently examined empirically the implications of cultural differences when teams operate in virtual contexts. To address this gap, this study aims to explore how different cultures interact and stimulate work collaboration in GDTs. Following the acquisition and merger of Volvo and Renault, we conducted a qualitative study of the collaborative work of GDTs located in Brazil, Sweden and France during the creation of Volvo Group's VM truck. Our results highlight that the interaction of the three involved national cultures led to better collaboration between members of a GDT. Furthermore, as a managerial contribution, this study suggests that culture can be understood as an agent of transformation to facilitate or improve the collaboration process.

Keywords: *Collaboration; Globally distributed team; National culture; Work practices; Qualitative research*

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> 'Think of a jigsaw' … the VM is a jigsaw … we put together something with parts made in Lyon, other bits made in Gothenburg, a Brazilian touch here and there … pah, pah … boom! We had the VM! We are good at adapting things, we are!
>
> (Arthur, Brazilian project manager, November 2007)

This excerpt from an interview with a Brazilian project manager working with team members from France and Sweden illustrates that globally distributed teams (GDTs) can collaborate to create surprising results. The project manager describes the creation of Volvo's VM truck as an assembly of pieces or 'a jigsaw' that demonstrates Brazilian competence – influenced by French and Swedish traits – at encouraging the collaboration of the countries involved, aggregating and integrating the existing potential that was previously dispersed.

Globalisation has developed a new kind of team – the GDT – that overcomes physical barriers and that comprises members in multiple locations working with advanced communication technologies to improve collaboration. However, team members must still overcome the limitations of time, space, culture and organisational affiliation, obstacles not usually encountered by traditional collocated teams (Piccoli et al., 2004). Working in GDTs is intrinsically complex because it involves the adjustment of interests, egos and personalities. This challenge is compounded when we think that team members probably do not share the same world view, do not speak the same native language and only have their work in common. The number of formal and informal interactions may be reduced, but using certain media for collaboration limits information sharing, which may increase the ambiguity of some tasks and create indecision about courses of action (Workman et al., 2003). As a result of the COVID-19 pandemic, many managers have stopped travelling and have started leading online GDTs for the first time. Led by an external shock, this sudden change has exacerbated the challenges of collaboration at a physical distance, challenges that

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in the field of international business are comprehensible, but the issue remains unaddressed in management practice (Caligiuri et al., 2020).

Research into GDTs has assessed: how trust will affect the quality of collaboration (Kauffmann, 2015); how communication processes can be more fluid, facilitating collaboration with the aid of technology (Maznevski & Chudoba, 2000); how to measure intercultural effectiveness (Messner, 2015); and the relationship between national culture and the motivation of knowledge sharing in GDTs (Wei et al., 2008). However, although national or cultural diversity is usually regarded as characteristic of virtual collaborations, and organisational culture is the backdrop for several studies, there is still a great need for empirical examination of GDTs facing real-world challenges (Stanko & Gibson, 2009). As Cramton and Hinds (2014, p. 1057) highlight, 'our understanding of the significance and impact of culture in GDTs is extremely limited'.

One striking feature of GDTs is that, as they comprise members living in different countries, they necessarily include different national and organisational cultures: even if they operate under the same overarching corporate culture, they are influenced by their subsidiaries' cultures. Although D'Iribarne (1989) makes a significant contribution by relating the organisation to cultural traditions, the author does not explore how teams from different national cultures cooperate. Working 'virtually' may result in a lack of shared identity, an associated loss of cooperation and commitment to norms, and a lower probability of effective communication. However, while there has been a steady increase in the number of studies that focus on how cultural differences may shape multinational team dynamics (Militaru et al., 2014), less is known about the role that cultural differences play when teams are enabled by technology (Stanko & Gibson, 2009).

Communication in GDTs is essentially based on computer-mediated communication technology, which usually lacks verbal cues and rituals. This limitation makes effective communication extremely difficult (Wei et al., 2018). It is also worth noting that international collaboration presupposes some understanding of how others' thinking differs from ours. This means that collaboration can be complicated by misunderstandings, interpersonal conflicts and cognitive challenges, although virtuality itself is not a performance inhibitor if members are able to use the most appropriate forms of technology at the right time (Stocker et al., 2018). Nevertheless, it is well known that the cultural differences between a GDT's members make collaborative work more complex (Cagiltay et al., 2015); the inherent diversity in competencies may facilitate the exploitation of information because it induces creative abilities. However, an excess of diversity might also mitigate the beneficial effects (Gotteland & Haon, 2010). Managers are looking for balanced interactions between team members to facilitate collaboration, although how this is achieved has not yet been explained. The lack of physical face-to face interaction, together with the complexity of different cultures, languages, times zones and ways of working in a virtual environment, led us to develop the following research question: *How do different cultures present in GDTs interact in virtual contexts and stimulate work collaboration?*

To answer this question, we examine the development by GDTs of Volvo's first medium-sized heavy-duty truck: the Volvo VM. In 2000, AB Volvo and Renault VI agreed to join forces to produce heavy-duty trucks for the European, North American and other markets. While the top management teams of Volvo Group in Sweden and Renault Trucks in France discussed a synergy strategy for the effective implementation of the global merger, Volvo do Brasil (VdB) saw an opportunity to enter the Brazilian market for medium-sized trucks. As a result, the Brazilian team was given the responsibility of developing the first medium-sized, heavy-duty truck (the Volvo VM), working alongside the French and Swedish teams.

In this study, we examined the interactions among the team members located in Curitiba, Lyon and Gothenburg and identified the common elements of flexibility found in their respective national cultural traits that are drivers for the collaboration process in a GDT. We contribute to management studies by showing how the adoption of culture can act as a 'managerial tool'. In other words, we suggest that culture can be understood as an *agent of transformation* to facilitate or improve collaboration between members of a GDT.

Globally distributed teams

With the increasing relevance of distributed communications systems and a diverse assortment of working groups within contemporary organisations, managers need to integrate virtual practices into their current team-building strategies and learn how to continually improve virtual group processes. As a result, research has been developing ways to explain these processes inside GDTs (Cagiltay et al., 2015; Hoch & Kozlowski, 2014).

Early conceptualisations of GDTs focused on geographic distribution before the rise of electronic communications (Hoch & Kozlowski, 2014). GDTs have been defined as groups of geographically distributed co-workers assembled via information and communications technologies to accomplish a variety of critical tasks (Stanko & Gibson, 2009). The absence of cultural differences in the conceptualisations of GDTs has been criticised (Hinds et al., 2011), but it is important to note that even when national or cultural diversity is not formally included in this definition it is implicit as an important feature of geographic dispersion (e.g., Hinds & Mortensen, 2005).

There are many challenges to working in GDTs. For example, Malhotra et al. (2007) found that several of the GDTs in their study struggled initially because they lacked a common

set of procedures, producing a lack of cohesion and difficulty in integrating the work. According to the authors, 'in the absence of communication norms, team members resorted to using the practices prevalent in their local setting' (Malhotra et al., 2007, p. 62). Examples of such protocols would be how to collect, share and use information, how to divide work, roles or responsibilities, and agreement on the social context for interpretation of information (Gressgård, 2011). Beyond the arguably more obvious factors that affect the collaborative success of GDTs, such as time differences, mismatched expectations, different levels of experience, a lack of norms for communication and cultural differences, Hattori and Lapidus (2004) also identified inclusion, integration, compromise and open communication as important.

According to Hasler-Waters and Napier (2002), understanding and promoting collaboration in a virtual environment have been a widespread concern since it requires trust, shared vision and communication, amongst other things (Kauffmann, 2015; Loilier & Tellier, 2004). Team members must work hard to overcome the challenges of not being able to communicate face to face, and technology is therefore a critical requirement for effective virtual team operation (Horwitz et al., 2006). However, efficient collaboration via electronic media requires a shared understanding between the team members of the problem at hand (Gressgård, 2011). Ultimately, efficient collaboration involves a set of important skills that need to be cultivated and learnt.

Considering the nature of GDTs, communication mediated by technology communicates less social information than face-to-face communication, which affects the development of interpersonal relationships in various ways (Cramton et al., 2007). As they are international and virtual, GDTs generate 'intra- and interpersonal dynamics that are challenging to work with because they are imperceptible or difficult' (Heimer & Vince, 1998, p. 83). To minimise this limitation, a virtual team leader in the petroleum industry noted that collaboration between a GDT's members began only once members knew more about other team members' backgrounds and expertise (Malhotra et al., 2007). We therefore assert that collaboration is a social event that capitalises on the knowledge, skills and efforts of several individuals where the actions of one individual alone will not achieve the expected result, so a dynamic relationship between members and groups is required.

Ambivalence of culture in GDTs

It is important to highlight our understanding of 'culture'. For us, culture is a shared context of meaning in which sharing means using the same symbolic categories to make sense of reality, although not necessarily attaching value to the same reality (D'Iribarne, 2009; D'Iribarne et al., 1998). For francophones, cross-cultural management also improves understanding of culture from a symbolic perspective, giving more room for description rather than comparison: what matters is not so much comparing cultures as understanding the intrinsic logic of each culture (Viegas-Pires, 2013). However, the use of scales of values and attitudes is prevalent in empirical research, characterising the properties of each national culture and comparing diverse national cultures with one another (e.g., see the works based on GLOBE – Hofstede, 1983; House et al., 2002; Trompenaars & Hampden-Turner, 1998).

Working with colleagues from different cultural backgrounds is challenging, but that challenge is compounded when the team environment is dispersed. Different cultures require different communication and collaboration behaviours, but it is not always clear that what works in one culture will work in another (Messner, 2015;Vaara, 2000). Diversity can lead to cultural confrontations and misunderstandings (Horwitz et al., 2006). Each country develops a different set of assumptions and norms under which to operate, and different professions, functions and even genders within an organisation can themselves have different cultures. Consequently, team members from different cultures come to the group setting with very different predefined notions about how a group should function (Distefano & Maznevski, 2012). Militaru et al. (2014) identified that certain cultural differences in distributed teams are beneficial because they can improve performance. However, collaboration is a complex process that, as a result of communication and interaction between parties, creates relationships that allow the sharing and synchronisation of information for the purpose of decision-making and achieving common goals (Kauffmann, 2015).

Several factors influence cultural differences between companies; however, one of the most important is the national culture (Stocker et al., 2018). When team members are situated across national and organisational boundaries, they may have different attitudes towards hierarchy and authority that influence how they work and interact in a team (Wickramasinghe & Nandula, 2015). Depending on the nationality and the hierarchical levels involved, it is possible to encounter problems of attribution and responsibility, that is problems of work delivery. Moreover, even with similarities in the control and authority relationships between the teams, the norms of their interpersonal communication can still be markedly different, for example in how open their style of communication is (Cramton & Hinds, 2014). National culture will also affect work practices when individuals bring their own national culture to work every day (Mandel, 2019). Furthermore, according to Wickramasinghe and Nandula (2015, p. 141), 'national diversity can be identified as a barrier if team members of one nationality have negative feelings towards other nationalities believing that one's own nationality is superior to others'.

It is worth stressing not only that multiculturalism encourages individuals to think differently, given the different perspectives of each culture, but also that it involves challenging encounters and attempts to resolve contradictions between conflicting cultural systems to improve interaction between members. Cramton and Hinds (2014) suggest that adding more than two locations creates more complex processes but with the same dialectical form. In their research, the authors selected teams spread over only two locations. They conceded that this was a limitation because, although it probably helped to emphasise the dialectical struggle of adaptation, GDTs are commonly spread over more than two sites.

Many researchers recognise the importance of culture as a fundamental dimension of virtuality and their studies include teams with members from different countries. Such an environment can only be productive if those involved are prepared for potential problems in advance (Cagiltay et al., 2015). From the individual's perspective, it is crucial to discuss how members themselves adapt to work in such teams since national culture impacts an individual's cultural values, which in turn influences their behaviour (Wei et al., 2008). In this paper, we study the interaction between *teams* from three different cultures rather than between *individuals*. Identifying how this interaction occurs, together with its limitations and barriers, helps to understand its dynamics and propose ways to develop it. Thus, we address the question of how different cultures present in GDTs interact in virtual contexts and stimulate work collaboration.

Research design

This research is based on qualitative data gathered during a field study conducted at Volvo's sites at Curitiba in Brazil, Gothenburg in Sweden and Lyon in France. We collected data from documentation concerning the development of the VM truck over the period 2000–2003, combined with semi-structured interviews and observation of the VM team members in different situations, including in workshops and during the research. We started by tracing and understanding the longitudinal documented information before triangulating it with data from semi-structured interviews.

Research setting

Our research centres on Volvo 3P, the business unit of Volvo Group responsible for the development of new trucks. Our focus is on VdB, located in Curitiba. In August 2003, VdB launched its first medium-heavy truck, the Volvo VM, onto the Brazilian market (see description of the case in the Appendix). Volvo VM was well received and was considered the most modern truck in the medium-heavy segment, not only in Brazil but also throughout Latin America, which was the sole market.

Brazil is a country where institutions operate through personal relationships as much as general rules. 'Diversity' is not the best word for describing Brazil and Brazilians: 'mixture' is better. Brazil is a nation of miscegenation, syncretism and cultures, diasporas and borderlands (Hilal, 2009). In contrast, egalitarianism is one important Swedish cultural value that has influenced and shaped life in Sweden and Swedish management in particular. Swedish companies have been transformed from hierarchical organisations to flat, decentralised structures with participatory practices following governmental policies (Zander & Zander, 2009). For their part, the French have a variety of idiosyncrasies and personalities, many of which are puzzling to outsiders. Beneath these differences, however, lies a culture that unifies the people and their institutions. A preoccupation with shaping, organising and magically transforming raw material into works of art is evident in the windows of French food shops.

Data collection

Using a GDT configuration requires the development of 'global products', which in this context means creating a truck that can be sold in two or more countries. Teams are formed with the objective of complementing local market expertise with knowledge from other countries.

We used documentary analysis, semi-structured interviews and observations to enable data triangulation (see Table 1). Together, these three types of data generated a rich data set that allowed us to construct our case study of Volvo VM. Indeed, we found references to this specific project in all three types of data. We first separated all the data-related references before analysing them. Data were collected during 20-day on-site visits in each country by a native Brazilian Portuguese speaker.

Data analysis procedures

With the consent of the participants, interviews with an average length of 90 min were transcribed verbatim and, to guarantee anonymity, participants' names were coded. The research was conducted simultaneously in Portuguese and English to preserve the accuracy of the information obtained. Two stages were developed for the analysis of the data. We utilised TalTac and NVivo 10 software for *content analysis through lexical analysis* to identify keywords based on their frequency of use.

Through the lexical analysis of the gathered data, we identified that the queries 'work' (i.e., work, works, worked, working, teamwork), 'relation' (relations, relationships) and 'flexible' (flexibility) occurred with high frequency in all the interviews and in the internal reports of the project. Investigating the words with a higher frequency that appeared near to these

Table 1. Description of material used in data collection

Source	Type of data	Use in the analysis
In-depth interviews	**First round: November 2006**	
	29 interviews with managers and engineers at Brazilian Volvo subsidiary in Curitiba, Brazil	Gathered data to comprehend Volvo's structure, project composition and the context in which its trucks are developed and how the GDTs operate; we conducted a pilot study
	Second round: December 2006	
	12 semi-structured interviews at Brazilian Volvo subsidiary, Volvo Powertrain, Volvo Trucks and Volvo 3P (all in Brazil)	After identifying ongoing projects, interviews were conducted to collect accurate information about the object under study (the development of the VM truck and the relations between the GDTs across the Volvo units in Brazil involved in the process)
	Third round: June 2007	
	8 interviews at Volvo 3P Sweden	Collected more data from a Swedish perspective, interviewing those who participated in the development of the VM
	Fourth round: September 2007	
	7 interviews at Volvo France	Gathered additional data, with a French perspective, from those who participated in the development of the VM
Documents	Global development project	Written record of the project: this document has all the technical and administrative information relevant to the project; therefore it enabled both a general and a specific overview of the life of the project
	Job descriptions; human resource policies; self-managed teams' institutional presentations; internal reports; press coverage and interviews; company manuals (code of conduct, The Volvo Way, health and safety policies, environmental policies, Volvo trucks)	We reviewed this material for information about the project's history, exploring the connections between the countries and formal perceptions
Observations	**First round: November/December 2006**	
	In Brazil: project workshop (22 participants); first workshop in innovation and technology (100 participants). Eleven projects on innovation were presented. Visit to the manufacturing plant in Curitiba	Notes were taken during the events to record all phenomena and processes that were taking place in both the individual and collective spheres
	Second round: June 2007	
	In Sweden: researchers stayed in the company for 10 days, conducting interviews and observing the dynamics of their relationships and some meetings	Gathering perceptions about behaviours, routines and practices

words (within an interval of five words), we found the queries 'organisation', 'communication' and 'culture', and the words 'values' and 'dynamic'.

Constructs related to 'way of work', 'management practices' and 'communication process' emerged as the first tree/nodes in the coding process. Some values in the sequence emerged, such as 'autonomy', 'respect', 'transparency' and 'agility', and these were coded separately. Next, we coded under 'work practices' all the concepts concerning work routine, such as hierarchy, managerial style, decision process and organisation climate. Likewise, we coded under 'national culture' all the constructs relating to national traditions and values.

In the theory-building-from-case-study stage, we followed three steps: open coding, axial coding and selective coding. Working with the lexical analysis developed previously, we started using these constructs in our open coding, integrating them with the queries already identified. As all subcategories were interconnected, we looked for any relationships between occasional circumstances, phenomena, context, interventional circumstances, interaction actions/strategies and consequences.

Findings

It is important to note that the Volvo VM was developed during the period of upheaval that typically follows a merger and acquisition, when top managers in Volvo Sweden and Renault France were discussing the future of the two organisations. Hence, there was great uncertainty in the French team regarding their role in future product development – with the possibility of product development being centred in Sweden – and therefore significant competition between the two countries. At that time, while the Swedish team only developed heavy trucks, the French team only developed medium trucks. The Brazilian team had identified an opportunity to develop and sell the medium truck to a large potential market in Brazil, and thus presented the VM project as the

first medium Volvo truck with the combined knowledge of Volvo in Sweden and Renault in France.

National culture and its influence on interactions in GDTs

First, we present elements of the respective national cultures of these three countries, as identified by the data. As mentioned in our procedures, national culture was coded according to the constructs related to national values and traditions. Described as a social mechanism characterised by an immediate view and directed towards short-term results with an emphasis on crisis solutions (Amado & Vinagre Brasil, 1991), we identified the Brazilian *jeitinho* construct in the Brazilian team's narrative. When team members explained their behaviour – mediating relations and resolving the problems encountered – we identified correlated concepts, including such terms as *jogo de cintura*, meaning flexibility of body and spirit to navigate obstacles, the good humour to keep trying, resilience and persistence. These findings reinforce Amado and Vinagre Brasil's (1991, p. 54) interpretation of the concept, where *jeitinho* describes how Brazilians deal with constraints: 'a flexibility of body and spirit'. In short, *jeitinho* is a cultural trait that is considered unique to Brazilian society, used as a problem-solving strategy (Duarte, 2006).

In the French team, we identified that agility and speed are consistently apparent when thinking and talking. We noticed that words and constructs related to the concepts of 'improvisation' and 'resolution in a short time' often emerged, which led us to identify the cultural trait of *bricolage*. Although Lévi-Strauss (1966, p. 17) did not offer a specific definition of *bricolage*, he described it as 'making do with whatever is at hand'. This behaviour was observed even during some interviews when, in the absence of an appropriate word in English, interviewees improvised with a word in French or with hand gestures: in short, through *bricolage*, interviewees arrived at a 'final concept'. This implies action and active engagement with problems and opportunities rather than lingering over questions of whether a workable outcome can be created from what is at hand.

We identified in all the Swedish team's communications, whether directly or indirectly, a concern for the shared values of quality, autonomy, collaboration and flexibility. These principles reflect not only their Viking heritage, in their desire to expand trade networks, but also the innovative teamwork developed at Volvo's Kalmar plant, which was inaugurated in 1974 and was the first assembly plant in the world to break with the Fordist concept (Sandberg, 2007). According to Gyllenhammar (1977), the most important change in Kalmar was a shift from individual, monotonous work to working as a group. The goal of the Kalmar plant was that the employees should be able to find 'meaning and satisfaction in their work […] without neglecting efficiency and economic results' (Agurén et al., 1976, p. 98).

To exemplify, in Table 2 we present the national culture from (A) Renault France, (B) Volvo Sweden and (C) the Brazilian Volvo subsidiary, and the respective idiosyncrasies we identified in French *bricolage*, Swedish Kalmar teams and Brazilian *jeitinho*.

We present below the interactions that emerged between members of the individual GDTs in the three countries. In view of the characteristics of each country, we first seek to analyse dyadic interactions between them. Interactions between the Swedish and French teams were identified as dysfunctional, characterised by stress, which could have been aggravated by the virtuality of the relationship. French culture accommodates confrontation, while Swedish culture does not. Furthermore, we observed that the French have a more direct style of communication than the Swedish. Another cultural point is French resistance to speaking English, which comes more naturally to the Swedish. When working together in a distributed setting, the French team suggested that there was more uneasiness in communication, so their preference was for visual contact as a way to avoid

Table 2. Elements of context from national culture in the organisation's three sites (France, Brazil and Sweden)

A	Renault France	Bricolage	'I invited a lot of people here to discuss with them deeply regarding techniques because I was the architect. The architect asks for work for all the different engineers, but the knowledge of the details of the techniques is on each engineer and the architect manages all the buildings. Here it is like a building but it's for trucks, we manage to work with the engine, etc., and you build that together and if something is wrong you can ask, or manage to ask evolution, update, it's like that to the specialist … I managed a complete project, with an architect's view.' (Fernand, manager, France)
B	Volvo Sweden	Kalmar teams	'I think that it is very important that both personally, culturally, but also team-wise, that it's considered to be all right to admit that I don't understand, and I need an additional explanation. And that all team members try to make it easier for everybody to understand. It could be that the person who originally explained can't explain in another way. But it could be another person listening, who had understood but could express it in a different way. And the person with the first explanation could confirm, "Yes, that is what I meant" And the third person could say, "OK, that's good, now I understand."' (Karen, engineer, Sweden)
C	Brazilian Volvo subsidiary	*Jeitinho*	'We are good at adapting things … our organisation is results oriented. We are paid to either fix what's wrong or adapt … to join! And as I tell you, cost reduction was a stretch like that, characteristic of us. It was out of a need that we developed the competence.' (Sergio, engineer, Brazil)

misunderstandings. This uneasiness seemed to be a trait of employees who had been working at Renault for longer and who, coincidentally, were as wary of the merger of Volvo with Renault Trucks as they were with speaking English as the official second language.

Interactions between the French and Swedish teams with the Brazilian team before introducing it as the third culture indicate that, separately, the Brazilian and Swedish teams demonstrated values of affinity, such as work values, respect and clear roles, where interactions between the Brazilian and French teams were characterised by agility and creativity. One point to highlight here is that the merger of Volvo and Renault generated two different reactions: the fear of job losses appears to have triggered conflict and exacerbated competition between the French and Swedish teams, which in turn prompted closer collaboration between the Brazilian and French teams.

We created Table 3 to illustrate interaction within the dyads and explore the respective countries' national cultures. We consolidate quotations that refer to the following relationships: (1) France and Sweden, (2) France and Brazil, and (3) Sweden and Brazil.

When investigating the causes of the *dysfunctional interaction* – or 'aggressive', according to Cooke and Szumal (1994) – between France and Sweden (Relationship 1), we noticed that both cultures like to debate, but the focus is different. French workers tend to appreciate the 'act in itself', while the Swedes are keen on debating to achieve better results and minimise future complications. The former approach is more emotional, and the latter more rational. In parallel, the *functional interaction* between France and Brazil (Relationship 2) was characterised by both cultures being agile and dynamic, seeking to create solutions and look for adaptations in the absence of resources. Another functional interaction was identified between Sweden and Brazil (Relationship 3) but for different reasons: their functional interaction was based on *values of affinity*. Transparency, respect and focus on work are values shared by both cultures. Thus, even though existing literature presents these two countries as having diverse cultural traits, the participants considered themselves similar in many ways, thanks to their shared values.

It is also important to point out that interpersonal relationships are not deemed to be static. According to a Brazilian project manager, relationships could change throughout the development of a project regardless of the influence of nationality. This indicates that the 'product' also interferes with the quality of interpersonal relationships, not just the individuals themselves.

Table 3. Interaction within the dyads: focus on national culture

1	Renault France	Dysfunctional interaction	Focus on debate: the French on the discussion act itself, the Swedes on the results/implications	'The French have a strong culture of debating and questioning and Swedes don't. It is part of French culture to really put an individual point of view so they hardly accept anything … "Oh, they said it is to do, so let's do it," no way: they question, debate, and the debate is a long, prolonged debate.' (Kauan, manager, Brazil)
				'They want to have more discussions to make sure that we arrive at a conclusion that, anyway, we've already had.' (Enzo, engineer, France)
	Volvo Sweden			'The French love a debate, especially a heated one … sometimes they cross the line [chuckles]. They easily do it if they get passionate, they think you win an argument by raising your voice and talking fast. They don't let anyone speak. It's a nuisance for the project.' (Adrian, engineer, Sweden)
2	Renault France	Functional interaction	Agility	'I think, Brazilians are very close to European culture, or though European culture, it's maybe the Portuguese., I think we are more or less the same, yes, I think we have some similar characteristics or way of working. Maybe we behave in the same way.' (Carl, manager, France)
			Fluid relations	'Our relationship with the French in the context of VM was great … The relations were very good. Very good!' (Carlo, manager, Brazil)
	Brazilian Volvo subsidiary		Focus on creation, dynamism	'Brazilians actually are very creative, more than the French. I think it's because when it comes to the culture in France, when it comes to management and so on.' (Antoine, engineer, France)
				'The Frenchman has a much more similar dynamism, this I felt. We have few resources, our money is scarce, so we must be creative, we must take advantage of these adversities to finally overcome them. They are dynamic, very similar to what we have here, dynamism to create, even to be audacious at times in some ideas.' (Ernesto, engineer, Brazil)
3	Volvo Sweden	Values affinity	Transparency	'I feel that the people in Brazil know what they are doing: "This is my area of responsibility; these are the tasks that I take on, I am responsible to deliver," and that's it, quite like Gothenburg.' (Albert, engineer, Sweden)
	Brazilian Volvo subsidiary		Focus on work	'My feeling is that in Brazil, they are very close to European culture. It's not so difficult for me to work with Brazil. I think we have a similar way of working.' (Gabriel, engineer, Sweden)
			Respect	'I do admire Swedish culture; they have had global industries since the 1930s and 40s. Just think about how many global companies are Swedish … Volvo, Scania, ABB and Ericsson … a country of only eight million people.' (Paulo, manager, Brazil)

> Relationships are not linear; they change according to each project. If projects are good, we have one kind of relationship, but if projects are bad, then relationships are completely different, and so on and so forth. (Carlos, Brazilian chief project manager)

Initially, GDT members tend to reproduce working behaviours from familiar settings in which their perceptions of reality and preconceived stereotyping can have an impact on their work. Changing such habits and stereotypes, however, is far from effortless: it requires team members to identify and work on their differences by interpreting, understanding and assimilating them.

When distinguishing between working relationships and interpersonal relationships, we noted through our observations in the field that working relationships have two axiomatic characteristics of individuals working in this type of environment: they recognise the need to be open-minded to generate and aggregate knowledge, and there is a need to be humble in order to identify and agree on the best options. However, team members also recognise the need to be aware of and to endeavour to learn the basic socialisation norms of the other nationalities involved in the project, thus avoiding biased judgements and stereotypes. Another point to consider is how different targets can trigger conflict. Although disagreement between a team's members can affect cohesion, it can also encourage efficiency because new points of view are explored.

We observed that dyadic interactions reinforced individual behaviours. If team members were able to accommodate one another's behaviours, the relationship was functional; if not, the relationship was dysfunctional. In a dysfunctional situation, introduction of the third culture acted as a mediator, established better integration of the various members and created in the process a complementarity of values.

Our findings show how the Brazilian team members – through their national cultural characteristics and as the third culture – not only mediated relations between the Swedish and French teams but also unlocked the opportunity of launching the VM onto the Brazilian market. We share one of the lived experiences of a Brazilian engineer to exemplify the situation:

> In one of our virtual meetings, the French engineer asked for the floor and said to me, 'Tell him [pointed to the Swedish engineer] that he is wrong' for this and that. Next, the engineer took the microphone and answered to me, 'Tell him [pointed to the French engineer] that he is wrong because …' That is, the three of us in the same virtual environment, the three listening to what everyone was saying, I felt like a judge in the middle of a divorce where the couple does not speak to each other. (Pedro, Brazilian project manager)

We also noticed how the cultural idiosyncrasies of *jeitinho*, *bricolage* and Kalmar team principles mentioned above helped us to make sense of the interactions between the three teams, particularly the role that the Brazilian team played by introducing more flexibility to the interactions between the two other teams. Because of the introduction of the third culture, the Brazilian team was therefore instrumental in promoting complementarity and compromise between the French and the Swedish, acting as a mediator among them (see Table 6 for more details). Ultimately, we noticed that through their national cultures, GDT members were looking for adaptability in the team, resulting in an increase in collaboration.

Work practices and their influence on interactions on GDTs

In our lexical analysis, when we focused on the query 'work', we were also able to identify the implications of introducing a third culture. Our aim was to observe the interplay of different national cultures in work practices. We classified our findings to correlate with work routines based on the principle that the elements of work practices are known as social and organisational norms.

It became evident that each team had its own view of their work focus. The French team identified the truck's engine. As one Brazilian engineer put it when describing a French engineer, they 'first make the engine and then build the truck around it. They are proud of what they do'. The Swedish team focused instead on the process, plans and methods, working with transparency. The Brazilian team focused on the customer, and for this reason tended to view the process holistically to arrive at a result.

To exemplify the differences between the countries, in Table 4 we present the work practices from the perspectives of (D) Renault France, (E) Volvo Sweden and (F) the Brazilian Volvo subsidiary.

In terms of interactions, we found that the relationship between the Swedish Volvo and French Renault teams was marked by conflict born of differences in hierarchical and work processes. There was a more vertical hierarchical structure at Renault France with greater distance between individual team members and less autonomy in communication, internal processes and participation in decision-making. In contrast, there was a flatter hierarchy at Volvo Sweden with greater autonomy, so team members were able to find and suggest answers more quickly. However, in contrast, in terms of decision-making for the market, the French team responded quicker, taking decisions at times based on the intuition of the chief, while the Swedish were more used to evaluating all possible alternatives and discussing them with the team.

Table 5 illustrates the relationships between these work practices inside the Volvo Group. We interpret the 'core' of

Table 4. Elements of context from work practices in the organisation's three sites (Renault, Brazilian Volvo Subsidiary and Volvo)

D	Renault France	Proud; focus on engine	'My job was Renault trucks and my network was Renault trucks, my working place, my friend was Renault trucks, and processes, it was very easy to exchange, to obtain feedback, to react, to share, to trust and after the fusion we all had to invent, to reorganise. And it, it looks quite fuzzy, complex, heavy, long and maybe my first reflex is to be local to be more efficient and to be confident. The first reflex is to be dynamic, to be more dynamic.' (Caleb, manager, France)
E	Volvo Sweden	Transparent; focus on process	'We send an updated agenda prior to the meeting so that everyone knows that these are the specific discussion points for the meeting next week. I think it's giving us a better meeting quality, being responsible for the meeting, and making some preparations.' (Karen, engineer, Sweden)
F	Brazilian Volvo subsidiary	Holistic vision; focus on customer	'We are good at doing the whole, the whole I want to say is the following, is top discuss an idea of cost reduction, play in a multifunctional group, discuss alternatives with production, commercial area, purchasing, engineering, after-market … we are about delivery as a whole!' (Renato, engineer, Brazil) 'We have all the business units and business areas that are spread across Europe. Here we have all the vision, we have everyone together, so our multifunctional work is much more cohesive. I'm interacting much more easily with people and the client.' (Pedro, manager, Brazil)

Table 5. Interaction within the dyads: Focus on work practices

5	Renault France	Conflict oriented	Communication process	Direct versus indirect communication approach	'Here in Sweden, we don't think so much in the hierarchy. But in France, you have it quite different. And also, how we send mails as well. In Sweden, you don't need to go to your manager to get some action from anyone. But in France, you need to go to his manager and tell him.' (John, engineer, Sweden) 'They are more distant and shy in the way they bring the solution. Personally, I am quite direct … if somebody proposes something that is thought of as not good, they will not say directly. They will say, "Okay, maybe it's a good idea." One week later, it becomes not so good, and the week after it's not good at all; see it's more indirect, that's the difference.' (Alexis, engineer, France)
			Managerial style	Participatory planning (evaluating all alternatives) versus intuition (quick response to the market)	'The Swedish people are people who don't want to change anything. For example, we have this PDCA in Volvo, which means "Plan Do Check Act," and the French people translate it as "Please Don't Change Anything."' (François, manager, France)
	Volvo Sweden		Work practices	Climate	'If you take the French and Swedish relationship for example, it is terrible. They compete, let's say they are competing for space, for power, within the company.' (Sergio, engineer, Brazil)
				Hierarchical vs flat	'Their top management is very strong in France, Lyon. The designers can't make their own decisions there. They must go to their manager as well. The manager makes a lot of the decisions. And here at Volvo, we are an organisation, so we are putting a lot of the decisions on the designers and so on.' (Willian, manager, Sweden)
6	Renault France	Outcome oriented	Communication process	More formality in communicating with managers; fluid communication process	'I think the Brazilian team is really good, easy to communicate with, really clear on what they are saying, so that has been very easy.' (Nathan, engineer, France)
	Brazilian Volvo subsidiary		Managerial style	Agility in decision-making	'I identify myself more with the French engineers because of their dynamics. Their dynamism is very similar to ours, dynamism to create, they are audacious with their ideas. I felt a little more audacity, creativity in accepting new concepts.' (Roberto, engineer, Brazil)
			Work practices	Restrictive work environment	'We have fewer resources, we have less funding, so we are more creative. We have to take advantage of these adverse situations.' (Cristiano, engineer, Brazil)
7	Volvo Sweden	Team oriented	Communication process	Open to participate	'I think that we are challenging each other. It's easy just to fall back on old habits, so it's good to have other people's view on things, another angle on things.' (Liam, engineer, Sweden)
			Managerial style	Autonomy	'With Sweden, we already know their modus operandi, you know. The Swede is a guy who likes to have 5,000 meetings before making a decision. They are extremely sure of what they are going to do.' (Ernesto, engineer, Brazil)
	Brazilian Volvo subsidiary		Work practices	Work routines	'We discuss ideas to reduce costs, we take part in multifunctional teams, we discuss alternatives with the production people, with the commercial area, with engineering, with the after-market, and so on and so forth.' (Olivia, engineer Brazil)

the work practices as depicted by the interviewees. Next, we analyse the countries acting together by consolidating quotations that refer to dyadic relationships: (5) Renault France with Volvo Sweden, (6) Renault France with the Brazilian Volvo subsidiary and (7) Volvo Sweden with the Brazilian Volvo subsidiary.

We characterised Renault France and Volvo Sweden's relationship (Relationship 4) as *conflict oriented* for the following reasons: (1) Communication processes: Volvo Sweden's direct communication vs Renault France's indirect communication; (2) Managerial styles: Volvo Sweden's participatory planning vs Renault France management's intuition and quick decision-making; (3) Work environments: Volvo Sweden's democratic and 'flat' environment vs Renault France's more competitive and vertical hierarchy.

We characterised Renault France and the Brazilian Volvo subsidiary's relationship (Relationship 5) as *outcome oriented* because: (1) The communication processes in both organisations are more formal or bureaucratic and the two teams see communication as one fluid process; (2) Managers had similar agility in their decision-making; (3) The teams' work practices are subject to the same work environment restrictions; (4) Creativity is born of the need to overcome the encountered restrictions.

We characterised the Volvo Sweden and Brazilian Volvo subsidiary's relationship (Relationship 6) as *team oriented* because: (1) These nationalities share an open and participative communication style with a team focus; (2) The managerial style for both organisations is the same: they have the autonomy to work democratically, listening to members throughout their meetings; (3) The internal work protocols in both organisations are very similar.

The role of the third culture in interplay between work practices and national cultures

Ultimately, we observed that although respective work practices could sometimes be differentiated, introduction of the third national culture as a mediator promoted complementarity of work values and facilitated effective collaboration. Table 6 illustrates the interplay between work practices and national cultures upon introduction of a third culture. Relationship 4 (work practices) represents Renault France, Volvo Sweden and the Brazilian Volvo subsidiary. Renault France focuses on the engine, Volvo Sweden on the process and the Brazilian Volvo subsidiary on the client, which implies that the third culture (Brazilian) played a *complementary role* between the French and Swedish cultures.

Relationship 8 (national culture) represents France, Sweden and Brazil, with the third culture (Brazilian) reinforcing *complementary values* to work together: by first combining French *bricolage* with Swedish Kalmar teams and then adding Brazilian *jeitinho*, teams found the amalgam needed to collaborate. With the interplay between complementarity and adaptability, we identified the Brazilian *mediation* 'role' as a driver for the collaboration between GDT's members.

In sum, with the inclusion of a third national culture and the analysis of interactions between team members, we observed that the Swedish, French and Brazilian teams complemented each other despite their differences, generating more flexibility and collaboration overall. In this sense, the interplay between work practices and national cultures, mediated by the third national culture, promoted complementarity in roles and values in the three teams, improving work collaboration and advancing the VM project.

The Brazilian team not only mediated relations between the Swedish and French teams but also seized the opportunity to bring a medium-sized truck to market in Brazil. Most of the participants recognised the need for complementarity of their respective roles. Although working in a GDT may be more challenging than working in a non-global team, it may also be more rewarding because GDTs promote continuous collaboration and information and knowledge exchange, as illustrated in the following extracts.

This Brazilian engineer focuses on the challenge of working in a GDT:

> Working in GDTs is more challenging; you share more, you learn more with people of different cultures, with different thoughts, and we are always discovering new things. It's not always easy because our way of working is not similar and we don't have the same challenges or the same energy … we have to manage and understand that. (Renato, engineer, Brazil)

This French engineer highlights that making mistakes helps you learn about people and processes:

> You can make a lot of mistakes with people from other countries, but it's very interesting; you can understand better how they work, their feelings, if they are open or not. (Jean François, engineer, France)

Meanwhile, this Swedish engineer highlights the opportunity to meet new people and learn different ways of working:

> I think it is fun to work globally because you meet a lot of new people, different cultures. Of course, sometimes it can be hard work, definitely. (Karl, engineer, Sweden)

Figure 1 illustrates the relationships between the French, Brazilian and Swedish sites, highlighting two key findings: the work practices of Renault, Volvo and the Brazilian Volvo subsidiary together facilitated collaboration between the members of a GDT, and the countries' respective national cultures together improved collaboration between the members of a GDT.

Table 6. Insertion of a third culture: Interplay between work practices and national cultures

Complementarity of the roles: (engine + process + client)									
4 Workpractices	Renault France	Focus on engine	'They think the engine is the most important part; everything else is built around it. I need an engine to fit a vehicle and not a vehicle to fit an engine. "I am French, and my way of working is the best." It doesn't work like that, you have to compromise, you have to understand others.' (Carlos, manager, Brazil)	Brazilian Volvo subsidiary	Focus on client	'It's good to have this communication with all people, to get the contact, to see all the energy coming from the people and to get this huge work; you know it's like a big train running, and so it's really nice, instructive.' (Hugo, engineer France)	Volvo Sweden	Focus on process	'The Swedish have a more holistic view, let's say, really global, they are concerned with what's going on here in Brazil.' (Enrico, engineer, Brazil)
8 National culture		*Bricolage*	'We start to manage that project … and don't see the project going far and cannot come back, the best way is to reduce parts, diversity, when something sees if you have the same platform, I mean the same chassis for example, if it sends everywhere, you have, if you want to have a specific suspension you can take from France and fix it directly because it's adapted, yes, and the sign of my job, of my office, is Lego: this looks like a Lego, take one fit, because it's the same, it's like that.' (Fernand, engineer, France)		*Jeitinho*	'Mediator? This happened a lot in this project, in this VM project, it happened in a way that it became comical. You know that thing about, when you go to those reconciliation or divorce meetings: tell my husband that, I don't know what I don't know what, tell my wife that. I used to be a comedian.' (Marcelo, team leader, Brazil) 'French and Swedish do not get along very well and it was funny sometimes to see how I did the midfield between French and Swedish in a way that I could not understand why I did that, but I ended up doing it because in the end I was responsible for the project and so I ended up doing it. But there were things that could, they are there, they are close to each other, the same time zone, and it was funny, sometimes as if I had to come from South America, for me to forward the details … anyway.' (Ernesto, engineer, Brazil)		Kalmar teams	'I mean, that is why we should work cross-functionally to get the input from production, from purchase, so we can get the most optimised product for the purposes we had the designers work. It is better because our designer and I are within product development and are focused on one thing, and then we think this feature is cool, and I want to have this and I am working with that. I don't think that production will certainly know certain ways. So that is why it is important to get input from everyone.' (Bryan, engineer, Sweden)
Complementarity of values: bricolage + Kalmar + jeitinho									

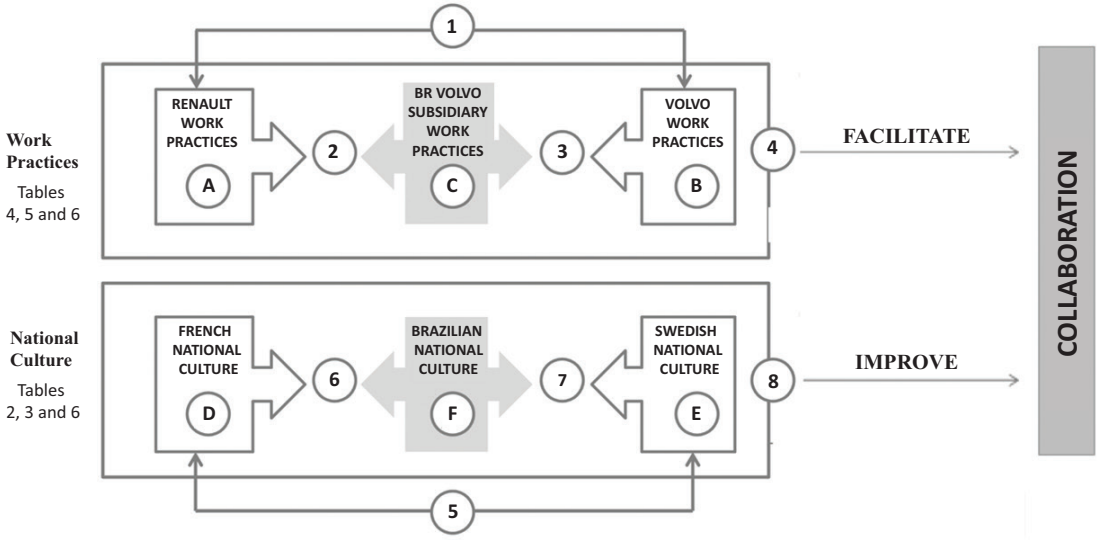

Figure legends:

1 = Work practices: (A) Renault and (B) Volvo
2 = Work practices: (A) Renault and (C) Brazilian Volvo Subsidiary
3 = Work practices: (B) Volvo and (C) Brazilian Volvo Subsidiary
4 = Work practices: (A) Renault and (B) Volvo and (C) Brazilian Volvo Subsidiary

5 = National culture: (D) French and (E) Swedish
6 = National culture: (A) French and (F) Brazilian
7 = National culture: (E) Swedish and (F) Brazilian
8 = National culture: (D) Renault and (E) Swedish and (F) Brazilian

Figure 1. Graphic representation of relationships between the organisation's three sites (France, Brazil and Sweden).

Discussion

With respect to studies on culture and its direct or indirect impacts on the interactions between members of a GDT, we would like to highlight here two points: (1) the significant differences in terms of epistemological and methodological views; (2) the different conceptions of the third culture.

There was a marked difference between studies that adopt a realist perspective in the anthropological tradition, where culture is a system of beliefs and practices, and those studies with a social constructionist perspective in the sociological tradition, which focuses on actors' interpretation or construction of cultures (Vaara, 2000). According to realist authors, cultures are converging around values more typical of Western capitalist societies, where the spread of free-market practices and the intensification of globalisation is diminishing national cultural differences to, ultimately, produce a universal business culture (Taras et al., 2011). However, although authors highlight the signs of cultural convergence, national cultural differences are still profound and are likely to persist in the coming decades. In this paper, we followed the sociological tradition, privileging the constructionist approach. We respect the individuality of the teams and, following our interpretation of participants' stories, identified *complementarity* as the point of interplay between national culture and work practices in a GDT. Consequently, we have reinforced D'Iribarne's (1989, 2009) view that each culture conveys its own tacit conception of social relations, so trying to adapt everything to the local culture, as suggested by Hofstede (1983), will not necessarily work.

A third culture can be interpreted as the result of multicultural teams coming together for a common purpose where they share not only knowledge about their team, the task and similar behaviours, but also values and norms that underlie and guide these behaviours (Adair et al., 2006). Casmir (1997, p. 92) defines this third culture as 'the construction of a mutually beneficial interactive environment in which individuals from two [or more] different cultures can function in a way beneficial to all involved'. Third-culture theory allows the conceptualisation of communication by which hybrid cultures are constructed as a dialectical process, constantly shifting the tensions of its disparate cultural parts (Sobre-Denton, 2017).

We also observe a trend across multiple sciences that indicates that, in many instances, three is better than two, for example: Jensen and Wiley (2006) demonstrated in a collaborative problem-solving study in mathematics that the presence of a third person modified the results, proving that triads outperform dyads; in healthcare, Cazzola and Matera (2014) investigated how to optimise the use of triple therapy in chronic obstructive pulmonary disease; third-party intervention has also played an important role in the management of conflict in organisations (Goldman et al., 2008); in marketing,

adding a third and inferior option to a set of two choices increases the 'preferences for the alternative that it most closely resembles' (Frederick et al., 2014, p. 487); and, in chemistry, inclusion of a third element describes 'catalysed mechanisms', where the catalyst reacts to form an intermediate, which then regenerates the original catalysts in a process (Laidler & Meiser, 1982).

Finally, in our study, we found that the introduction of a 'real' third culture – as opposed to a 'hybrid' one – helped team performance after a merger or acquisition. Cultural integration is crucial to the success of cross-border merger and acquisition integration (Cui et al., 2016). Merger and incorporation processes generate fear and anxiety which, in turn, cause resistance and an atmosphere of little or no collaboration. To minimise this uncertain environment, three cultures should be involved, as the third could act as a mediator to help the two conflicting cultures work together.

Contributions

We have contributed to GDT literature by exploring the interaction of teams with diverse cultures and sites and the role of the third culture. Following Potter et al. (2000), team interaction styles affect performance because they can hinder or enhance the ability of team members to apply their knowledge to perform a task. However, individual teams' expertise will only be utilised if the GDT's overall style of interaction allows it. Where GDTs involve conflicting cultures, introducing a third national culture as a mediator between the members will promote complementarity of their respective expertise and facilitate effective collaboration.

We contributed to management literature by showing that adopting a *third national culture* can facilitate the interaction of two conflicting cultures. What we found in our analysis is that the addition of the third culture alters the interaction between the two other cultures. This corroborates Xie et al. (2016) who found that, although empirical evidence indicates that individuals prefer to forge social ties with people whose traits – education, race, age and sex – match their own, the importance of complementarity is highlighted in a virtual world. It should be noted that the mediation situation in our case study reflects the uniting of the three cultures involved and is not related to any specific national culture. In other words, a national culture does not have a fixed mediation role but, depending on the environment, a third culture may assume that role. However, in this case, the characteristics of Brazilian national culture (with its emphasis on *jeitinho*) contributed directly to the role of mediator.

As a contribution to management practice, we present culture as a 'managerial tool', whereby managers can organise groups of people from three different cultures, with the third acting as a mediator. Such conscious organisation of groups or teams can help to reduce problems encountered in the merger and acquisition process, for example, by maximising the productivity of relationships. In short, we propose that culture can be understood as an *agent of transformation* that has the potential to facilitate or improve collaboration between members of a GDT.

Conclusion

In the context of our case study, we validated the relationship between work practices and national culture for collaboration within a GDT. We identified that national cultural traits – defined as Brazilian *jeitinho*, French entrepreneurial *bricolage* and Swedish Kalmar teams – helped us understand the behaviours between Brazilian workers from Volvo, who were able to embrace new challenges despite tight resource and time constraints. We noticed that work practices facilitate collaboration between a GDT's members, which was reinforced through the complementarity of views inside the team and is consistent with previous theory and research. However, we also found that willingness to work in this environment is fundamental, which means that individuals must be considered as well (Chédotel, 2004). The work practices where they shared understanding (Gressgård, 2011), structure, norms and communication process (Kauffmann, 2015) facilitated collaboration. Even in situations of conflict, more specifically in 'task conflict' (Hinds & Mortensen, 2005), it is possible to support this statement. In this study, the inclusion of a third culture as a mediator promoted not just complementarity of the skills and competencies present but also stimulated flexibility between the GDT's members and thus collaboration within the GDT.

The main limitation of our research is that it is based on a single case study. However, its analytical generalisability means it should be applicable to other GDTs with team members from Brazil, France and Sweden, as well as serve as a trigger to study other cultural interactions between the members of a GDT. Defining precisely the Brazilian *jeitinho* and French *bricolage* concepts remains elusive. We used metaphors, stories and quotes as proxy measures, and our research provided insights into the use and usefulness of these concepts in the GDT context. More work is needed to better understand the role of these concepts in organisation strategies and to establish their level of use in different markets.

As suggestions for future research, we note that the COVID-19 pandemic has forced many employees to work virtually. This sudden change has exacerbated the challenges of leading from a distance, but those challenges have yet to be adequately addressed in management practice literature (Caligiuri et al., 2020). Future research could thus address methods to train managers how to work and lead from a distance and study further the role of culture in collaboration, complementing the research presented in this paper.

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Appendix

VM case study context

The engineering department in Brazil was created in 1980, 3 years after the plant was opened in the industrial district of Curitiba. At that time, Volvo Sweden was developing a new truck with advanced cab features to replace the NL truck line. In Brazil, consumers were fond of the NL, so the responsibility for producing the NL was gradually shifted to Brazil. The Brazil site took full control of production in 1997, when production formally ceased in Sweden. In January 2001, alongside the introduction of the concepts of business units and business areas, the Volvo Group implemented its engineering structure, known as Volvo 3P. The Volvo 3P business unit in Brazil addresses product development, focusing on truck chassis, cabins, electrical systems and vehicle dynamics. Product development works in collaboration with other supporting areas, such as documentation, project coordination and control. Although the structure has the rigour of a matrix organisation, it has implemented areas for project coordination that interact with all other areas. A project is rarely confined to a single area. For instance, it would be hard to isolate the development of only cabins or chassis or, if a seat design is modified, the electrical structure will also need to be modified. In simple terms, all areas interact constantly. In one way or another, every project interacts with Volvo's global structure, as final approvals are dictated at a global level regardless of the project's size and timescale. With regard to project execution, it depends on the nature of the project.

Between 2000 and 2005, global interaction was strong, with elements of projects being developed in Brazil and in Sweden. Between 2005 and 2007, projects were focused on product modification rather than on creation. Such projects became known as 'local projects', although global collaboration was required in specific situations. In 2008 and thereafter, interaction returned as a strong feature, albeit more diversely. For instance, the Brazilian team would work on projects addressing different, non-Brazilian markets. In the past, VdB developed products that were not manufactured in Brazil or that were first made in Europe and then finished in Brazil. In most projects, then, the global organisation was seen as a resource that could eventually be brought on board; currently, the situation has been inverted, with products developed in Brazil becoming a resource for the global organisation.

As the Brazilian structure is much smaller, team integration is visibly stronger, with more involvement and commitment from members fostered by active participation and uncomplicated communication. To a certain extent everyone knows one another's work; it is rare for a team to work in isolation, that is while being oblivious to other developing projects.

The launch of VM in Brazil

After 20 years of producing heavy-duty trucks, Volvo revealed its new line of medium trucks. Some of the components in the VM line came from Renault's medium-range model, the Midlum, which was then modified with a new set of mechanics produced in Brazil, very similar to models offered by Ford and Volkswagen. The basic structure of the truck is as follows: the springs, chassis and brakes are the same as those found in the French Midlum but adapted to Brazilian conditions. The VM was the first semi-heavy model carrying the Volvo brand outside of Europe. Two and a half years were needed to complete the development process in Brazil. The project also relied on support provided by Renault and Volvo engineering in France and Sweden, respectively. The project obtained USD 35 million during the development stage, and an additional BRL 6 million was invested in dealerships and training. To achieve production of 4,000 units per year, a 9,200 m^2 plant extension was built in Curitiba and 200 new jobs were created. With almost 80% of the components being manufactured in Brazil, Volvo produced 20 prototypes; these prototypes travelled 3.8 million km, covering different environments. They were handled by different drivers, and faced comparative tests with other leading brands. With an eye on the market and in search of an optimum model, Volvo studied all available brands carefully before arriving at the ideal composition for the VM: a Motoren-Werke Mannheim (MWM) engine, Eaton clutches and transmission, ArvinMeritor axles, ZF8097 power steering and Suspensys suspension.

The Midlum segment. Volvo VM had five main competitors in the 16–23-tonne single-axle segment and three competitors producing double-axle trucks. The first was the Ford Cargo 1722, and the second was the Mercedes-Benz L-1620, considered at the time to be the ultimate vehicle in this class. Volvo entered the market with an emphasis on its new differentials, chassis and modern cabin.

Volvo–MWM partnership

The engine for the Volvo VM was developed in a partnership between VdB and MWM engineering. A series of adaptations were made to comply with Volvo's strict requirements. The choice of MWM engines for the VM line was a breakthrough. Volvo was pursuing advanced technology, with low maintenance costs and using domestic manufacturers, setting a unique precedent. Some 99% of the MWM 6.10 TCA engines were manufactured in Brazil, which is crucial for domestic manufacturing as it determines whether buyers are eligible for the Finame credit line, subsidised by the Brazilian Development Bank (BNDES). To meet Volvo's strict quality standards, approximately 60 items from the engine had to be adapted, including safe-stop pneumatic functionality and the tubes linking the engine and aftercoolers, which were made of aluminium.