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Emergent Customer Team Performance and Effectiveness: An Ex Post Facto Study on Cognition and Behavior in Enterprise Systems Implementation

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Abstract:

Implementing enterprise systems usually involves a partnership between the customer organization's internal team and an external team with professionals from the technology supplier and the business consultants. On both sides, team performance (a process) and team effectiveness (an outcome) emerge partly due to the unpredictable effects of the interaction between human factors at the individual level. Thus, a team's dynamics and achievements may not fully correspond to its members' individual characteristics—for instance, a modest team may be formed by outstanding individuals, and an outstanding team may be formed by modest individuals. With an ex post facto approach and a case study on a successful ERP customization project, we studied the interaction effects between human factors (here represented by cognition and behavior) that lead to team performance and effectiveness. Moreover, we focused on the customer side of teamwork due to gaps identified in the literature. Individual team members in our study did not score the highest in several cognitive and behavioral measures; thus, we conclude that a high-performance, effective team does not necessarily possess a theoretically ideal cognitive and behavioral archetype. This study further contributes to the ambiguous debate on performance and effectiveness, their emergent nature, and the role of team management.

Keywords: Teams, Projects, Knowledge Work, High-performance Work, Effectiveness, Enterprise Information Systems, Cognition, Behavior, Emergent Properties, Complex Systems, Ex Post Facto Analysis.

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1 Introduction

The *Wunder von Bern* ("the miracle of Bern"), the final match of the fifth Football World Cup, took place on 4 July, 1954, Bern, Switzerland. In the match, the West German squad unexpectedly defeated the legendary Hungarian Golden Team, the Mighty Magyars. West Germany had nearly all amateur players, while Hungary counted on full-time football professionals and achieved great results before and during the cup. The Hungarian players had a reputation for their individual qualities, and the team implemented one of the most revolutionary tactics in football history. However, West Germany played by the rules (they focused on the needed scores to move forward to the final match) while adopting unusual tactics—a mix of fixed and moving roles. In the cup's initial stage, Hungary defeated West Germany 8-3, but the two teams met again in the final match in which West Germany defeated Hungary 3-2.

This case illustrates that a team may achieve its goals even if 1) team members do not excel in professional qualities at the individual level, 2) team members had not worked significantly together before, and 3) the team faces an enormous challenge for the first time. The case also suggests that 4) a team continuously adjusts its performance (a process measure) to situational needs, and 5) team effectiveness (an outcomes measure) represents the ultimate goal in projects. After all, what matters in competitions is winning them. Similarly, organizations can adopt a practical, outcomes-oriented stance when planning how teams will participate in complex business endeavors such as introducing new work routines and new information systems/technology (IS/IT) as part of organizational change. IS/IT-mediated organizational change is critical in business and a classical research topic, but we need to further understand the human side of its success factors (Moura, Dominguez, & Varajão, 2019; Colomo-Palacios, Tovar-Caro, García-Crespo, & Gómez-Berbís, 2010).

In this paper, we discuss the human side of team performance and effectiveness in customized information systems software (CISS) projects. In CISS projects, organizations usually distribute IS/IT professionals into two teams—the in-house customer team and an external team that the technology supplier and the business consultants form. Together, they implement the customer's core business processes on an IS/IT infrastructure and, thus, should understand the vendor's technology, the business environment, and the customer organization's strategic stance. Here, we focus on customer teams because their role in organizations has changed from isolated workers to organizational-change agents (Paré & Jutras, 2004) and because the literature has neglected them (Bellini, Pereira, & Becker, 2016). Since cognition and behavior represent useful categories to address the human side of IS/IT project team performance (Xiang, Yang, & Zhang, 2016; Bellini, Pereira, & Becker, 2012), we used them to craft the following research question (RQ):

> **RQ**: What cognitive and behavioral traits manifest in a high-performance customer team that works with external partners in a successful CISS-type implementation project??

To address this question, we conducted a three-year case study and an ex post facto study with customer team professionals who successfully implemented a large enterprise-wide system (ERP) in a Brazilian organization. We took the measures for team members' cognitive and behavioral archetypes from the most exhaustive review on team cognition and behavior that we know of in the IS/IT literature (Bellini et al., 2012).

The paper proceeds as follows: in Section 2, we provide useful definitions to understand this study, such as the role of people and teams in software development, team members' cognitive and behavioral aspects, the emergent phenomena of team performance and effectiveness, the role of team management and leadership, the customer side of systems implementation, and the theoretical framework that we adopted to address the people traits in customer teams. In Section 3, we discuss the opportunity we had to use that framework in practice to measure the cognitive and behavioral archetype that manifested in a customer team that implemented an ERP system and how the resulting measures may serve as a first reference (benchmark) for high-performance, effective customer teams in implementation projects. In Section 4, we discuss how high-performance work and team effectiveness partly result from team members' cognitive and behavioral traits and whether team members and their manager/leader have conflicting views about performance. In Section 5, we discuss the study's limitations, present suggestions for future studies, and conclude the paper.

2 Literature Review

Enterprise information systems are "industry-specific, *customizable* software packages that integrate information and business process in organizations" (Devadoss & Pan, 2007, p. 352, emphasis added) and "a complex *social* phenomenon that is intricately linked to and complicit in shaping organizational structure and identity" (Alvarez, 2008, p. 203, emphasis added). Such systems help organizations integrate and exchange data and facilitate new ways to implement the organizational routines (Ignatiadis & Nandhakumar, 2007). Thus, researchers have frequently associated organizational change with enterprise information systems (Moura et al., 2019), such as enterprise resource planning (ERP) systems. It follows that, as organizations should differentiate themselves to some degree from their competitors, they need to find a technology vendor that enables ERP customization in many cases. We conceive a general type of enterprise system called customized information systems software (CISS), which a vendor develops for a given organization to implement at least one of its core business processes (see Figure 1).

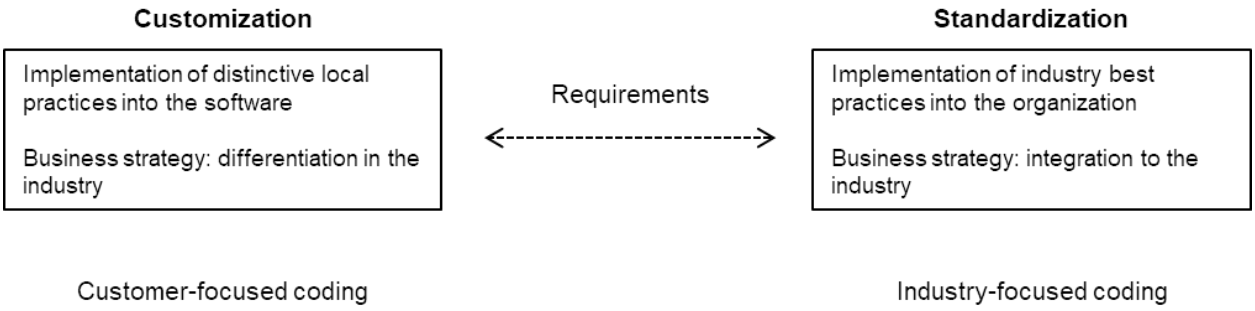

Figure 1. Strategic Requirements Engineering

Organizations develop CISS-type products according to IS development (ISD) principles. ISD professionals typically work in teams (O'Connor & Basri, 2012) and in a project-based fashion (Agarwal, Brown, Ferratt, & Moore, 2006). Moreover, in ISD, team-level interactions give rise to a social perspective about how people work together (Sawyer, Guinan, & Cooprider, 2010), which makes ISD "more of a *social event* than a technical case" (Lu, Xiang, Wang, & Wang, 2011, p. 813, emphasis added). We can frame such a social perspective according to Leavitt's (1965) proposition that four equally important, interdependent dimensions describe any organization: its tasks, technologies, structure, and people. Tasks and technologies form the organization's technical subsystem, while structure and people form its social subsystem. Leavitt's (1965) framework has a long tradition in IS/IT studies (e.g., Grant & Mergen, 1996, Sarker, 2000, Palvia, Sharma, & Conrath, 2001; Bellini et al., 2016) and represents a useful way to frame the human factors (the people dimension) as critical in organizational design. Bellini et al. (2012) further proposed that, in ISD, one can approach the people dimension through a team's cognitive and behavioral archetype and, thus, contribute to understanding ISD team members' personal traits (Siau, Tan, & Sheng, 2010) and how the traits relate to team and project success (Jetu & Riedl, 2012). We discuss these topics in Sections 2.1 to 2.3.

2.1 Cognition and Behavior

We reviewed all studies on teamwork published between 2008 and 2018 in two reputable scholarly sources for team studies—the *Journal of Management* and *Team Performance Management*—in order to frame cognition and behavior as the critical categories that describe Leavitt's (1965) people dimension in ISD. Additionally, in a snowball process, we reviewed the main models that the studies we found cited. We did so to find the critical categories under which we could classify mental phenomena and effective action related to work in order to validate Bellini et al.'s (2012) assumption that cognition and behavior are those critical categories. We found that the literature did not only distinguish between cognition and behavior but also discussed issues such as affect, emotion, mood, motivation, feeling, attitude, and belief. However, we found cognition and behavior as virtually the only constant categories that all studies mentioned. Kozlowski and Ilgen (2006) explained the difficulty in classifying mental phenomena and effective action in just a few categories as follows:

> *Any effort to classify team processes into the cognitive, motivational/affective, and behavioral categories…will have some topics that could potentially fit in an alternate category. The classification simply reflects our judgment of best fit.* (p. 81)

> *Research in the area of collective affect, mood, and emotions in work teams is in its infancy, both conceptually and empirically [so] we must wait and see.* (p. 93)

Kozlowski and Ilgen (2006) perceived cognitive, motivational/affective, and behavioral issues as shaping team processes. By the same token, in their meta-analytical study, DeChurch and Mesmer-Magnus (2010) found cognition, motivation, and behavior as the key factors that influence teamwork effectiveness. They defined motivation as "team members' collective reactions to interpersonal aspects of team functioning" (p. 34) and, thus, in terms of reactions. However, reactions are ambiguous as they can be either mental phenomena or real action. Therefore, the way they defined motivation possibly overlaps with cognition, behavior or both. They also mentioned that "motivational states describe emotional attraction to the team, beliefs about its capability to perform tasks, and the like" (p. 35) and, thus, introduced some terminological complexity in associating motivation with emotions and beliefs. In another work, Salas et al. (2008) reviewed five decades of research on team performance in organizations and posited that teamwork involves various interrelated cognitions, attitudes, and behaviors. However, here again, they did not specify how attitudes differ from either cognitions or behaviors. A final example of terminological complexity is Markus and Kitayama's (1991) seminal work on the self's cultural aspects where cognitions, emotions and motivations constitute the key analytical categories.

On the other hand, many studies have considered only the two categories of cognition and behavior (or similar terminology) as sufficient to describe the human factors at work. For example, Bradley, Baur, Banford, and Postlewaite (2013) examined the behavioral processes and the affective/cognitive states in team dynamics. Mancha, Hallam, and Dietrich (2009) discussed the interplay between stable personality factors and variable human behavior that account for software development performance. In reviewing studies on team performance from the last five decades, Salas, Cooke, and Rosen (2008) discussed measurement issues exclusively for cognition and behavior. Bellini (2018) developed an approach to digital effectiveness wherein an individual's cognitive and behavioral traits (along with the external factors of environmental ergonomics) account for that individual's limitations and capabilities to purposefully use technology. Pak and Kim (2018) discussed the impact of high-performance work on employee attitudes and behavior, and Agrawal (2012) discussed cognitive and behavioral change in team members. Thus, we assume that cognition and behavior are unambiguous, sufficient categories to frame the human factors in teamwork.

2.2 Emergent Team Performance and Effectiveness

We found some confusion in the literature on how to frame performance vis-à-vis effectiveness. We concur with Salas et al. (2008) that performance refers to the process of doing things, while effectiveness refers to the outcomes of performance. Pentland and Feldman (2005) and Kozlowski and Ilgen (2006) also share the process view of performance, while other sources were unclear on this matter (e.g., DeChurch & Mesmer-Magnus, 2010; Nesterkin & Porterfield, 2016; Savelsbergh, Van Der Heijden, & Poel, 2010; Jong & Fodor, 2017; Pak & Kim, 2018; Shin & Konrad, 2017). Another issue concerns the levels of performance and effectiveness, of which performance poses the greatest conceptual and measurement difficulties. One concern involves distinguishing between individual and team performance (Pak & Kim, 2018), and a second concern involves framing the importance of high-performance work units for organizational performance (Shin & Konrad, 2017). We briefly discuss such issues next.

Aghazadeh and Seyedian (2004) viewed high-performance work systems as intimately related with organizational change, socio-technical work design, teamwork, and new technology. They posited that those systems manifest multifunctionality, employee involvement, training, commitment, autonomy, and a permanent need to rethink the workplace, develop new technology, and institutionalize performance-based compensations. In reviewing the literature on high-performance IS/IT teams, Moura et al. (2019, pp. 69-70) found that those teams:

> *Have the right mix of technical and functional expertise and problem-solving, decision-making and interpersonal skills; shape their purposes usually in response to the firms' high management; invest a huge amount of time and effort exploring, shaping and agreeing on a purpose that belongs to them both individually and collectively; translate their purposes into explicit, measurable and attainable performance goals… with purposes and goals building on*

> *one another and being combined with team commitment (are thus result oriented) develop strong commitment to how they will work together to accomplish their purposes (are thus process oriented); hold themselves responsible and accountable, both as individuals and as a team, for the team's performance; have supporting and encouraging leaderships; are highly efficient; and make collective results more important to each individual than individual members' goals.*

As for the antecedents of an IS/IT team's (high) performance, Sudhakar, Farooq, and Patnaik (2011) and Moura et al. (2019) found that soft factors in individual team members and in the team significantly affect team performance. Such findings support our intention to investigate how team members' cognitive and behavioral traits shape team performance in an emergent manner.

Team effectiveness involves a much simpler, empiricist logic since it refers to a team's realized outcomes. One can address team effectiveness with typical project success measures; namely, cost, time, quality (Atkinson, 1999), and different stakeholders' perceptions (Fowler & Walsh, 1999). However, if we consider the literature that has not distinguished between performance and effectiveness, we find several other ways to approach a team's realized outcomes. Jiang, Klein, and Pick (2003) suggested an aggregate measure that included budget, time, expertise deployment, co-work with other organizational units, and overall results. Guinan, Cooprider, and Faraj (1998) presented an aggregate measure that included stakeholder- and team-reported performance. Authors in the IS/IT field have seen team outcomes as an aggregate of perceived performance and discretionary awards (Bezrukova, Jehn, Zanutto, & Thatcher, 2009) or the time to complete an error-free software-modification project (Espinosa, Slaughter, Kraut, & Herbsleb, 2007). In particular, one can view effective teams as "effective intellectual property-producing teams that tend to produce appropriate products on time, on budget, and running the first time" (Petre, 2010, p. 174). Boyd, Huang, Jiang, and Klein (2007) evaluate the effectiveness of IS/IT professionals based on perceptions of the professionals themselves and the technology users with whom they interact. Evaluations may also include ratings from supervisors (Dinger, Thatcher, Treadway, Stepina, & Breland, 2015) and comparisons between employee- and manager-rated employee achievements (Den Hartog, Boon, Verburg, & Croon, 2013). Capretz (2003) have provided another stream of thought in discussing software engineers' personality types. That author concluded that "better software will result from the combined efforts of a variety of mental processes, outlooks and values" (p. 214) but also contended that personality instruments do not accurately predict success. Accordingly, Arnulf (2012, p. 448) posited that "building competence in team reflection processes may be a more practical approach to improving team effectiveness than selection by personality tests". Here, we assume a pragmatic view of team effectiveness by estimating it based on all available indicators of project success that we discuss in Section 3.

The last key aspect of our view on how individuals and teams perform and eventually achieve effectiveness concerns the emergent properties of complex systems. Emergence refers to the aggregation effects in complex systems (Johnson, 2001; Georgiou, 2003); that is, the unpredictable phenomena that emerge from the interaction between parts of a whole. Discernible macrobehaviors (Johnson, 2001) emerge and characterize the whole system's dynamics. In our study, we focus on a specific macrobehavior: how a team systemically performs based on individual team members' cognition and behavior to ultimately produce team effectiveness. Thus, similar to Kozlowski, Chao, Grand, Braun, and Kuljanin (2013) and Kozlowski and Klein (2000), we adopt a perspective in which we approach the whole while also examining its parts. However, mixed views exist on whether high-performance work teams result from those macrobehaviors or if deliberate, orchestrated action can develop them. While Perry, Karney, and Spencer (2013, p. 106) posited that "good teams don't just happen—they still require much effort and intentionality", for Ingvaldsen, Johansen, and Aarlott (2014, p. 294), "[high-performance work systems] may emerge in the absence of managerial or HRM interventions".

Researchers who have assumed that team effectiveness results from emergent team processes (Kozlowski & Ilgen, 2006) have correspondingly considered high-performance work systems to be complex systems and, as such, their behavior to be not a linear sum of individual behavior (Subramony, 2009; Ramos-Villagrasa, Marques-Quinteiro, Navarro, & Rico, 2017; Kozlowski & Ilgen, 2006; Zhang, Cao, & Tjosvold, 2001; Kuppinger, 2016). Consequently, distinct high-performance patterns emerge at the team level (Pak & Kim, 2018). Moreover, the relationship between promoting high-performance practices and realizing performance also constitutes a controversial issue as performance may be a function of past performance (Shin & Konrad, 2017). In any case, we can identify emergent properties in team processes by observing the dynamic interactions among team members that, over time, produce more stable states

represented by collective tasks, self-efficacy beliefs, conflict management, interpersonal cohesion, pride, and trust (Kozlowski & Ilgen, 2006). We can also identify such properties through certain measurable ways in which the highly absorbing, performance-enhancing state of flow manifests (De Moura & Bellini, 2019).

We concur with the emergence rationale for team performance and effectiveness. That is, high performance does not necessarily represent a planned product but an emergent *possibility* in IS/IT work. This view results from the fact that IS/IT professionals work with a good degree of autonomy and voice in organizations (Bellini, Palvia, Moreno, Jacks, & Graeml, 2019) such that they can collectively transcend limitations at the individual level and achieve peaks in performance in unpredictable ways (De Moura & Bellini, 2019). Thus, emergent performance owes partly to each individual's traits (Bravo, Santana, & Rodon, 2015) and to the ways in which managers manage individuals (Gittell, Seidner, & Wimbush, 2010). However, having individually talented members does not guarantee team effectiveness (Mathieu, Tannenbaum, Donsbach, & Alliger, 2014) since non-technical issues also come into play (Park, Spitzmuller, & DeShon, 2013). By the same token, we assume that having less talented individuals does not sufficiently anticipate teamwork failure. That is, we cannot infer team performance and effectiveness merely by considering individual-level factors. As team members work interdependently and interactively (Kostopoulos, Spanos, & Prastacos, 2013), their joint efforts may result in positive effects even if each individual does not perform at a high level. Such an assumption comes from the very reason why teams exist; that is, groups of people whose complementary characteristics enable them to carry out tasks that exceed each individual's ability alone (Osmundson, Michael, Machniak, & Grossman, 2003).

We show the relationship between individual performance, team performance, and team effectiveness in Figure 2. Team performance refers to the process of doing things collectively, which individual team members' performance and interaction effects partly shape, whereas team effectiveness results from performance. Since we address the human factors of organizational work and posit that cognition and behavior represent appropriate categories to describe the human agency in ISD projects, we focus on team members' cognitive and behavioral traits to describe their performance. Thus, we posit that team members' cognitive and behavioral traits as moderated by interaction effects shape team performance and effectiveness.

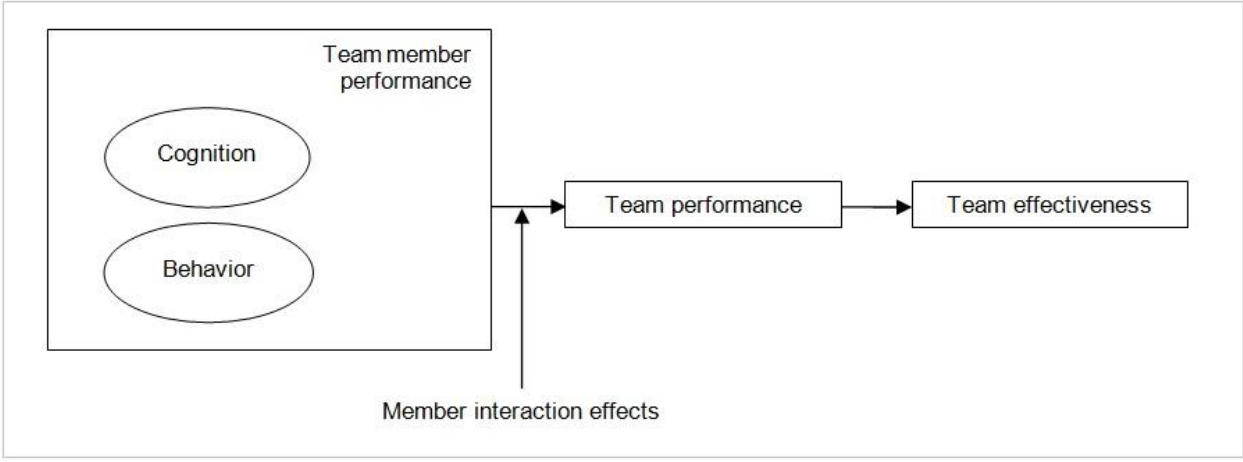

Figure 2. Human Factors that Partly Explain Individual and Team Phenomena

2.3 Team Management, Leadership, and Customer Teams

The emergent nature of team processes (performance) and team outcomes (effectiveness) does not mean that a team can exist without team management and leadership. On the contrary, high-performance ISD teamwork requires effective and supportive management (Ferratt, Ahire, & De, 2006) as people constantly try to understand the environmental norms and adhere to a team culture (Matsudaira, 2019). Thus, besides team members' work routines, teams also need managerial action, which institutionalized leadership roles usually represent. Researchers have framed team leadership as one of three critical antecedents of team performance (the other two being goal clarity and team-learning processes) (Savelsbergh et al., 2010). We borrow from complexity leadership theory (Uhl-Bien, Marion, & McKelvey, 2007) to analyze leadership in ISD-based projects. According to that theory, organizational leadership in

the knowledge economy involves three roles: an administrative role (the more traditional aspects of leadership), an enabling role (leadership concerned with creative problem solving, adaptability, and learning), and an adaptive role (leadership that deals with change). Also, leadership should exist throughout the organization (in the present case, the team) so that each member is empowered to champion learning and innovation (Mendes, Gomes, Marques-Quinteiro, Lind, & Curral, 2016).

The literature on team management and leadership has adopted the ability-motivation-opportunity (AMO) framework (Batra & Ray, 1986; MacInnis & Jaworski, 1989) to characterize the key dimensions of high-performance work (e.g., Obeidat, Mitchell, & Bray, 2016; Jyoti & Rani, 2017; Pak & Kim, 2018), according to which team managers and leaders should organize a work environment that promotes the desired individual abilities (e.g., with training on the job and judicious assignment of workers to roles), motivation (e.g., with performance appraisals and due compensations) and opportunities to act (e.g., with a democratic work environment, flexible work design, and communication channels). Team managers should also provide feedback on individual and team performance (Dinger et al., 2015; Den Hartog et al., 2013). Researchers have additionally suggested to triangulate supervisors' perceptions with team members' perceptions when studying the antecedents of team performance (Moura et al., 2019; Savelsbergh et al., 2010). Indeed, Savelsbergh et al. (2010) found that team leaders have unique perceptions about teamwork. Among the findings, the authors found that team members care less than team leaders about goal clarity and specific competencies; in contrast, team members attribute more importance to behavioral aspects. Team leaders also care more than team members about objective team characteristics related to work. Thus, we conjecture that team leaders focus more on effectiveness (work's outcomes), while team members care more about individual and team performance (the work process).

As for how supervisors and other stakeholders actually assess the IS/IT professionals, Boyd et al. (2007) criticized measures that focus on the ISD process. They advocated for a more balanced measurement approach that includes subjective judgment, surrogate measures, process measures, outcomes measures, and different stakeholders' perspectives. However, their framework leaves some issues open. First, they do not show the rationale behind their seven performance dimensions (work quality, project work, general tasks, interpersonal quality, dependability, teamwork and leadership, and career-related training); thus, we do not know each dimension's criticality, whether and to what extent any two dimensions conceptually overlap, and whether the seven dimensions sufficiently explain performance. Second, their framework seems to have breadth but not depth. Third, their research model does not address project teams. Kappelman, McLean, Johnson, and Gerhart (2014) added to the measurement debate by stating that performance measurement for in-house IS/IT personnel tends to resemble performance measurement for CIOs; that is, the IS/IT professionals are assessed based on the outcomes of using the technology, performing the business operations, and meeting the strategic goals. However, such a perspective does not address the factors behind those outcomes—the factors that actually describe performance or how things are done.

In the present study, we focus on in-house teams from the customer side of CISS-implementation projects because ISD research has not sufficiently examined customer teams (Bellini et al., 2012, 2016). In searching how to measure the performance of customer teams that work in ISD-based CISS-type projects using team members' cognitive and behavioral archetype, we adopted Bellini et al.'s (2012) measurement framework (see Table 1) since, to our knowledge, it compiles ISD-related cognitive and behavioral measures to the most exhaustive extent. Moreover, their framework provides the detail we required to study the factors that Moura et al. (2019) have identified as antecedents of high performance in detail. Following a hierarchical measurement approach, we organize the cognitive and behavioral traits in six indicators (see Table 1). Each measure gives rise to one psychometric question for data collection. We provide an illustrative open-ended data collection instrument in the Appendix—the one we used in our applied study as we describe in Section 3. Readers should note we did not conduct this study to advance the literature on specific cognitive and behavioral traits; rather, we used a compilation of cognitive and behavioral traits available in the literature to discuss the formation of team performance and effectiveness.

Bellini et al.'s (2012) compilation comprises cognitive and behavioral traits that individuals, managers, external partners, and other stakeholders in ISD-based CISS-type projects should have in mind to frame the social subsystem of teamwork. It is a competence map that adds to the repertoire of pre-project agreements between a project's key stakeholders to reduce role ambiguity and, ultimately, improve software project performance (Liu & Chiu, 2017). However, a set of measures, metrics, and indicators does not sufficiently help one manage teams. We should also collect real-world values for the measures in order to estimate how one can expect a successful team to perform in each cognitive and behavioral trait.

Towards that end, the problem now becomes how to identify the reference values for individual cognition and behavior that account for team performance and effectiveness. We can identify such values with a practice-based, heuristic-like, ex post facto procedure, which we explain in Section 3.

Table 1. Cognitive and Behavioral Traits of Customer Teams (Adapted from Bellini et al., 2012)

Indicator	Definition of the indicator and its metrics	Measures in indicator (qty.)
Eligibility	This indicator refers to individuals' structural identity and serves as a pre-screening mechanism to assemble the customer team based on members' more stable personal traits. It includes metrics on personality (Person), trustworthiness (Trust), innovativeness and entrepreneurship (Innov), and expertise and transactive memory (Expert).	17
Risk-averse attitude and social integration	This indicator refers to how individuals conceive their current professional endeavor in the sense of how they align with their company's present needs. It includes metrics on strategic enrollment (RiskStrat), role cherishing (RiskRole), and system championing (RiskSyst).	14
Self-preservation	This indicator refers to how individuals interact with their current business partner based on personal effectiveness and the expedients used to justify pro- and anti-project behaviors. It includes metrics on goal incongruence (GoalInc), psychological self-justification (NfPsycho), social self-justification (NfSocial), sunk cost effect (SCostEff), and completion effect (ComplEff).	11
Transaction costs management	This indicator refers to how individuals transact with their current business partner based on functional effectiveness; that is, it refers to human behavior in business transactions. It includes metrics on contractual relationship (Contract), relationship monitoring (Monitor), and opportunism and information asymmetry (OppAsym).	11
Interpersonal effectiveness	This indicator refers to how individuals justify their behaviors in a professional endeavor (particularly the effectiveness with which an individual reports to an external partner). It includes metrics on organizational proxy (Proxy), collaborative elaboration (CollElab), customer learning (CustLearn), and customer communication and leadership (CustComm).	20
Prospect	This indicator refers to how individuals frame the historical (past and future) perspective of the relationship with their current business partner; that is, the likelihood that an individual will continuously participate in CISS-type projects. It includes metrics on cooperative interdependence (Balance) and partnership propensity (ProPart).	9
Total theoretical traits		
6 indicators	21 metrics	82 measures
Note: terms in parentheses refer to the code of the corresponding metric in the instrument (see the Appendix).		

3 Method

We need empirical studies to understand a team's development process (Perry et al., 2013) and the distinction between the intermediary mechanisms of behavior-based processes and affective- or cognitive-based states in team dynamics (Bradley et al., 2013). Thus, we planned for a long immersion in a CISS-type ISD-based project in which we could study in practice the key concepts that emerged from our literature review for the special case of a customer team (i.e., team members' cognition and behavior, their leadership, and the emergent phenomena of team performance and effectiveness). We conducted a three-year case study on the daily routines of what we later recognized as a high-performance, effective customer team that had co-responsibility for a successful CISS implementation. After the case study, we collected measures on individual members' cognitive and behavioral traits and averaged them to the team level—similar to what Sawyer et al. (2010) did—to identify a cognitive and behavioral archetype that partly *described* team *performance* and *explained* team *effectiveness*. By averaging the measures, we did not offend the complex systems assumption that higher-level measures may not correspond to the sum of individual measures; rather, we used judgement to normalize the measures and characterize team performance (thus, our results include a dose of subjectivity) and measured team effectiveness on a binary scale (i.e., the project succeeded or failed according to several criteria). We additionally collected the team manager's perception about the team's traits and compared it to the team members' average perception.

We justify the long case study as follows. First, we studied a CISS-type project that implemented a fully customized ERP system from the beginning, and such projects typically take a long time. Second, we wanted to examine teamwork's emergent, unpredictable properties that possibly reflect a high-performance work unit's practices; therefore, being able to make such inferences also takes time. We find support for this rationale in Kozlowski et al. (2013, p. 587), who posited that "researchers have to capture teams at pre-formation…, characterize the context…, and then assess the development of the team long enough to capture emergence of the phenomena of interest". Since we could determine the overall team-performance pattern and measure team effectiveness only after the team concluded its work, our study had both a forward orientation (the case study) and a backward orientation (the ex post facto analysis). We assumed that, if the customer team we had access to performed at a high level, then we would reveal reference (benchmark) values for the cognitive and behavioral archetype of customer teams in ISD-based CISS-type projects via measuring its members' traits. Accordingly, we developed an interview protocol to address the member traits, which we make available in the Appendix. The protocol materializes the inventory of cognitive and behavioral traits that we present in Table 1. The values resulting from its application represent empirically verified levels that a high-performance, effective customer team achieved in cognitive and behavioral traits available in the IS/IT literature.

We adopted an ex post facto rationale to characterize team members' individual performance, team performance, and team effectiveness. However, we did not follow a full ex post facto design as we did not compare two or more groups (i.e., two or more customer teams) using statistical models. Ex post facto studies represent a methodological alternative to experiments for studying the complex causes of behaviors in natural settings when certain conditions hold (Kerlinger, 1964; Lord, 1973; Tuckman, 1999) as follows: 1) researchers realize that an effect (the dependent variable) has occurred, which means that 2) they can no longer manipulate its causes (the independent variables) because the causes have already manifested; also, 3) they can use no other experimental control, and 4) randomization is meaningless. As for our study, after we concluded that the team was effective, we investigated its members' cognitive and behavioral archetype by resorting to Bellini et al.'s (2012) measures and by discussing them with key professionals in the project based on the rationale that team members' cognitive and behavioral archetype would partially describe team performance and partially explain team effectiveness. Thus, the only difference between our study and a full ex post facto study concerned the fact that we could not compare our customer team with another successful or unsuccessful team to verify commonalities and differences in team members' cognition and behavior as well as the aggregation effects. However, under certain contingencies, even experiments involve only one group; thus, our research design did not impede an ex post facto study, though it represents a limitation. We did not compare the team in our study with other teams due to the case's uniqueness in terms of complexity (ERP customization), the unpredictable outcomes (project success and the team's high performance), duration (three years), and access factors (our direct interaction with the project's professionals). Accordingly, we could not have possibly examined two or more comparable cases at the same time.

3.1 The Empirical Setting

The unit of analysis was a customer team that co-developed a customized enterprise system (ERP) with a leading worldwide vendor. In that team, we studied its members' cognitive and behavioral traits as factors that partially described team performance and partially explained team effectiveness. We refer to the organization where we studied the team as "the university"—a Brazilian university ranked among the best universities in Latin America. As part of an organizational-change effort that included redesigning its institutional strategy, business processes and market orientation, the university decided to implement an ERP package from a global technology vendor. We refer to the ERP acquisition and implementation project with which the university intended to strengthen its position of technological leadership as "the project". The project implemented the first full academic enterprise system from a leading global vendor in Brazil.

Bellini et al. (2016) characterize the university and the project in detail. In particular, they summarize the university, its strategic orientation, the role that the project played in that strategy, the project's uniqueness in various settings (in Brazil, in Latin America, in the educational sector, and in the global ERP industry), the customer team's high-performance aspects, and the issues that the university needed to manage before, during and after the project regarding 1) the university's business needs that concerned cost, time, and quality; 2) professionals' required expertise; 3) the teams involved; 4) the conflicts between new and old frames of mind in the university; 5) the challenge of customizing the prospective system's source code and functionalities according to the Brazilian academic and legal realities; 6) the contract between the

university, the ERP provider, and the system-implementation consultants; and 7) the expected changes in the relationship between the university and the market.

The university has been a technology leader in Brazil for a long time. It used to develop its own solutions and solutions for other organizations in house, housed one of the largest clusters of IT companies in the country since the 1990s, and advocated for the open-source movement. However, as part of a new strategic orientation, the university decided to outsource the development of a business model inspired in proprietary technology. The university needed a model that aligned with best practices in organizational management as well as technology that would allow it to streamline processes, decentralize decisions, downsize, institutionalize a process-based work routine rather than a system in which departments executed routines, and transform itself into a digital organization. Also, the university decided to institutionalize new strategic practices based on balanced scorecard principles (Kaplan & Norton, 2000); thus, it needed a clear business orientation, data integration, and powerful technology.

After it spent 17 months comparing leading ERP solutions across the world, the university focused on two global players: SAP and PeopleSoft/Oracle. Both companies submitted their proposals, and the university sent professionals in missions to universities in the USA and Uruguay that had implemented either SAP or PeopleSoft/Oracle in order to learn from their experience. Seven months after focusing on those two vendors, the university opted for PeopleSoft/Oracle. We show some criteria that the university considered in the decision in Table 2.

Table 2. Decision Criteria

PeopleSoft/Oracle	SAP
License granted to the organization	License granted to users
More than 600 clients in the educational sector	More than 40 clients in the educational sector
Product “Student Administration” implemented in more than 500 universities	Product “Campus Management” recently launched
Leader in solutions for the educational sector	Global leader in ERP systems
The solution was a reference in human resources management	The solution was a reference in manufacturing management
There was a PeopleSoft partner responsible for the implementation near the university	The SAP partner responsible for the implementation was at that time located 1,100 km away from the university

The university expected to realize many benefits from the ERP implementation (we show some in Table 3). The university estimated it would directly invest US$5 million on the project in the first five years and obtain a return on investment that ranged from 44 to 180 percent in the three years after that. Table 3 also shows the project’s cost centers and the expected losses if the university decided not to implement the ERP system. The project’s executives initially planned to minimize customization to reduce implementation and maintenance costs, but they soon realized it would be impossible to develop a more “vanilla” solution because the Brazilian academic and legal processes have a highly idiosyncratic nature.

The difference in the benefits that the vendor and the university estimated possibly arose due to the vendor inflating the estimates and the customer being skeptical about them. But two other possible explanations exist. First, the vendor presented its numbers based on its experience in other countries since it had no experience with academic implementations in Brazil. No other major player in the ERP industry had that experience either, so more accurate numbers did not exist. Second, the university had not implemented an ERP system before; thus, it had no cue on how a specific technology and related practices would impact it. In such situations, having one’s feet on the ground and assuming minimum benefits that would pay off represents the right thing to do, especially in a highly competitive market such as the college and graduate education sector in Brazil. The last column in Table 3 also shows how long the university needed to realize benefits based on its own estimates. The most important returns (process and cost gains) occurred in the first year after the system’s launch.

We provide the organogram of the project in Figure 3. The ISD professionals worked in the circled unit (i.e., development), but the project’s demands, particularly regarding requirements engineering, could also make them work temporarily in other units of the university. They worked under the PMBOK principles of project scope, time, cost, risk, quality, human resources, communications, procurement, and integration (Project Management Institute, 2004). Team managers and leaders looked after project management and team coordination, but all professionals had training on PMBOK principles.

Table 3. Expected Benefits, Cost Centers, and Potential Losses

Expected benefit	Estimate (ERP industry)	Estimate (The University)	Years to realize the benefits*
Increased course enrollment	up to 50%	3%	3-4
Reduced course drops/withdrawals	10%	5%	5
Reduced rework	25-35%	10%	1
Increased efficiency in allocating resources to projects	25-35%	10%	1
Reduced costs regarding materials and services	2-25%	10%	1
Reduced campaign costs	25-50%	10%	2-3
Attract additional resources	—	10%	5
New cost centers to consider			
Software license and maintenance (ERP, database, operational system, training), consultancy (implementation, change, programming, business modeling), personnel hiring and training, communication tools, IT infrastructure, data center, and a fully featured building for the project			
Expected losses if the university did not implement the ERP			
Delayed solutions to market demands if ever implemented			
Huge investments and risks to integrity to update the old IT infrastructure (approximately 50,000 labor hours, two years, and nearly US$1 million)			
Huge investments and risks to integrity to develop some of the ERP functionalities, such as a Web portal, customer relationship management (CRM), workflow management, data warehouse, and financial management (approximately US$2.2 million)			
It would not implement various new organizational routines			
* Years after system's launch until the university realized the benefits vis-à-vis its own estimates.			

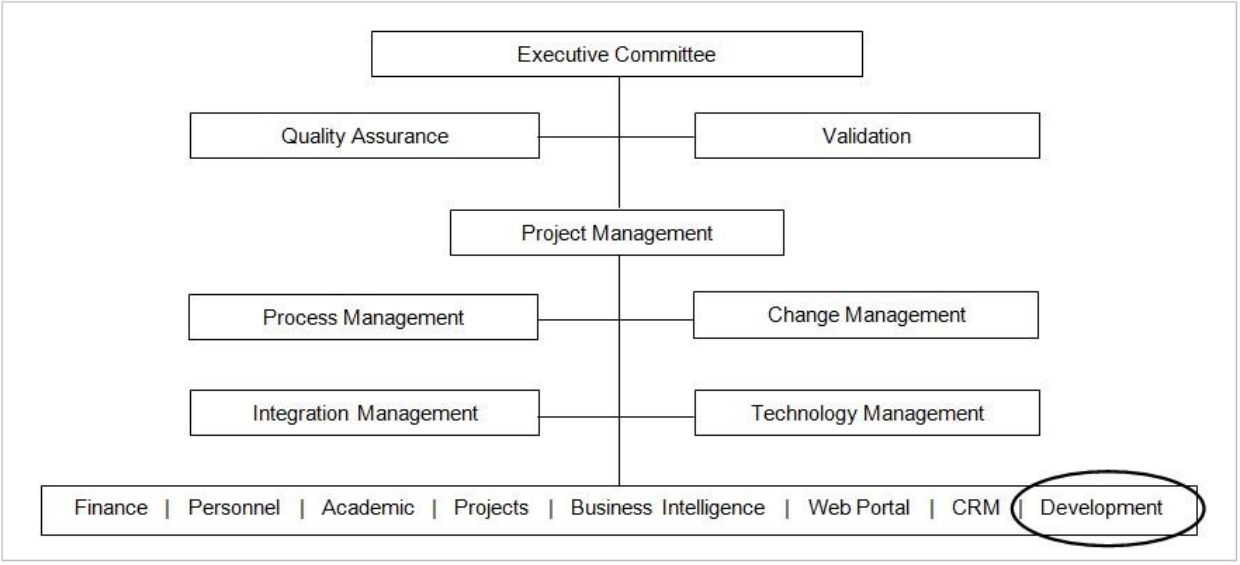

Figure 3. The Project's Organogram

The project's customer team was a project team (Cohen & Bailey, 1997) with high behavioral and informational interdependence (DeChurch & Mesmer-Magnus, 2010). The team both shaped and was shaped by four types of internal and external factors (Sudhakar et al., 2011): technical factors (hardware, software, and other tools), environmental factors (socio, political, economic, and legal issues), organizational factors (organization structure and culture), and soft factors (team climate, team conflict, team diversity, team member competencies, team leader behavior, and top management support). We focus on the soft factors in this study.

Our characterization of the university's customer team in terms of performance and effectiveness is central to our argument since we assume that team members' cognitive and behavioral traits partly explain the emergent team processes and outcomes. To that end, we concluded that the team represented a high-performance and effective unit. We determined its effectiveness based on project outcomes such as those in Table 3 and the perception of multiple stakeholders about those outcomes (details available in Bellini et al., 2016), and we determined its performance based on aggregating individual performance on cognition and behavior. The three organizations involved in the project (the university, the ERP vendor, and the implementation consultancy), the specialized media, and the team itself considered the implemented ERP system as successful according to project and product criteria (Morton & Hu, 2008; Jetu & Riedl, 2012) and rated the implementation team as a high performer. The customer team constituted a high-performance unit since the average performance of all metrics and indicators for the cognitive and behavioral measures ranged from moderate to high, which we discuss in detail in Section 4. As additional evidence for the customer team's performance, different companies hired some members immediately after the project to work in similar projects for the same global ERP vendor, while other members received promotions at the university for outstanding performance. Since the project had largely positive organizational outcomes, we assume that the implementation team as a whole—the customer team included—proved instrumental to its success. The project's chief executive stated on his business website:

> *I managed a project team [with] up to 140 members…divided in 15 teams (sub-projects). We implemented more than 40 ERP Peoplesoft modules in just 18 months…serving…all business support and processes [at The University], such as teaching management, finance, support, research management, and staff management. We also implemented a set of tools of Business Intelligence and a customized Web Portal which covers every solution given by the project. In the same period, we also replaced the Library system by implementing the Fiscal software, and we replaced the agenda systems and corporate mail, connecting them to the Portal and the ERP. This implementation is a world "case" for Oracle/Peoplesoft.*

We also asked the university's CIO to rate the degree to which the team leaders used formal methods to assess the customer team professionals during the project. The CIO provided his bird's-eye view on the methods due to his experience in multiple similar projects for nearly two decades in the industry but also because he had access to confidential information on individual and team issues. According to him, the following methods that Silva, Varajão, Pereira, and Pinto (2017) compiled in combination with other instruments provided positive scores on team performance and effectiveness: personality assessment (graphic rating, and checklist), behavioral assessment (critical incidents, forced choice, behaviorally anchored rating, mixed standard rating, and behavioral observation), comparison assessment (ranking, paired comparison, point rating, and forced distribution), and outcomes assessment (performance standards and management by objectives). The CIO also provided most of the data in Table 3 and commented on how it relates to team effectiveness as follows:

> *The university has met all expected benefits in acceptable time. The main goal of the project was to optimize the use of resources and reconfigure the organization. The university should leave behind a hierarchical culture and work in a matrix-like logic. Attracting new students and retaining the current ones was not a priority, as the university had enough reputation in the market to do this naturally. As an example of a new configuration, the IT department stopped developing solutions for the university and providing data centers for other organizations to become a more internal consulting unit with a whole new set of information-based incumbencies and organizational status. The ERP included the right business model to facilitate the intended reconfiguration. Besides those benefits having been met, it was by the right time too. We can easily see how the benefits are linked to the implementation of the ERP, for instance the gains in process efficiency. The project was the catalyst of a huge transformation in educational units in Brazil regarding business practices such as in organizational governance, costs management, resource usage, and strategic thinking.*

3.2 Data Collection and Analysis

Our data-collection effort began when the first author conducted a three-year case study in which he independently observed the project, its customer team and the interactions with the external team. Based on the case study, we could more deeply understand the university's organizational change strategy, the project's role in that strategy, and how customer team performance emerged in daily routines. Due to ERP

implementations' typically long timeframe and complexity, the customer team and the external team worked in smaller units, and their composition changed from time to time according to the expertise that the project required at different moments. Immediately after the case study (the end of the project), the same researcher carried out in-depth interviews with key professionals in the customer team, including the team manager/leader and chief executive. He conducted these interviews to reveal scores that the professionals would assign to the measures in Table 1 in assessing themselves and their teammates, which resulted in estimates about the team's cognitive and behavioral traits in practice. By interviewing team members and the team manager/leader on the same issues, we followed recommendations in team studies (Moura et al., 2019; Savelsbergh et al., 2010), and, by informing each participant that we would validate their answers against other sources, we also imposed greater responsibility on their data reporting.

The first author worked as an IS/IT faculty member at the university during the project; thus, he had the opportunity to interact weekly with the implementation team. All respondents in the in-depth interviews, except the chief executive, attended at least one of his courses on management information systems and decision support, which included ERP implementation as a course topic. The lectures frequently addressed the project to illustrate concepts, practices, and challenges as the project provided a rare opportunity for students and instructors at the university to learn about ERP implementation, team management, and organizational change. Moreover, each classroom included three students on average who also worked on the project; thus, they could share their actual experiences about coding, development strategies, team dynamics, project indicators, and human factors. Consequently, besides interviewing key informants and experiencing the organizational change in practice for three years, the researcher also had access to fresh facts that students who worked in the project reported. Note that we (i.e., all three authors) did not work on the project; thus, we did not interfere in team dynamics.

Table 4 shows the profile of the participants in the interviews. We set various criteria to review individuals. They needed to have worked in the project during most of its duration and until its end (our respondents participated in the project from 53 to 100% of its duration) and they needed to have considerable experience in the IS/IT profession, at the university, and in their specific role in the project. The interviewer (the first author) also needed to know the participants relatively well since some questions addressed overly sensitive information about their frame of mind and actual behavior. Finally, individuals needed to have worked directly with at least one partner from the external team to understand the difference between working for the technology vendor, the implementation consultants, and the customer organization. Our respondents worked directly with between two and eight external partners except the manager, who had 35 partners in the external team. Eight professionals from the customer team satisfied all requirements, and so we invited them for the interviews. The eight individuals represented the most typical professional roles in ISD (Yang & Tang, 2004) as follows: project manager, system analyst, and programmer. They all also used the university's legacy systems and would likely use the new ERP. Additionally, one participant was a lead user of actual organizational processes that the project would customize in the new system, so she had a prototypist role as well.

The interviews occurred in a single week. We contacted participants to schedule a talk with the interviewer (the first author) in a private room at the university. They received an interview agreement form, and they all allowed the interviewer to audio-record the full conversion. The interviewer did not press the participants in any way to reveal information they did not wish to, to speak differently from how they did normally, or to observe time limits during the interviews. Before starting the conversation, each interviewee received a bookstore coupon in recognition for participation. They did not know that we conceived their customer team as a high-performance and effective unit for having led the project to successful outcomes; thus, the participants did not have a corresponding cognitive bias and could freely express their visions about themselves and the team.

After each interview, we transcribed the audio recordings into a text file. We then applied content-analysis techniques to identify meaningful parts of the text that we could use to help validate the theoretical measures and, at the same time, measure the degree to which each customer team member and the team as a whole manifested the cognitive and behavioral traits of interest. We adapted the revealed causal mapping (RCM) method (Nelson, Nadkarni, Narayanan, & Ghods, 2000) to reveal the assumptions and causal paths that hid in people's minds. RCM can help one analyze complex discourses in particular. Since our respondents responded in a predominantly objective, clear, and sufficient way during the conversations, we found it easy to develop the conceptual and causal maps. We coded meaningful parts of the discourses (the values for the measures) in a spreadsheet according to the indicators and metrics

that we present in Table 1. To assemble the categories from content analysis, we followed two broad procedures: 1) we identified topics of interest to the interviewer/researcher (i.e., conceptually relevant topics) and 2) we identified topics of interest to the interviewee (i.e., practically relevant topics). The interviewer then organized the raw categories from the text notes, and all authors validated the categorization according to their specific expertise in enterprise projects: the first author as a researcher on IS/IT team management, the second author as a researcher on relationship marketing, and the third author as a researcher on project management and measurement approaches.

Table 4. The Participants

Team member	Role in the project	Prior experience in IS/IT	Experience in the university	Experience in the role*	Experience in the project**
Programmer #1	Webmaster	90 months	108 months	18 months	53%
Programmer #2	Webmaster	36 months	36 months	20 months	59%
Analyst #1	Programmer and systems analyst	36 months	68 months	10 months	62%
Analyst #2	Network administrator	-	45 months	34 months	100%
Analyst #3	Webmaster and systems analyst	222 months	120 months	34 months	100%
Analyst #4	Network administrator	30 months	30 months	25 months	74%
Analyst #5	Lead user and business analyst	-	84 months	18 months	53%
Manager	Chief executive	120 months	120 months	34 months	100%

Team member	Internal partners (Qty.)***	External partners (Qty.)***
Programmer #1	15	2
Programmer #2	8	3
Analyst #1	10	8
Analyst #2	10	8
Analyst #3	13	5
Analyst #4	10	8
Analyst #5	8	3
Manager	90	35

* Includes all the member's experience (not restricted to the project) with the corresponding professional role mentioned in column "role in the project".
** The percentage of time regarding the full duration of the project.
*** The partners did not necessarily have the same position in the organizational hierarchy as the team member with whom they interacted on a daily or weekly basis.

We focused on both the conceptual and the applied relevance of the discourses due to the permanent tension between theory and practice when one collects data from practitioners. Therefore, we gathered all good evidence regardless of whether it already existed in the scholarly literature. In other words, when analyzing the text notes, we looked for known concepts (top-down analysis) and emergent concepts (bottom-up analysis). With such a method, we would validate the measures in Table 1 and possibly identify additional measures. At the end of the categorization process, we had identified 202 categories and weighted them according to the strength of the statements that the respondents made. Most categories confirmed the measures in Table 1 (we discuss exceptions in Section 4), and we found no new measures. As for why, we can conceive of two reasons. First, the measures in the interview protocol came from an exhaustive, systematic compilation of relevant literature; thus, we likely obtained the most relevant measures for managing IS/IT teams. Second, interviewees typically find it easier to focus on available information in an interview protocol than to think about possibly missing information, or they simply manifest agreement bias (DeVellis, 2003). We additionally validated the categories with the help of three external judges with academic and industry experience in software engineering. In particular, we asked these judges to individually evaluate the categories and discuss them together in a panel. In the

validation process, we asked the judges to express the degree to which the categories realistically described a high-performance IS/IT team's cognitive and behavioral archetype.

Finally, we normalized and plotted the measures in charts that represent what one may expect from a high-performance IS/IT customer team in terms of team members' cognition and behavior. The normalization procedure relied exclusively on our expertise about measures' importance and magnitude as we inferred from the content-analysis procedure. We needed to conduct the normalization procedure because we used significantly heterogeneous measures (i.e., they referred to different phenomena). Furthermore, subjectivity affected the normalization procedure to some degree as many measures involved social science constructs and our data came from open-ended interviews. We normalized the measures with a common scale that represented the magnitude of each cognitive or behavioral trait in five levels (from low to high). We then weighted each value according to how we perceived the emphasis that each respondent gave to the trait and averaged the values from all respondents for each measure. We then computed the averages for all measures in a metric.

4 Results and Discussion

As this study involved an originally large set of 82 measures that we derived from the same number of open-ended questions, we cannot discuss each measure here. Moreover, as it happens with items in a long survey questionnaire, each measure reflects only a tiny part of the phenomena of interest and, thus, lacks relevance for individual analysis. In this section, we present the measurement results according to their aggregation in metrics. However, since we still had a large number of metrics (21), we briefly discuss the results according to the six higher-level indicators that aggregate the metrics. We show the values of the measures for each metric in each indicator in Tables 5 to 10. We report average values for team members' perceptions and the values for the team manager's perceptions. Each table reflects one of the six indicators and the corresponding metrics. Each metric includes several measures, and each measure corresponds to one question in the open-ended interview protocol (see Appendix).

The first important result concerns scale development because we could qualitatively interpret the 82 theoretical measures. The interviews revealed that we could remove seven measures (Innov2, CollElab3, CollElab5, CollElab6, CustComm3, CustComm5, and CustComm6) and codify 10 measures into four new measures (Contract1 + Contract2, OppAsym1 + OppAsym2, Proxy1 + Proxy2 + Proxy3, and CustLearn1 + CustLearn2 + CustLearn3), which resulted in a 69-item instrument. The reduction in the number of measures did not change the instrument's conceptual structure since we did not remove any metric. Additionally, the removed measures were scattered among several metrics; thus, they also did not affect any metric's integrity.

Subsequently, we plotted the metrics according to their measures' values as we comment on above. We represent the customer team's competence map according to team members and their manager in Tables 5 to 10. We plotted the team's and the manager's perceptions together as a useful way to estimate the real magnitude of the measures since they contrast different perspectives. The manager and his team mostly agreed on the perceived magnitude of the cognitive and behavioral traits of the team, which we assume to describe team performance in this study. However, we expected to find discrepancies as per Savelsbergh et al.'s (2010) findings regarding team managers focusing more on results (effectiveness) and team members focusing more on behaviors (performance). Participants did not seem to overrate the perceptions as if they wanted to legitimize the team's performance possibly due to the proximity between the interviewer and the interviewees and to our informing the participants that we would contrast their perceptions with other sources.

Next, we analyzed the metrics' magnitude with four assumptions in mind. First, we assumed the magnitude that we plotted for an indicator's metrics corresponded to the aggregate degree to which the participants perceived the metrics (traits) manifested in the team, *not* each metric's importance for high-performance teamwork. While Savelsbergh et al. (2010) identified what team managers and team members *value* the most in teamwork, the values that we collected from the interviewees were the perceived *actual* manifestation of cognition and behavior in a high-performance team regardless of particular agents' preferences. Second, we assumed that each measure in a metric had a direction, so the magnitude plotted for each metric refers to the aggregate perceived magnitude in that direction (we clarify what we expected each question in the instrument to measure in the Appendix). Third, we assumed that one should take the magnitudes we reveal in this study as *potentially needed* magnitudes for a customer team to perform at a high level; we cannot easily verify this causal path since we do not have additional

evidence on whether high-performance teamwork could include different magnitudes. Future comparative studies should consider this research opportunity. Fourth, even if team members seem to underperform in certain metrics, we cannot assume that they require corrective action given that the project eventually succeeded. However, we present suggestions to improve performance in such cases.

In terms of eligibility (see Table 5), the team members and manager perceived that the team achieved moderate-high and high levels in traits that made the team members good candidates to work in ISD-based CISS-type projects. Based on the results, a high-performance, effective customer team starts with individuals already prepared with the basic talents regarding personality (Person), trustworthiness (Trust), innovativeness and entrepreneurship (Innov), and expertise and transactive memory (Expert). As such, when assigning individuals to customer teams, one should start with measuring their scores in those typically more stable traits and expect high scores in most measures.

Table 5. Team Performance Regarding the Indicator Eligibility

Metric	Low	Moderate-low	Moderate	Moderate-high	High
Person				TM	M
Trust					Both
Innov					Both
Expert					Both

Note: "TM" represents team members' perceptions, "M" represents the manager's perceptions, and "both" means that both the members and the manager manifest similar perceptions.

In terms of risk-averse attitude and social integration (see Table 6), the team members and manager perceived that the team had moderate, moderate-high, and high awareness about the company's needs in the project. Based on the results, a high-performance, effective customer team may start with individuals who lack awareness about or enthusiasm for the organizational change strategy (RiskStrat) or their stake in it (RiskRole) but who have high adherence to the prospective system (RiskSyst). As such, when assigning individuals to customer teams, one should consider the fit between the individual and the expected IS/IT artifact while also anticipating the need to help the team member see the organization's "big picture" and the expected benefits at the professional and institutional levels.

Table 6. Team Performance Regarding the Indicator Risk-averse Attitude and Social Integration

Metric	Low	Moderate-low	Moderate	Moderate-high	High
RiskStrat			M	TM	
RiskRole			M	TM	
RiskSyst					Both

Note: "TM" represents team members' perceptions, "M" represents the manager's perceptions, and "both" means that both the members and the manager manifest similar perceptions.

In terms of self-preservation (see Table 7), the team members and manager perceived that the team had mechanisms in place to justify participation in the project at moderate, moderate-high, and high levels. Based on the results, a high-performance, effective customer team houses individuals with personal agendas besides the organizational one (GoalInc), especially in terms of how they value the investments already made after a certain moment (NfPsycho) and their external image (NfSocial). As such, when assigning individuals to customer teams, one should consider their preparedness to face failure (maybe through hiring people with success and failure experiences). One may also consider training and enculturating people about projects' economy and organizational strategy so that they can clearly understand that investments made in the past (SCostEff) or the emergence of a project's end (ComplEff) should not blur their commitment to solving the problematic situation that motivated the project even if that means revisiting the project in full.

In terms of transaction costs management (see Table 8), the team members and manager perceived that the team had moderate, moderate-high, and high knowledge about the partnership with the external team in the project. Based on the results, a high-performance, effective customer team may house individuals with limited knowledge about the full dynamics of a joint commitment to authority and responsibility in projects (Contract) and about the expected flow of information to promote quality and reduce time and costs (Monitor). On the other hand, on the positive side, customer team members do not seem to behave

opportunistically in the partnership (OppAsym). As such, when assigning individuals to a customer team, one may consider training them about the roles in the project and how to use each role to address specific needs. One can also use document repositories that address the roles, typical situations that require expertise, and authority-responsibility levels so that team members share information and, thus, minimize asymmetry and inefficiencies.

Table 7. Team Performance Regarding the Indicator Self-preservation

Metric	Low	Moderate-low	Moderate	Moderate-high	High
GoalInc					Both
NfPsycho					Both
NfSocial				TM	M
SCostEff			TM	M	
ComplEff			Both		

Note: “TM” represents team members’ perceptions, “M” represents the manager’s perceptions, and “both” means that both the members and the manager manifest similar perceptions.

Table 8. Team Performance Regarding the Indicator Transaction Costs Management

Metric	Low	Moderate-low	Moderate	Moderate-high	High
Contract			M	TM	
Monitor			Both		
OppAsym*					Both

* We expected this particular metric to have a negative effect; thus, we reverse-coded it.
Note: “TM” represents team members’ perceptions, “M” represents the manager’s perceptions, and “both” means that both the members and the manager manifest similar perceptions.

In terms of interpersonal effectiveness (see Table 9), the team members and manager perceived that the team had a moderate, moderate-high, and high ability to participate in joint projects. Based on the results, a high-performance, effective customer team has individuals prone to engaging in information exchanges (Proxy), integrating different visions (CollElab), and establishing a positive climate for information exchange (CustLearn), but they also seem less skillful in communication abilities with partners (CustComm). As such, when assigning individuals to customer teams, one may include communication-development opportunities while also respecting that personality traits and social constructions may limit communication.

Table 9. Team Performance Regarding the Indicator Interpersonal Effectiveness

Metric	Low	Moderate-low	Moderate	Moderate-high	High
Proxy					Both
CollElab				TM	M
CustLearn					Both
CustComm			TM	M	

Note: “TM” represents team members’ perceptions, “M” represents the manager’s perceptions, and “both” means that both the members and the manager manifest similar perceptions.

Finally, in terms of prospect (see Table 10), the team members and manager perceived that the team had a moderate-high and high agreement level about whether their continued participation in the project and similar endeavors would benefit all parties involved. Based on the results, a high-performance, effective customer team houses individuals who have confidence about their performance (Balance) and about the likelihood that they will participate in similar projects in the future (ProPart). As such, when assigning individuals to customer teams, one should consider hiring individuals with experience in similar projects not only because they develop capabilities through experience but also because multiple experiences may relate to the self-confidence trait we identified.

Table 10. Team Performance Regarding the Indicator Prospect

Metric	Low	Moderate-low	Moderate	Moderate-high	High
Balance				TM	M
ProPart					Both

Note: "TM" represents team members' perceptions, "M" represents the manager's perceptions, and "both" means that both the members and the manager manifest similar perceptions.

After analyzing the six indicators' magnitude, we reviewed the transcriptions again to search for the most prominent aspects in team members' discourse in order to see the big picture of team performance and to verify Savelsbergh et al.'s (2010) insights that managers devote more attention to outcomes-related traits while team members devote more attention to process-related traits. Initially, we found that two aspects dominated the discourses across the six indicators: 1) the importance of communication and knowledge sharing, and 2) the existence of hidden agendas. The first aspect concurs with the fact that technology- and business-related expertise along with technology- and business-related communication precede a team's social capital that leads to high ISD team performance (Lee, Park, & Lee, 2015). Indeed, high-performance ISD teamwork features strong communication skills and knowledge sharing among team members (Lu et al., 2011). Communication quality also seems to explain why team members and the team manager aligned to a high degree in their ratings (Den Hartog et al., 2013), while the respondents may have highlighted knowledge sharing because it represents a critical factor when work involves teams from different organizations with different expertise and insufficient shared history (Pee, Kankanhalli, & Kim, 2010).

The second aspect is less obvious (i.e., the presence of hidden agendas among team members—when personal objectives highly influence one's actions). ERP-implementation projects are part of organizational-change strategies in which individuals try to influence design and implementation to meet their interests (Boonstra, 2006), but we did not expect to find much evidence of hidden agendas in a high-performance unit responsible for such great outcomes as what we found in the project. On the contrary, we expected to find individuals who had an intrinsic motivation to solve customization challenges and participate in the engaging aspects of IS/IT work. However, in analyzing the participants' discourses, we found a type of self-centered rationality that nevertheless did not impede them to act as an effective team. We objectively addressed hidden agendas in self-preservation's measures, but we also found additional evidence for them in different conversations. Although surprising to some degree, hidden agendas represent normal phenomena once people participate simultaneously in different systems, such as their work environment, family, friendship circle, and religious community; as systems overlap in several aspects, different systems demand individuals' attention, with the consequence that decisions and actions will not fully address maximum utility for any system or individual concerned. Importantly, we found that, when deciding on whether to provide the project with potentially useful, privately held information, team members first considered their interests in sharing that information or not; thus, the hidden agendas may have had an invisible influence over the team's performance.

Regarding the team manager's and the team members' focus in the discourses, we did not find enough evidence to support Savelsbergh et al.'s (2010) finding that managers focus more on results and team members focus more on teamwork's behavioral aspects. We conducted our interviews to reveal the magnitude to which cognitive and behavioral traits manifested in a team in order to characterize (high) team performance as an antecedent of team effectiveness; thus, we limited the conversations to those performance measures. However, we expected to find clues about the manager's dominant focus on results (effectiveness) even if we discussed the antecedents (performance). In that sense, the best we found concerned the references that the manager made to the project's expected outcomes as the reason why he constantly participated with the team in managing conflicts, sharing information, and mobilizing the needed competencies, such as when he mentioned "the wall in the horizon" and "at maximum speed" to mean the need to work in the project's planned duration and when he compared the lower costs of having in-house professionals on board as compared to using contractors.

Finally, reflecting on learning represents good project practice (Williams, 2004). Accordingly, we compile additional lessons that we learned for high-performance teamwork from the project in Table 11.

Table 11. Additional Lessons Learned from the Discourses

The team was permanently aware that "the wall is fixed at the deadline" (manager). This fact might have had negative effects on the team about not turning back if needed; that is, sometimes the team moved irrationally forward just because it had to. The manager noted a related phenomenon in saying "the 90%-complete syndrome is real, since we don't realize that we overestimate what is actually done".
Motivating team members to improve their self-organization habits proved a permanent effort, but it did not surpass accomplishing tasks and observing deadlines in importance.
Prior technological knowledge is not as important as learning capability, which relates to the flexibility one needs when faced with technological changes and the pressure for creative solutions.
At the beginning of the partnership between the university and the business consultants, the project's customer team and the external team had stressful interactions, which we found interesting given that animosity in business relationships usually develops through time.
Team members did not recognize the training sessions as effective to solve their concerns about the project. This fact is puzzling since training effectiveness is an important aspect of high-performance work. However, the team proved to have outstanding learning capabilities to perform the tasks and break industry records in ERP implementation.
The contract between the university and the business consultants proved a black box for individuals who did not hold managerial positions. This fact led to losses in productivity as the partners did not promptly solve controversies and tasks sometimes overlapped.
The project was worth every effort and personal sacrifice along the 18-month implementation, although team members considered the rewards insufficient. Their deep involvement with the project relates to the general sense that IS/IT professionals are used to "hard but fulfilling work" (programmer #2) and to "doing nightshifts" (manager). Insufficient rewards, though, conflict with good high-performance work practices. Individuals require appropriate rewards as several professionals made it clear, such as in "overtime payment is a motivational factor" (programmer #2), "being extraverted doesn't mean that you'll always be extraverted… you don't work proactively when credits for performance are not as expected… life is not made of just 'thank you', but also of financial and status benefits…; each individual demands unique attention" (programmer #1), and "my participation in the project was important for me [due to returns]" (analyst #5). On the other hand, team members mutually supported one another in acknowledging their performance at work, which they sometimes considered a form of reward.

In summary, we conclude that customer teams' performance and effectiveness in ISD-based CISS-type projects partly result from cognitive and behavioral factors. Members in high-performance customer teams exhibit an effective—even if not theoretically optimal—combination of the six higher-order traits called eligibility, risk-averse attitude and social integration, self-preservation, transaction-costs management, interpersonal effectiveness, and prospect behavior. Nevertheless, at the same time as personal issues influence customer team members' decisions and actions, we can also expect team management/leadership to keep the team on track in temporary projects (Turner & Müller, 2003). The project likely had such leadership in that the main leader and chief executive proficiently empowered individuals to meet the group's agenda. This important finding relates to complexity leadership theory. Furthermore, he arguably possessed a transformational leader's performance-mediating qualities (Tabassi, Roufechaei, Bakar, & Yusof, 2017) in that he inspired others to transcend their self-interests and focus on shared goals (Zhang et al., 2011). Researchers have recognized transformational leaders as important to promote post-adoption use of enterprise systems (Rezvani, Dong, & Khosravi, 2017), and we acknowledge their importance also during the implementation process. Furthermore, since human-resource practices towards the IS/IT professionals typically depend on their managers' view (Enns et al., 2006) and since managers play an important role in delivering the right messages on expected performance to a team (Pak & Kim, 2018), the good fit that we verified between the project's manager and team members on their perceptions may have institutionalized a favorable work environment to all concerned and, thus, also contributed to team performance and effectiveness. Hence, we need to consider the possible influence of Pygmalion effects; that is, the positive influence that the manager's expectations about his team had on the team's performance (Rosenthal & Jacobson, 1968).

Finally, we note that not all team members positively viewed the project's strategic stance and customer team professionals' performance. The project suffered from occasional and recurrent critiques from individuals and groups concerned with the university's downsizing and market orientation, the large number of people to be managed, their different competencies and conflicting interests, the tight deadlines, insufficient rewards, limited help from the external team, and high turnover rates. Moreover, since the project's customer team comprised only the university's personnel, the sometimes adverse organizational climate had a negative effect on the individuals, which possibly moderated their performance. As such, the reported levels of compliance to the measures, metrics, and indicators may

have been lower than other customer teams would possibly report while not compromising team effectiveness. This finding is not new in the literature as high-performance work systems may correlate with employee anxiety, role overload, and turnover intentions (Jensen, Patel, & Messersmith, 2013).

5 Conclusions

In this study, we take a step toward determining the key cognitive and behavioral traits of members in high-performance customer teams that work with external partners in ISD-based CISS-type projects and how the traits manifest in practice. To do so, we examined a landmark ERP customization project featured in the industry as having established new standards for team performance in those projects. We had access to the full implementation process and to eight key professionals who worked on the project and provided organizationally relevant and personally sensitive information about 82 measures that translate customer team members' cognitive and behavioral archetype into practice. We reduced the measures to 69 in total, and, to facilitate real-world application, we present and discuss their perceived performance according to their aggregation in 21 metrics and six indicators.

The study contributes to theory and practice in several ways. First, at a more conceptual level, we distinguish between team performance and effectiveness and, thus, motivate much deeper analyses of team processes and outcomes. We also conceive performance and effectiveness as emergent properties of complex systems and distinguish between customer teams and external teams, which managers should manage idiosyncratically. Second, at the application level, we verify the degree to which a high-performance customer team manifests cognition and behavior at the individual and group levels and, thus, provide a first reference (benchmark) for those traits' expected magnitude in high-performance, effective customer teams. In this sense, we show that emergent phenomena due to interaction effects have strong influence on group processes and outcomes so that only practice can inform the right mix of factors that lead to project success. For this reason, we recommend ex post facto methodological approaches (after project outcomes exist) to reveal the story behind project success. Lastly, we provide an open-ended interview protocol that other researchers can easily convert into a Likert-type instrument to statistically discuss the cognitive and behavioral traits that we present. Internal and external parties can also use the protocol to benefit from 360-degree appraisals (Savelsbergh et al., 2010).

The values that we gathered for the measures have meaning only if one considers them simultaneously since a particular measure from a particular individual may prove misleading if not contrasted with that measure in other individuals or to other measures in the same individual. That is, complementary individuals and traits rather than individuals that meet and exceed theoretical expectations in all traits characterize high-performance work. Cognition and behavior result from individual constitution and complex personal experiences that limit any one individual to develop all possible traits to optimum degree. Likewise, we cannot precisely foretell the interaction outcomes of particular levels of cognitive and behavioral traits, although we now have a reference as to how traits that individuals and teams possess may look like in a high-performance, effective team.

This study's limitations include the fact that we generalized results based on organizational-change endeavors (Paper & Simon, 2005), on individuals working in a university setting (Pollock & Cornford, 2004), and on high-performance work (Posthuma, Campion, Masimova, & Campion, 2013). Additionally, our data primarily comes from personal discourses, which can contain inaccuracies for many reasons, such as bounded rationality, hidden intentions, and both the interviewee's and the interviewer's communication skills such as in discussing project risks (Keil, Tiwana, & Bush, 2002) and project success (Procaccino, Verner, Shelfer, & Gefen, 2005). The normalization procedure constitutes another limitation since we based it on our own discretion. Moreover, we did not address in full the political factors that possibly intervene in reported work performance, such as power (Sabherwal & Grover, 2010). We addressed such factors to some degree in the self-preservation indicator and when discussing the primacy of self-interests in individuals' agendas.

As for future research, researchers need to extensively survey the cognitive and behavioral traits in the global software industry to reveal idiosyncrasies and commonalities in individual workers, teams, and projects. Future research could also verify whether team performance temporal archetypes that Quigley, Collins, Gibson, and Parker (2018) describe exist in the IS/IT field in order to understand what to expect from team performance over time. Third, researchers could study whether high-performance work practices in IS/IT teams typically emerge naturally or require significant planning and management.

Finally, researchers could study the complementary case of ineffective teams that comprise high-performance individual members—such as Hungary's Mighty Magyars.

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References

Agarwal, R., Brown, C. V., Ferratt, T. W., & Moore, J. E. (2006). Five mindsets for retaining IT staff. *MIS Quarterly Executive*, *5*(3), 137-150.

Agrawal, V. (2012). Managing the diversified team: Challenges and strategies for improving performance. *Team Performance Management*, *18*(7/8), 384-400.

Aghazadeh, S.-M., & Seyedian, M. (2004). The high-performance work system: Is it worth using? *Team Performance Management*, *10*(3/4), 60-64.

Alvarez, R. (2008). Examining technology, structure and identity during an enterprise system implementation. *Information Systems Journal*, *18*(2), 203-224.

Arnulf, J. K. (2012). Organizational change capacity and composition of management teams: A visualization of how personality traits may restrain team adaptability. *Team Performance Management*, *18*(7/8), 433-453.

Atkinson, R. (1999). Project management: Cost, time and quality, two best guesses and a phenomenon, its time to accept other success criteria. *International Journal of Project Management*, *17*(6), 337-342.

Batra, R., & Ray, M. L. (1986). Situational effects of advertising repetition: The moderating influence of motivation, ability, and opportunity to respond. *Journal of Consumer Research*, *12*(4), 432-445.

Bellini, C. G. P. (2018). The ABCs of effectiveness in the digital society. *Communications of the ACM*, *61*(7), 84-91.

Bellini, C. G. P., Palvia, P., Moreno, V., Jacks, T., & Graeml, A. R. (2019). Should I stay or should I go: A study of IT professionals during a national crisis. *Information Technology & People*, *32*(6), 1472-1495.

Bellini, C. G. P., Pereira, R. C. F., & Becker, J. L. (2012). Customer team effectiveness through people traits in information systems development: A compilation of theoretical measures. *International Journal of Human Capital & Information Technology Professionals*, *3*(3), 54-78.

Bellini, C. G. P., Pereira, R. C. F., & Becker, J. L. (2016). Organizational structure and enterprise systems implementation: Theoretical measures and a benchmark for customer teams. *Information Technology & People*, *29*(3), 527-555.

Bezrukova, K., Jehn, K. A., Zanutto, E. L., & Thatcher, S. M. B. (2009). Do workgroup faultlines help or hurt? A moderated model of faultlines, team identification, and group performance. *Organization Science*, *20*(1), 35-50.

Boonstra, A. (2006). Interpreting an ERP-implementation project from a stakeholder perspective. *International Journal of Project Management*, *24*(1), 38-52.

Boyd, M., Huang, S.-M., Jiang, J. J., & Klein, G. (2007). Discrepancies between desired and perceived measures of performance of IS professionals: Views of the IS professionals themselves and the users. *Information & Management*, *44*(2), 188-195.

Bradley, B. H., Baur, J. E., Banford, C. G., & Postlewaite, B. E. (2013). Team players and collective performance: How agreeableness affects team performance over time. *Small Group Research*, *44*(6), 680-711.

Bravo, E. R., Santana, M., & Rodon, J. (2015). Information systems and performance: The role of technology, the task and the individual. *Behaviour & Information Technology*, *34*(3), 247-260.

Capretz, L. F. (2003). Personality types in software engineering. *International Journal of Human-Computer Studies*, *58*(2), 207-214.

Cohen, S. G., & Bailey, D. E. (1997). What makes teams work: Group effectiveness research from the shop floor to the executive suite. *Journal of Management*, *23*(3), 239-290.

Colomo-Palacios, R., Tovar-Caro, E., García-Crespo, Á., & Gómez-Berbís, J. M. (2010). Identifying technical competences of IT professionals: The case of software engineers. *International Journal of Human Capital & Information Technology Professionals*, *1*(1), 31-43.

DeChurch, L. A., & Mesmer-Magnus, J. R. (2010). The cognitive underpinnings of effective teamwork: A meta-analysis. *Journal of Applied Psychology*, *95*(1), 32-53.

De Moura, Jr., P. J., & Bellini, C. G. P. (2019). Shared flow in teams: Team vibration as emergent property, metaphor, and surrogate measure. *Team Performance Management*, *25*(7/8), 440-456.

Den Hartog, D. N., Boon, C., Verburg, R. M., & Croon, M. A. (2013). HRM, communication, satisfaction, and perceived performance: A cross-level test. *Journal of Management*, *39*(6), 1637-1665.

Devadoss, P., & Pan, S. L. (2007). Enterprise systems use: Towards a structurational analysis of enterprise systems induced organizational transformation. *Communications of the Association for Information Systems*, *19*, 352-385.

DeVellis, R. F. (2003). *Scale development: Theory and applications*. Thousand Oaks, CA: Sage.

Dinger, M., Thatcher, J. B., Treadway, D., Stepina, L., & Breland, J. (2015). Does professionalism matter in the IT workforce? An empirical examination of IT professionals. *Journal of the Association for Information Systems*, *16*(4), 281-313.

Enns, H. G, Ferratt, T. W., & Prasad, J. (2006). Beyond stereotypes of IT professionals: Implications for IT HR practices. *Communications of the ACM*, *49*(4), 105-109.

Espinosa, J. A., Slaughter, S. A., Kraut, R. E., & Herbsleb, J. D. (2007). Familiarity, complexity, and team performance in geographically distributed software development. *Organization Science*, *18*(4), 613-630.

Ferratt, T. W., Ahire, S., & De P. (2006). Achieving success in large projects: Implications from a study of ERP implementations. *Interfaces*, *36*(5), 458-469.

Fowler, A., & Walsh, M. (1999). Conflicting perceptions of success in an information systems project. *International Journal of Project Management*, *17*(1), 1-10.

Georgiou, I. (2003). The idea of emergent property. *Journal of the Operational Research Society*, *54*(3), 239-247.

Gittell, J. H., Seidner, R., & Wimbush, J. (2010). A relational model of how high-performance work systems work. *Organization Science*, *21*(2), 490-506.

Grant, D., & Mergen, E. (1996). Applying quality to Leavitt's framework to solve information technology problems: A case study. *Information Technology & People*, *9*(2), 43-60.

Guinan, P. J., Cooprider, J. G., & Faraj, S. (1998). Enabling software development team performance during requirements definition: A behavioral versus technical approach. *Information Systems Research*, *9*(2), 101-125.

Ignatiadis, I., & Nandhakumar, J. (2007). The impact of enterprise systems on organizational resilience. *Journal of Information Technology*, *22*(1), 36-43.

Ingvaldsen, J. A., Johansen, T. S., & Aarlott, M. M. (2014). Emergent HPWS: Why HRM may not be needed to build a high-performance work system. *Team Performance Management*, *20*(7/8), 294-306.

Jensen, J. M., Patel, P. C., & Messersmith, J. G. (2013). High-performance work systems and job control: Consequences for anxiety, role overload, and turnover intentions. *Journal of Management*, *39*(6), 1699-1724.

Jetu, F. T., & Riedl, R. (2012). Determinants of information systems and information technology project team success: A literature review and a conceptual model. *Communications of the Association for Information Systems*, *30*, 455-482.

Jiang, J. J., Klein, G., & Pick, R. A. (2003). The impact of IS department organizational environments upon project team performances. *Information & Management*, *40*(3), 213-220.

Johnson, S. (2001). *Emergence: The connected lives of ants, brains, cities, and software*. New York, NY: Scribner.

Jong, J. P., & Fodor, O. C. (2017). Attuning to individual work routines and team performance. *Team Performance Management*, *23*(7/8), 385-406.

Jyoti, J., & Rani, A. (2017). High performance work system and organisational performance: Role of knowledge management. *Personnel Review*, *46*(8), 1770-1795.

Kaplan, R. S., & Norton, D. P. (2000). Having trouble with your strategy? Then map it. *Harvard Business Review*, *78*(5), 167-176.

Kappelman, L., McLean, E., Johnson, V., & Gerhart, N. (2014). The 2014 SIM IT key issues and trends study. *MIS Quarterly Executive*, *13*(4), 237-263.

Keil, M., Tiwana, A., & Bush, A. (2002). Reconciling user and project manager perceptions of IT project risk: A delphi study. *Information Systems Journal*, *12*(2), 103-119.

Kerlinger, F. N. (1964). *Foundations of behavioural research: Educational and psychological inquiry*. New York, NY: Holt, Rinehart & Winston.

Kostopoulos, K. C., Spanos, Y. E., & Prastacos, G. P. (2013). Structure and function of team learning emergence: A multilevel empirical validation. *Journal of Management*, *39*(6), 1430-1461.

Kozlowski, S. W. J., Chao, G. T., Grand, J. A., Braun, M. T., & Kuljanin, G. (2013). Advancing multilevel research design: Capturing the dynamics of emergence. *Organizational Research Methods*, *16*(4), 581-615.

Kozlowski, S. W. J., & Ilgen, D. R. (2006). Enhancing the effectiveness of work groups and teams. *Psychological Science in the Public Interest*, *7*(3), 77-124.

Kozlowski, S. W. J., & Klein, K. J. (2000). A multilevel approach to theory and research in organizations: Contextual, temporal, and emergent processes. In K. J. Klein & S. W. J. Kozlowski (Eds.), *Multilevel theory, research and methods in organizations: Foundations, extensions, and new directions* (pp. 3-90). San Francisco, CA: Jossey-Bass.

Kuppinger, M. (2016). *Teams: The fundamental unit of twenty-first century organizational performance* (doctoral dissertation). Benedictine University, Lisle, Illinois.

Leavitt, H. J. (1965). Applied organizational change in industry: Structural, technological and humanistic approaches. In: March, J. G. (Ed.), *Handbook of organizations* (pp. 1144-1170). Chicago, IL: Rand McNally.

Lee, J., Park, J.-G., & Lee, S. (2015). Raising team social capital with knowledge and communication in information systems development projects. *International Journal of Project Management*, *33*(4), 797-807.

Liu, J. Y.-C., & Chiu, G. C.-T. (2017). Influence of project partnering on stakeholder role ambiguity and project manager risk perception in information system projects. *Project Management Journal*, *47*(6), 94-110.

Lord, H. G. (1973). *Ex post facto studies as a research method*. Syracuse, NY: Syracuse City School District.

Lu, Y., Xiang, C., Wang, B., & Wang, X. (2011). What affects information systems development team performance? An exploratory study from the perspective of combined socio-technical theory and coordination theory. *Computers in Human Behavior*, *27*(2), 811-822.

MacInnis, D. J., & Jaworski, B. J. (1989). Information processing from advertisements: Toward an integrative framework. *Journal of Marketing*, *53*(4), 1-23.

Mancha, R., Hallam, C., & Dietrich, G. (2009). Self-efficacy in software developers: A framework for the study of the dynamics of human cognitive empowerment. *International Journal of Information Technologies & Systems Approach*, *2*(2), 34-49.

Markus, H. R., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological Review*, *98*(2), 224-253.

Mathieu, J. E., Tannenbaum, S. I., Donsbach, J. S., & Alliger, G. M. (2014). A review and integration of team composition models: Moving toward a dynamic and temporal framework. *Journal of Management*, *40*(1), 130-160.

Matsudaira, K. (2019). How to create a great team culture (and why it matters). *Communications of the ACM*, *62*(6), 42-44.

Mendes, M., Gomes, C., Marques-Quinteiro, P., Lind, P., & Curral, L. (2016). Promoting learning and innovation in organizations through complexity leadership theory. *Team Performance Management*, *22*(5/6), 301-309.

Morton, N. A., & Hu, Q. (2008). Implications of the fit between organizational structure and ERP: A structural contingency theory perspective. *International Journal of Information Management*, *28*(5), 391-402.

Moura, I., Dominguez, C., & Varajão, J. (2019). Information systems project teams: Factors for high performance. *Team Performance Management*, *25*(1/2), 69-83.

Nelson, K. M., Nadkarni, S., Narayanan, V. K., & Ghods, M. (2000). Understanding software operations support expertise: A revealed causal mapping approach. *MIS Quarterly*, *24*(3), 475-507.

Nesterkin, D., & Porterfield, T. (2016). Conflict management and performance of information technology development teams. *Team Performance Management*, *22*(5/6), 242-256.

Obeidat, S. M., Mitchell, R., & Bray, M. (2016). The link between high performance work practices and organizational performance: Empirically validating the conceptualization of HPWP according to the AMO model. *Employee Relations*, *38*(4), 578-595.

O'Connor, R. V., & Basri, L. S. (2012). The effect of team dynamics on software development process improvement. *International Journal of Human Capital & Information Technology Professionals*, *3*(3), 13-26.

Osmundson, J. S., Michael, J. B., Machniak, M. J., & Grossman, M. A. (2003). Quality management metrics for software development. *Information & Management*, *40*(8), 799-812.

Palvia, S. C., Sharma, R. S., & Conrath, D. W. (2001). A socio-technical framework for quality assessment of computer information systems. *Industrial Management & Data Systems*, *101*(5), 237-251.

Paper, D., & Simon, S. J. (2005). Change research: The search for a theoretical construct. *Information Resources Management Journal*, *18*(3), i-vi.

Paré, G., & Jutras, J.-F. (2004). How good is the IT professional's aptitude in the conceptual understanding of change management? *Communications of the AIS*, *14*, 653-677.

Park, G., Spitzmuller, M., & DeShon, R. P. (2013). Advancing our understanding of team motivation: Integrating conceptual approaches and content areas. *Journal of Management*, *39*(5), 1339-1379.

Pak, J., & Kim, S. (2018). Team manager's implementation, high performance work systems intensity, and performance: A multilevel investigation. *Journal of Management*, *44*(7), 2690-2715.

Pee, L. G., Kankanhalli, & Kim, H.-W. (2010). Knowledge sharing in information systems development: A social interdependence perspective. *Journal of the Association for Information Systems*, *11*(10), 550-575.

Pentland, B. T., & Feldman, M. S. (2005). Organizational routines as a unit of analysis. *Industrial & Corporate Change*, *14*(5), 793-815.

Perry Jr., E. E., Karney, D. F., & Spencer, D. G. (2013). Team establishment of self-managed work teams: A model from the field. *Team Performance Management*, *19*(1/2), 87-108.

Petre, M. (2010). Mental imagery and software visualization in high-performance software development teams. *Journal of Visual Languages & Computing*, *21*(3), 171-183.

Project Management Institute. (2004). *A guide to the project management body of knowledge*. Newtown Square, PA.

Pollock, N., & Cornford, J. (2004). ERP systems and the university as a "unique" organization. *Information Technology & People*, *17*(1), 31-52.

Posthuma, R. A., Campion, M. C., Masimova, M., & Campion, M. A. (2013). A high performance work practices taxonomy: Integrating the literature and directing future research. *Journal of Management*, *39*(5), 1184-1220.

Procaccino, J. D., Verner, J. M., Shelfer, K. M., & Gefen, D. (2005). What do software practitioners really think about project success: An exploratory study. *Journal of Systems & Software*, *78*(2), 194-203.

Quigley, N. R., Collins, C. G., Gibson, C. B., & Parker, S. K. (2018). Team performance archetypes: Toward a new conceptualization of team performance over time. *Group & Organization Management*, *43*(5), 787-824.

Ramos-Villagrasa, P. J., Marques-Quinteiro, P., Navarro, J., & Rico, R. (2017). Teams as complex adaptive systems: Reviewing 17 years of research. *Small Group Research*, *49*(2), 135-176.

Rezvani, A., Dong, L., & Khosravi, P. (2017). Promoting the continuing usage of strategic information systems: The role of supervisory leadership in the successful implementation of enterprise systems. *International Journal of Information Management*, *37*(5), 417-430.

Rosenthal, R., & Jacobson, L. (1968). Pygmalion in the classroom. *The Urban Review*, *3*(1), 16-20.

Sabherwal, R., & Grover, V. (2010). A taxonomy of political processes in systems development. *Information Systems Journal*, *20*(5), 419-447.

Salas, E., Cooke, N. J., & Rosen, M. A. (2008). On teams, teamwork, and team performance: Discoveries and developments. *Human Factors*, *50*(3), 540-547.

Sarker, S. (2000). Toward a methodology for managing information systems implementation: A social constructivist perspective. *Informing Science*, *3*(4), 195-205.

Savelsbergh, C. M. J. H., Van Der Heijden, B. I. J. M., & Poel, R. F. (2010). Attitudes towards factors influencing team performance: A multi-rater approach aimed at establishing the relative importance of team learning behaviors in comparison with other predictors of team performance. *Team Performance Management*, *16*(7/8), 451-474.

Sawyer, S., Guinan, P. J., & Cooprider, J. (2010). Social interactions of information systems development teams: A performance perspective. *Information Systems Journal*, *20*(1), 81-107.

Shin, D., & Konrad, A. M. (2017). Causality between high-performance work systems and organizational performance. *Journal of Management*, *43*(4), 973-997.

Siau, K., Tan, X., & Sheng, H. (2010). Important characteristics of software development team members: An empirical investigation using repertory grid. *Information Systems Journal*, *20*(6), 563-580.

Silva, A., Varajão, J., Pereira, J. L., & Pinto, C. S. (2017). Performance appraisal approaches and methods for IT/IS projects: A review. *International Journal of Human Capital & Information Technology Professionals*, *8*(3), 15-28.

Subramony, M. (2009). A meta-analytic investigation of the relationship between HRM bundles and firm performance. *Human Resource Management*, *48*(5), 745-768.

Sudhakar, G. P., Farooq, A., & Patnaik, S. (2011). Soft factors affecting the performance of software development teams. *Team Performance Management*, *17*(3/4), 187-205.

Tabassi, A. A., Roufechaei, K. M., Bakar, A. H. A., & Yusof, N. A. (2017). Linking team condition and team performance: A transformational leadership approach. *Project Management Journal*, *48*(2), 22-38.

Tuckman, B. W. (1999). *Conducting educational research*. Fort Worth, TX: Harcourt Brace College Publishers.

Turner, J. R., & Müller, R. (2003). On the nature of the project as a temporary organization. *International Journal of Project Management*, *21*(1), 1-8.

Uhl-Bien, M., Marion, R., & McKelvey, B. (2007). Complexity leadership theory: Shifting leadership from the industrial age to the knowledge era. *The Leadership Quarterly*, *18*(4), 298-318.

Williams, T. (2004). Identifying the hard lessons from projects—easily. *International Journal of Project Management*, *22*(4), 273-279.

Xiang, C., Yang, Z., & Zhang, L. (2016). Improving IS development teams' performance during requirement analysis in project—the perspectives from shared mental model and emotional intelligence. *International Journal of Project Management*, *34*(7), 1266-1279.

Yang, H.-L., & Tang, J.-H. (2004). Team structure and team performance in IS development: A social network perspective. *Information & Management*, *41*(3), 335-349.

Zhang, X., Cao, Q., & Tjosvold, D. (2011). Linking transformational leadership and team performance: A conflict management approach. *Journal of Management Studies*, *48*(7), 1586-1611.

Appendix: Original Instrument

Here, we report the original instrument we used in open-ended interviews with customer team members and their manager. We gave the following general directions to the respondents:

- Please answer the questions considering your specific role and experience in the project mentioned by the interviewer.
- Be as deep and clear as possible, and do not hesitate to add any comments you consider pertinent. You do not need to feel pressed by time to complete this interview.
- When asked about "the project", please consider the project mentioned by the interviewer.
- When asked about "your partner", please consider your partner at the contractor's project team.
- When asked about "your team", please consider your teammates at your company's project team.
- Similar interviews may be also performed with business managers, IS/IT managers, system analysts, and programmers from all sides of the project (university, technology supplier, business consultants, etc.).

Indicator 1: Eligibility

Metric 1.1: **Personality** (Person)

- Person1: Are you generally talkative and gregarious?
- Person2: Are you generally organized, conscientious and persistent?
- Person3: Are you generally friendly, tolerant, and forgiving?
- Person4: Are you generally secure, enthusiastic, and stable?
- Person5: Are you generally cultured, curious, and imaginative?

Metric 1.2: **Trustworthiness** (Trust)

- Trust1: Should transactions with you be supervised closely?
- Trust2: Do you respect confidentiality of project information?
- Trust3: Is project information received from you trustworthy and relevant?
- Trust4: Do you withhold important project information?

Metric 1.3: **Innovativeness and entrepreneurship** (Innov)

- Innov1: To which extent do your ideas, solutions and decisions generally reflect team, company or industry standards or frames of reference?
- Innov2: To which extent are you driven by detail, efficiency, and conformity to rules in the work environment?
- Innov3: Are you more prone to change or stability in the work environment?
- Innov4: To which extent are your ideas, solutions and decisions generally implemented?

Metric 1.4: **Expertise and transactive memory** (Expert)

- Expert1: Do you have the requisite expertise for the project?
- Expert2: To which extent can you distinguish between effective and ineffective actions for the project?
- Expert3: Do you have a good mental map of your team's expertise?
- Expert4: Does your expertise mix efficiently with your team's and your partner's?

Indicator 2: Risk-averse Attitude and Social Integration

Metric 2.1: **Strategic enrollment** (RiskStrat)

- RiskStrat1: Do you understand the strategic meaning of the project for your company?
- RiskStrat2: Do you enthusiastically adhere to the project's strategic intent?
- RiskStrat3: Are you ready to undertake the organizational change (if) required?
- RiskStrat4: Do you feel like working in a true team with your partner?

Metric 2.2: **Role cherishing** (RiskRole)

- RiskRole1: Can you see the links between the strategic meaning of the project and your role in it?
- RiskRole2: Do you anticipate personal benefits/drawbacks in fulfilling your role in the project?
- RiskRole3: Do you feel responsible for the project's outcomes?
- RiskRole4: Do you feel authoritative in the project?

Metric 2.3: **System championing** (RiskSyst)

- RiskSyst1: Do you understand what the system is expected to do?
- RiskSyst2: Do you have a positive attitude towards the system?
- RiskSyst3: Is your attitude towards the system aligned with your team's presumable attitude towards it?
- RiskSyst4: Is your attitude towards the system aligned with your partner's presumable attitude towards it?
- RiskSyst5: Is the workload expected from you humane and technically reasonable?
- RiskSyst6: Is the time available to working with your partner enough for meeting quality and deadlines?

Indicator 3: Self-preservation

Metric 3.1: **Goal incongruence** (GoalInc)

- GoalInc1: Do you act out of self-interest when working in the project?
- GoalInc2: Would association with failure in the project have an adverse effect on your chance to advance in the company?

Metric 3.2: **Psychological self-justification** (NfPsycho)

- NfPsycho1: Do you repeatedly express support for the project?
- NfPsycho2: Are you extensively involved with the project?
- NfPsycho3: Are you emotionally attached to the project?

Metric 3.3: **Social self-justification** (NfSocial)

- NfSocial1: Would abandonment of the project make you "look bad" to others?
- NfSocial2: Do people inside or outside the company view the project as your "baby"?

Metric 3.4: **Sunk cost effect** (SCostEff)

- SCostEff1: Do you refer to your own past investments in the project as a reason to continue in/with it?
- SCostEff2: Do you feel that a great deal of time, money and other resources was already invested in the project, and that this would be a reason to continue in/with it?

Metric 3.5: **Completion effect** (ComplEff)

- ComplEff1: Do you argue that you have gone too far to quit the project?
- ComplEff2: Do you argue that you are too close to the end to quit the project?

Indicator 4: Transaction Costs Management

Metric 4.1: **Contractual relationship** (Contract)

- Contract1: Do you understand what the relationship with your partner is all about?
- Contract2: Do you understand what the specific outcomes expected from the relationship with your partner are?
- Contract3: Does informal information have a place in the professional relationship with your partner?

Metric 4.2: **Relationship monitoring** (Monitor)

- Monitor1: Do you have a clear picture on the ongoing relationship with your partner?
- Monitor2: Is it easy and pleasurable to work and monitor the relationship with your partner?
- Monitor3: Is it likely easy and pleasurable to work and monitor the relationship with you?
- Monitor4: Does work with your partner flow smoothly along the timeline?

Metric 4.3: **Opportunism and information asymmetry** (OppAsym)

- OppAsym1: Do you conceal negative information from your partner or from top layers in the project/company?
- OppAsym2: Do you distort negative information when reporting to your partner or to upper management?
- OppAsym3: Do you take personal advantage of information in the project?
- OppAsym4: Do you withhold potentially useful information that is not explicitly asked for in the project?

Indicator 5: Interpersonal Effectiveness

Metric 5.1: **Organizational proxy** (Proxy)

- Proxy1: Do you facilitate your partner's learning about your company's business?
- Proxy2: Do you facilitate your partner's learning about your company's business needs?
- Proxy3: Do you facilitate your partner's learning about your company's technology needs?
- Proxy4: Are you prone to contributing (proactively and reactively) with your expertise in the project?

Metric 5.2: **Collaborative elaboration** (CollElab)

- CollElab1: To which extent do you ask about the others' unstated reactions to ideas?
- CollElab2: To which extent do you use multiple ways to describe an idea?
- CollElab3: To which extent do you identify differences that are not obvious to the others?
- CollElab4: To which extent do you focus on understanding or achieving the others' personal goals?
- CollElab5: To which extent do you generate alternatives that meet shared goals of your team and your partner's?
- CollElab6: To which extent do you compare alternatives to fallback positions?

Metric 5.3: **Customer learning** (CustLearn)

- CustLearn1: To which extent does a business dialogue reorient your thinking about requirements?
- CustLearn2: To which extent does a business dialogue question your preconceptions about requirements?
- CustLearn3: To which extent does a business dialogue expand your scope of thinking about requirements?

- CustLearn4: To which extent can a business dialogue change your attitude and behavior in the project?

Metric 5.4: **Customer communication and leadership** (CustComm)

- CustComm1: Do you communicate clearly, accurately and in appropriate time with your partner?
- CustComm2: Are you sensitive to your partner's present needs?
- CustComm3: Do you pay attention to what your partner says?
- CustComm4: Do you deal effectively with your partner?
- CustComm5: Are you a good listener to your partner?
- CustComm6: Do you generally say the right thing at the right time to your partner?

Indicator 6: Prospect

Metric 6.1: **Cooperative interdependence** (Balance)

- Balance1: To which extent do you meet project obligations that directly relate to others?
- Balance2: What is the stake of the total customization effort that you feel responsible for?

Metric 6.2: **Partnership propensity** (ProPart)

- ProPart1: Are you satisfied with your interpersonal performance in the project?
- ProPart2: Do you repute your action towards your partner as of genuine business partnership?
- ProPart3: To which extent friendship is an attribute of the relationship with your partner?
- ProPart4: To which extent quality of working life is an attribute of the relationship with your partner?
- ProPart5: Are you prone to building a mutually beneficial (win-win) professional history with your partner?
- ProPart6: Is it likely that you will choose to work with your partner again in a similar customer-developer contract?
- ProPart7: Is it likely that your partner will choose to work with you again in a similar customer-developer contract?

Interviewee's Profile

Age:

Gender:

Company:

Role in the company:

Role in the project:

Months of IS/IT professional experience (before the project):

Months in the company (before the project):

Months in the project:

Months in the role (during the project):

Size of your team (customer team):

Size of your partner's team (external team):

Main form of interaction with professionals from the external team:

Months interacting with professionals from the external team:

Frequency of interaction with professionals from the external team:

Additional Notes

We used this section to enter any additional notes.

(The interviewer then gave the interviewee the opportunity to add any comment about the topics of the conversation.)

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