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Workgroup Embeddedness and Professionalism among IT Professionals: Impacts on Work-Life Conflict and Organizational Citizenship

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Abstract

Over the course of their careers, IT professionals become embedded in their workplace. In the organizational behavior literature, research has found that job embeddedness provides direct, positive benefits for employers, including lower turnover intention, lower levels of withdrawal behaviors, lower actual turnover, and more. In this paper, we present a more nuanced view, namely that embeddedness among IT professionals may influence the development of professionalized mindsets, which, in turn, has a mix of positive and negative consequences. To understand these relationships, we introduce a concept called *workgroup embeddedness* (WGE). WGE captures how IT professionals become embedded in their organizational workgroup or unit. We report a multiphase study that (1) developed a measure of WGE, (2) established the validity of WGE, and (3) evaluated the implications of WGE among 150 IT professionals using data collected at two points in time. We found that WGE drives an increase in professionalism, which, in turn, increases work-life conflict. Also, we found that both WGE and professionalism positively influence organizational citizenship behaviors. These findings indicate that WGE may play a role in socializing and driving more professionalized mindsets among IT professionals, such as professional identification, which leads to positive outcomes like citizenship behaviors but may come at the expense of negative consequences in professionals' nonwork lives. Post hoc findings highlight that belief in public service and identification with the IT profession influence work-life conflict and organizational citizenship. We conclude with implications for research and practice.

Keywords: Workgroup Embeddedness, Job Embeddedness, Organizational Embeddedness, Professionalism, Professional Identity, Information Technology Professionals, Work-Life Conflict, Organizational Citizenship Behaviors

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1 Introduction

Information technology (IT) labor shortages have long been a concern for organizations, consistently ranking as one of the most important issues for IT managers (Kappelman et al., 2020; Kappelman et al., 2021). IT talent shortages may be growing more intense—in a

survey of technology executives, 57% reported that their top concern was sourcing qualified IT talent (Caminiti, 2021). Such shortages have real impact, with roughly two thirds of surveyed technology executives reporting that scarce IT labor presents a major barrier to the adoption of emerging technologies (Rimol, 2021). Further, according to a recent survey of

1,200 IT professionals, over 70% of respondents were contemplating leaving their jobs within the next year (Dean, 2021). Accordingly, there is a pressing need to understand how organizations can develop stronger social ties with their IT talent as a means of mitigating IT staffing concerns. Such ties are often referred to as embeddedness, which represents deep connections that IT professionals form with their employing organization's social fabric, which encourages staying in the current job and motivates positive organizational behaviors (Lee et al., 2004; Mitchell et al., 2001).

Embeddedness broadly refers to the degree to which individuals become deeply connected to their organizational peers and employment position in the workplace (Lee et al., 2004; Mitchell et al., 2001). Meta-analysis confirms that the workgroup is a particularly powerful referent for attachment and identification when framing individual behavior and work experiences (Riketta & van Dick, 2005). Workgroup embeddedness (WGE) is particularly relevant to IT professionals because their work lives are often centered around interactions with their IT peers at the workgroup level (Riketta & van Dick, 2005). Ranging from Agile to DevOps, the structure of IT professionals' work requires them to depend on peers to pursue IT and organizational goals, such as collaboration and coordination in software development processes (Espinosa et al., 2007; Faraj & Sproull, 2000; Stewart & Gosain, 2006). These repeated group-level interactions often lead the IT staff to form a shared unique social environment and culture within an organization's IT function (Guzman et al., 2008; Guzman & Stanton, 2009).

We consider how embeddedness in IT workgroups shapes IT professionals' work lives—a level of analysis that has received relatively little consideration from information systems (IS) workforce and human resource research. Although embeddedness research broadly encompasses many varying bonds at different levels of analysis (Lee et al., 2004; Mitchell et al., 2001; Ng & Feldman, 2007; Ng & Feldman, 2014), embeddedness research has not conceptualized how professionals form strong ties specifically within their workgroup environment nor examined the potential outcomes of such bonds. As a result, we develop the concept of WGE to understand how IT professionals become enmeshed within the social fabric of their workplace among their organizational IT peers and how their IT peers influence the development of work-related mindsets. We argue that WGE represents a particularly useful level at which the workplace experiences of IT professionals can be considered.

We expect WGE to directly impact IT professionals' workplace experiences and behaviors. For example,

close bonds with IT peers may drive both positive behaviors, such as organizational citizenship, as well as adverse outcomes endemic to the IT workforce, such as work-life conflict (Chen & Karahanna, 2018).¹ However, we know relatively little about the mediating mechanisms through which a highly embedded IT professional may decide to go “above and beyond” for their IT peers. Accordingly, developing a deeper understanding of IT professionals, their work experiences, and their behavior requires understanding their work-oriented mindsets, which may be shaped by strong bonds with their peers. To capture these workplace-oriented mindsets, we rely on concepts that form professionalism (Dinger et al., 2015; Hall, 1968), which include elements of individuals' professional identity (Riemenschneider & Armstrong, 2021), their views of their careers, and how they view the role of their profession in their organization and broader society (Hall, 1968). Although professionalism helps to explain IT professionals' perspective of the importance of their work, we expect that IT professionals' WGE, (e.g., their interactions and bonds with organizational IT peers) will exert more influence on their work behavior and relationship with their employing organization (Moreland & Levine, 2006).

Examining WGE and professionalism in conjunction improves our ability to understand their relative importance among IT professionals. While embeddedness has been connected to numerous outcomes such as job satisfaction and turnover, comparatively less is known about how WGE shapes day-to-day behaviors like organizational citizenship or influences outcomes like work-life conflict. Moreover, because WGE may shape IT professionals' understanding of their organizational experiences and mindsets (Riketta & van Dick, 2005), we expect that studying bonds with an IT professional's workgroup can help us understand how they develop more professionalized mindsets over time. By connecting WGE to professionalism, we can help explain positive behaviors manifested and adverse outcomes experienced by highly embedded IT professionals.

Hence, this paper develops the concept of workgroup embeddedness and integrates it into a nomological network vis-à-vis professionalism and evaluates their joint influence on the workplace experiences and behaviors of IT professionals. To develop a richer understanding of WGE, we ask: *What is workgroup embeddedness? How does workgroup embeddedness influence the development of professionalism and impact the work experiences of IT professionals?*

The paper unfolds as follows: First, we review the literature on embeddedness and elaborate on the concept of workgroup embeddedness. Then, we describe a

¹ In this article we use work-life conflict, as a broader and more inclusive concept than work-family conflict, which has

historically been used in IS workforce literature (e.g., Ahuja 2002; Ahuja et al. 2007; Sarker et al. 2018)

research program that (1) develops the measurement of the WGE construct, (2) evaluates the validity of the construct, and (3) evaluates a research model that examines how WGE extends the nomological network that explains how WGE impacts IT professionals' professionalism and, in turn, a key negative workplace experience (work-life conflict) and a key performance outcome (organizational citizenship behaviors). We conclude by discussing the results of the analysis of the research model and post hoc analyses and offering implications for research and practice.

2 Embeddedness Theory

To frame our study of workgroup embeddedness and its influence on professional mindsets, work behaviors, and experiences, we briefly review existing work on embeddedness. Human resource management research suggests that embeddedness results from internal and external forces that "entangle" employees within specific social fields or, more specifically, professional contexts (Lee et al., 2004; Mitchell et al., 2001). Embeddedness confers feelings of being enmeshed due to mental and social connections to an organization or profession (Mitchell et al., 2001; Ng & Feldman, 2007; Ng & Feldman, 2012). Embeddedness yields numerous beneficial outcomes for employers, including reduced turnover intentions (Bergiel et al., 2009; Crossley et al., 2007), lower turnover rates, higher task performance, and higher contextual performance of employees (Lee et al., 2004).

Embeddedness builds on field theory (Lewin, 1943), which states that various social fields influence individuals' personal and professional lives. A social field is constituted by the various people that participate in and engage with others in the field. A social field can be very broad and involve thousands or millions of people, such as the IT occupation in general, or a social field can be relatively small and include only a handful of individuals, such as a family or a single work shift. Professionals become more embedded in a field over time as they form more social connections with peers, develop better fit with their work environment and expectations, and accumulate benefits that would be difficult to replace (Allen, 2006; Bergiel et al., 2009; Crossley et al., 2007; Felps et al., 2009; Holtom et al., 2006; Holtom & O'Neill, 2004; Lee et al., 2004; Mitchell et al., 2001). These elements of the workplace are valued, and since workers cannot accurately predict work experiences in a different job or organization (Buckley et al., 1998; Simon, 1957), embedded workers are typically reluctant to leave. Embeddedness theory further suggests that highly embedded workers exhibit fewer withdrawal behaviors such as absenteeism and turnover and engage in more positive workplace behaviors such as job performance and organizational citizenship (Lee et al., 2004; Mitchell et al., 2001).

Although embeddedness scholars most commonly use the term job embeddedness (Mitchell et al., 2001), Feldman and Ng (2007) note the conceptual importance of precision in terminology:

In the embeddedness literature, there has been some ambiguity between the constructs of job embeddedness and organizational embeddedness. Because embeddedness in a particular job essentially embeds an individual in the current organization, too, Mitchell, Holtom, Lee, Sablinski, et al. (2001) did not differentiate job embeddedness from organizational embeddedness in much detail. Ng and Feldman (in press) note, though, that whereas job embeddedness implies organizational embeddedness, organizational embeddedness does not necessarily imply job embeddedness; certainly, interjob mobility within an organization is possible, too. Thus, although there is often overlap between job and organizational embeddedness in practice, they are conceptually different constructs. (p. 352)

As evidenced by this discussion from Feldman and Ng, there is some inconsistency in the literature in terms of how various embeddedness concepts are applied and understood. Accordingly, we briefly discuss the various terms that have been applied in the interest of helping to ameliorate any potential disconnect or ambiguity before we continue with our conceptual development.

In their seminal paper, Mitchell et al. (2001) use the term *job embeddedness* as an umbrella term to broadly refer to the extent to which an individual is enmeshed within their employment and local community contexts. Specifically, they define job embeddedness as composed of two major aspects: on-the-job embeddedness and off-the-job embeddedness. On-the-job embeddedness addresses major forces that combine to embed or constrain an individual within their employing organization, including fit with the organization, links to the organization, and organization-related sacrifice, with most items specifically referring to one's organization or company (Lee et al., 2004; Mitchell et al., 2001). Although the on-the-job embeddedness measures do cross various referent foci, such as the job, workgroup, and organization, on-the-job embeddedness is designed to capture a broad array of elements that contribute to embedding an individual within their employing organization. Off-the-job embeddedness is driven by factors such as being married, having a spouse who works outside the home, owning a home, having family in the area, and enjoying the local climate.

Although Feldman and Ng (2007) rightly point out the importance of crispness in the conceptualization of job versus organizational embeddedness, it seems that Mitchell et al. (2001) did not intend to define a

construct that referred to an individual being stuck specifically in one job or position; they write: “job embeddedness represents a broad constellation of influences on employee retention” (p. 1104). In fact, given that fully half of the original job embeddedness construct includes aspects labeled quite specifically as “off-the-job,” it appears that the “job” part of the job embeddedness label was intended more to simply denote one’s employment context in general rather than to specify an exact level of analysis at which the concept should be applied, as with concepts like job satisfaction (Scarpello & Campbell, 1983) or person-job fit (Caldwell & O’Reilly III, 1990), which are designed and measured to be applied specifically at the job level. Job embeddedness might alternatively be labeled employment embeddedness or work embeddedness without invalidating or changing the meaning of the construct.

In the past 20 years, the job embeddedness construct, composed of off-the-job and on-the-job embeddedness, has been used in a variety of ways. Off-the-job embeddedness is now commonly referred to as community embeddedness.² A global job embeddedness measure addresses the overarching concept of job embeddedness as a whole but does not specifically include off-the-job elements (Crossley et al., 2007). Accordingly, the term job embeddedness is, at times, used for what Mitchell et al. labeled as the on-the-job embeddedness component of the original construct. For example, note the extended quotation above from Feldman and Ng (2007), wherein job and organizational embeddedness are discussed in detail without reference to “off-the-job” elements of embeddedness, and consider the global job embeddedness measure from Crossley et al. (2007), which does not include off-the-job or community elements.

We bridge the many threads of embeddedness research by suggesting that organizational embeddedness is a more appropriate term for on-the-job embeddedness, given that most of the items used by the original embeddedness scholars refer to the organization (Lee et al., 2004; Mitchell et al., 2001). In the commonly used global job embeddedness short-form scale developed by Crossley et al. (2007), *all* seven items refer to being attached to one’s organization—the word “job” does not appear in any of the items. Further

highlighting the lack of distinction between on-the-job and organizational embeddedness, organizational scholars have treated the two as empirically synonymous, as evidenced by the inclusion of organizational embeddedness in a meta-analysis of job embeddedness under the category of “on-the-job embeddedness” (Jiang et al., 2012).³ Our view is consistent with Feldman and Ng (2007) regarding the importance of clarity in conceptualization; thus, we use the term *organizational embeddedness* in lieu of on-the-job embeddedness since that is the referent focus more appropriately conceptualized and measured by the on-the-job embeddedness measures (Crossley et al., 2007; Jiang et al., 2012; Lee et al., 2004; Mitchell et al., 2001). Also, importantly, the term organizational embeddedness offers greater clarity and simplicity when discussing the organizational embeddedness concept in regard to similar concepts using the organization as the focus, such as organizational attachment (Riketta & van Dick, 2005).

Accordingly, in professional settings, there are two well-studied forms of embeddedness: (1) job embeddedness, which subsumes organizational and community embeddedness, and (2) occupational embeddedness (see Table 1). Under the umbrella of job embeddedness, *organizational embeddedness* is the component within professional settings and occurs when an IT professional connects with organizational colleagues, fits with organizational culture and work demands, and sacrifices meaningful value when leaving the organization (Lee et al., 2004; Mitchell et al., 2001; Ng & Feldman, 2007). In terms of the overall IT profession, *occupational embeddedness* would result from social connections with others in the IT field, fit with IT work and cultural characteristics, and the sacrifices incurred by leaving the IT profession (Ng & Feldman, 2009).

We direct attention to an understudied form of embeddedness called workgroup embeddedness, which addresses how an individual professional may become embedded among peers within a specific workgroup, team, or function in an organization. WGE is a form of organizational embeddedness with a specific focus: the workgroup.⁴

² Although community embeddedness has demonstrated implications for reducing turnover and absenteeism (Lee et al. 2004; Mitchell et al. 2001), we focus on embeddedness within the organization since meta-analysis results indicate stronger and more consistent organizational outcomes for “on-the-job” forms of embeddedness (Jiang et al. 2012).

³ For example, Jiang et al. (2012) include organizational embeddedness in the meta-analysis under the label “on-the-job embeddedness” (p. 1095).

⁴ If job embeddedness research precisely measured embeddedness specifically at the job level, workgroup

embeddedness would be positioned between organizational embeddedness and the level of conceptualization implied by the term *job* embeddedness (see Feldman and Ng 2007). As discussed above, since job embeddedness includes both on-the-job and off-the-job embeddedness, and since on-the-job embeddedness conceptualizes and measures embeddedness within the organization overall, we focus on positioning workgroup embeddedness in relation to the term organizational embeddedness in order to avoid confusion.

Table 1. Embeddedness Constructs

Construct	Definition and usage
Job embeddedness	A broad set of forces that influence employee retention, composed of fit, social links, and sacrifices from both on-the-job embeddedness and off-the-job embeddedness (Mitchell et al., 2001).
Organizational embeddedness	Refers to the “on-the-job” component of job embeddedness from Mitchell et al. (2001), and represents how an individual can become enmeshed within an organization due to the confluence of fit, social links, and sacrifices in the firm
Community embeddedness	Refers to the “off-the-job” component of job embeddedness in Mitchell et al. (2001), and represents how an individual can become enmeshed within a community or geographic area due to the confluence of fit, social links, and sacrifices in the local environment
Occupational embeddedness	A broad set of forces that influence an individual to stay in their profession, composed of fit, social links, and sacrifices within the occupational field (Ng & Feldman, 2007).

WGE implies that professionals can move between positions within their department or organizational unit but would find it difficult to leave the organization entirely. Much like organizational and occupational embeddedness, the concept of workgroup embeddedness can be applied to any professional field.

Naturally, the concern arises regarding the merit of studying a workgroup embeddedness construct that is nested within the concept of organizational embeddedness. The management and organizational behavior literatures have a history of conceptualizing and leveraging constructs applicable at both the organizational and workgroup level. For example, van Kippenberg and van Schie (2000) study the impact of both organizational identification and workgroup identification, finding that workgroup identification was the stronger correlate with several important individual-level outcomes, including job satisfaction, job involvement, job motivation, and turnover intentions. In a meta-analysis of workgroup attachment and organizational attachment, Riketta and van Dick (2005, p. 493) summarize five major reasons why the workgroup may be a more powerful focus for attachment than the organization: (1) workgroups offer a context where individuals can be recognized as unique but also part of the social group; (2) individuals spend more time with the workgroup, are more familiar with the workgroup, and are therefore more likely to perceive the workgroup as being more similar to themselves than the organization; (3) individuals are more likely to consider the workgroup to be the more salient group membership (compared to organizational membership) since individuals spend more time interacting with people who are outgroup members relative to the workgroup (i.e., other non-workgroup organizational workers) than with outgroup members relative to the organization (i.e. people who work for other organizations); (4) organizations are trending toward

flexible teamwork and group-level work processes; and (5) the workgroup is more cognitively relevant regarding individual experiences at work. Meta-analysis results indicate that outcomes are more strongly influenced when there is a match between the level of the attachment, workgroup, or organization, and the level of the outcome, such as group-related outcomes or organization-related outcomes. However, meta-analysis results also demonstrate that the workgroup is generally the more salient social unit because workgroup attachment was overall stronger than organizational attachment (Riketta & van Dick, 2005).⁵ In total, our conceptualization of workgroup embeddedness parallels these streams of research from the management and organizational behavior literatures by positioning a workgroup-level construct that may more saliently relate to aspects of an IT professional’s workplace experiences.

WGE offers multiple potential opportunities for understanding IT professionals over a more broadly defined and measured organizational embeddedness concept. First, WGE focuses on the social group in an organization that is most proximal and relevant (Lawler, 1992) to individual IT professionals—their immediate peers and colleagues in their workgroup. An extensive body of knowledge addresses the importance of group-level characteristics and processes on many different individual, group, and organizational outcomes, including topics such as workgroup cohesiveness (Mullen & Copper, 1994), workgroup diversity (van Knippenberg & Schippers, 2007), and workgroup moods (Bartel & Saavedra, 2000). Furthermore, given the propensity for workgroups to form distinct group cultures (Hurley, 1995; Levine & Moreland, 1991; Patel & Conklin, 2012), there is a potential for group-level culture to create a distinct work environment that contributes to embedding professionals in a workgroup.

⁵ For an in-depth discussion of the distinction between workgroup embeddedness and workgroup attachment,

workgroup identification, and workgroup commitment, see Appendix A.

As workgroups socialize new members (Anderson & Thomas, 1996) into the workgroup and workgroup culture (Levine & Moreland, 1991), such socialization may not only strengthen embeddedness within the workgroup but may also influence the formation of work and career-related mindsets and attitudes. Additionally, research demonstrates the importance of social attachment and belonging at the workgroup level, finding that strong group attachments contribute to positive outcomes such as more OCBs (De Cremer & van Knippenberg, 2002; den Hartog et al., 2007). Although the concept of WGE may be applicable in any field, we believe it may be of particular value to understanding IT professionals, given their close relationships with peers in work teams or groups (Faraj & Sproull, 2000; Stewart & Gosain, 2006). Additionally, WGE may be an appropriate concept for shedding light on the factors framing IT professionals' career paths, potentially explaining why some IT professionals have an IT career in one organization for long durations—perhaps due to high WGE—whereas other professionals in IT professional and secondary labor markets transition into IT and back out of IT within two to three years on average (Joseph et al., 2012)—again, perhaps driven by low WGE.

The workgroup embeddedness concept may prove especially useful for understanding modern business environments that are undergoing transitions toward boundaryless work (Kost et al., 2019) and the gig economy (Ashford et al., 2018) because workgroup embeddedness allows for examining how workers might become embedded within an organizational group or function for an employer, without necessarily being tied to one specific job or position. Workgroup embeddedness could account for how individual professionals may become embedded within a specific function or type of work within an organization, such as IT, marketing, or accounting, without being tied to a more traditional and tightly defined job. We believe understanding workgroup embeddedness could be beneficial for the study of any profession that requires close teamwork or coordination to, for example, support IT infrastructure or use IT to enhance or reengineer firm processes or software development (Faraj & Sproull, 2000; Stewart & Gosain, 2006).

3 Workgroup Embeddedness

We define WGE as a function of (1) a feeling of closeness and strong social bonds with peers in the

workgroup, (2) fit with the workgroup, and (3) the tangible and intangible utility that would be sacrificed if one left the workgroup. WGE connects IT professionals to their employing organizations and, like other forms of embeddedness, suggests that this connection can lead to positive outcomes in employees' work lives and for the organization (Allen, 2006; Bergiel et al., 2009; Crossley et al., 2007; Felps et al., 2009; Holtom et al., 2006; Lee et al., 2004; Mitchell et al., 2001) (see Table 2).

WGE encompasses more than the tightly bounded organization-specific factors implied by traditional definitions of job embeddedness. Where conventional job embeddedness focuses on the narrow constraints of a specific job (Mitchell et al., 2001), WGE offers a broader perspective useful to IT professional experiences in the workplace and includes how IT professionals may move between jobs along a technical career path (Joseph et al., 2012). At the same time, WGE creates a more defined construct space to account for professional experiences and the impact of strong social bonds with local peers than can be captured by the concepts of organizational or occupational embeddedness (Ng & Feldman, 2007), which focuses on broad ties to an employer or profession, respectively.

3.1 WGE Dimension One: Social Links and Belongingness

The social links construct refers to the number of social contacts that an IT professional has within their organization. The desire to stay in a firm generally increases with the number of contacts. Traditionally, the social links construct is conceptualized and measured as a simple count of a person's social connections in the organization (Felps et al., 2009; Lee et al., 2004; Mitchell et al., 2001) and does not consider the nature (e.g., quality, strength) of the connections (Zhang et al., 2012).⁶ Considering the quality of social connections is essential because close emotional relationships are more proximal behavioral drivers than more distant relationships in organizations (Ashforth et al., 2016). In this area, embeddedness research has attempted to improve the measurement of the social links aspect of embeddedness by including the affective quality of relationships (Hom et al., 2010; Murphy & Hom, 2008), although these measures have not gained traction in the broader embeddedness literature.

may have varying strengths and purposes. At the group level, we argue that the *sense of belonging* is more theoretically appropriate for the social context. The sense of belonging also benefits from being a simpler, more concise measure that is more practical for future researchers to leverage.

⁶Although some embeddedness scholars advocate for improving the measure of social links through the application of sophisticated social network metrics (Zhang et al. 2012), we argue that such social network approaches are more logical to apply when considering an individual's broader set of connections within the overall organization, where a wide variety of social connections

Table 2. Workgroup Embeddedness Definitions

Embeddedness	Workgroup embeddedness	Expanded implications
Social links: The number of connections between a person and other people or groups (Mitchell et al., 2001)	Social links: The quality and extent of social relationships formed within the IT function and the organizational processes it supports (Baumeister & Leary, 1995).	By considering belongingness theory, we account for the <i>quality</i> of social relationships, not just quantity. By accounting for quality and explaining why people develop and value relationships, the revised conceptualization offers a deeper understanding of why IT professionals value these close social ties to peers and act accordingly.
Fit: The perceived compatibility or comfort with an organization and the work environment (Mitchell et al., 2001)	Fit: The level of perceived compatibility with IT work demands, the fulfillment of personal desires, and similarity between individual and social characteristics within the IT function (Kristof-Brown et al., 2005).	Modified to capture notions of complementary and supplementary fit that are characteristic of IT professionals' jobs.
Sacrifice: The perceived potential cost of material or psychological benefits forfeited by leaving (Mitchell et al., 2001)	Sacrifice: The levels of <i>tangible</i> and <i>intangible</i> benefits derived from remaining within the organization's IT function that would be forfeited by leaving (Dinger et al., 2012; Mobley, 1977).	The revised conceptualization considers utility theory to focus on the value derived from staying in the workgroup. Utility theory explains why IT professionals are reluctant to sacrifice tangible and intangible benefits and provides a theoretical foundation for this dimension.

Theory suggests that the quality of relationships is more important than the number of social contacts (Baumeister & Leary, 1995), and research highlights, in particular, the positive workplace outcomes realized when individuals feel a sense of belonging with their workgroup (De Cremer & van Knippenberg, 2002; den Hartog et al., 2007). Such social connections are essential to consider in IT work. IT staff members particularly value perceived support from peers (Ertürk, 2014) and typically identify with the IT group more than the broader organization (Guzman et al., 2008; Guzman & Stanton, 2009).

Groups provide IT professionals with a sense of social acceptance and assurance (Lee & Robbins 1995)—for example, around shared values about IT (Rao & Ramachandran, 2011) or through bonding with peers within a unique IT work environment (Guzman et al., 2008; Guzman & Stanton, 2009). Belongingness theory (Baumeister & Leary, 1995) explains that when IT professionals feel connected to their IT peers, they will feel a sense of safety because groups often protect the welfare of group members (Ainsworth, 1989). Accordingly, this feeling of acceptance and belonging provides useful reassurance in the face of demanding work obligations. For example, this sense of belongingness helps IT professionals reconcile the gap between their perceptions of the IT function as essential versus their managers' perceptions of the IT function as a service and therefore makes them more resilient to the pressure of taking on challenging tasks, making difficult requests, or dealing with demanding end users (Rao & Ramachandran, 2011).

Beyond resilience to pressure, belonging to the IT group strengthens IT professionals' ability to locate the necessary expertise or seek advice on solving a technical problem (Baumeister and Leary 1995; Faraj & Sproull, 2000). IT professionals that have close bonds with peers may have developed useful social capital in the form of more advanced information channels and an understanding of which peers are likely to provide helpful guidance (Coleman 1988; Faraj & Sproull, 2000). Therefore, IT professionals may be more willing to turn to trusted peers versus managers to help resolve technical issues or business problems (Rao & Ramachandran, 2011). Therefore, because of a desire for safety, acceptance, and access to resources, IT professionals are likely to highly value belonging to an IT group, and higher levels of belongingness generally foster a higher level of embeddedness within the workgroup.

3.2 WGE Dimension Two: Fit

Fit refers to an IT professional's "perceived compatibility or comfort with an organization and with his or her environment" (Mitchell et al., 2001 p. 1104). Research on workgroups has found that new entrants to a group are socialized into and adapt to the group culture (Anderson & Thomas, 1996; Levine & Moreland, 1991). IT professionals' supplementary and complementary fit (Cable & Edwards, 2004; Kristof-Brown et al., 2005; Kristof 1996) with an IT group's culture contributes to their embeddedness within their employing organizations. When IT professionals share the norms and values of their IT peers, they exhibit a higher supplementary fit with the IT group and the

culture of the IT function (Guzman et al., 2008; Guzman & Stanton, 2009). For example, within a specific firm, the IT group may have norms regarding dress and work hours. Complementary fit refers to an IT professional's ability to fulfill IT-specific responsibilities within the organization (Chilton et al., 2005). For instance, an IT professional may feel particularly valued if they possess extensive technical knowledge that is required by the organization (Guzman et al., 2008; Guzman & Stanton, 2009). Hence, high levels of fit with the IT group would be expected to drive higher levels of embeddedness within the workgroup.

3.3 WGE Dimension Three: Sacrifice and Utility

Sacrifice refers to “the perceived cost of material or psychological benefits that may be forfeited by leaving” an organization (Mitchell et al., 2001 p 1105). Sacrifice is captured in IT professionals' estimates regarding the value of their jobs, and utility theory suggests that IT professionals evaluate the perceived utility of their current job vis-à-vis the perceived utility of an alternative job (Dinger et al., 2012). IT professionals may be reluctant to leave high utility jobs, but are more likely to leave when other jobs offer greater utility (Dinger et al., 2012; March & Simon, 1958; Mobley, 1977; Porter & Steers 1973).

An IT professional's job utility is a function of a job's tangible and intangible value (Mobley 1977). When considering alternative positions, IT professionals estimate the value of tangible factors such as compensation and career development policies (Ferratt et al., 2005), as well as intangible factors such as respect from colleagues (Mitchell et al., 2001). These estimates may be based on what the IT professional considers desirable aspects of IT work—for example, a casual work environment, flexible hours, or opportunities for advancement. Utility associated with the workgroup increases the perceived sacrifice associated with leaving, which increases workgroup embeddedness. By distinguishing between tangible and intangible benefits that may be sacrificed, we draw attention to how IT professionals derive utility from their work. In terms of salary and related financial perks like retirement contributions or healthcare coverage, a tangible benefits package may be easy to quantify and compare between alternative jobs. However, intangible benefits, such as being respected by peers or flexible work hours, may be harder to quantify when considering an alternative position.

Our conceptualization of WGE advances the IT workforce literature in two ways. First, our conceptualization of WGE offers a useful perspective

on how IT professionals may become attuned to the social structures and characteristics of work in the IT profession (Dinger et al., 2015) as well as the idiosyncrasies of the IT occupational subculture that may be present within individual firms (Guzman et al., 2008; Guzman & Stanton, 2009). Second, WGE offers a perspective on how IT professionals progress along IT career paths (Joseph et al., 2012). IT professionals may transition through a progression of technical IT jobs while staying within the IT function—encouraged, perhaps, by strong WGE—or they may ultimately transition into more business-oriented roles outside of the IT function—resulting, perhaps, from weak WGE. Such progression to greater responsibility and expectations may also explain why IT professionals may ignore personal obligations outside work—increasing work-life conflict (Dinger et al., 2010). This conceptualization of WGE also offers a unique contribution to management and organizational behavior research, in general, by suggesting a concept useful to understand how professionals in any field may become embedded within a local workgroup or department composed of professional peers.

4 Workgroup Embeddedness and IT Professionals' Work Lives

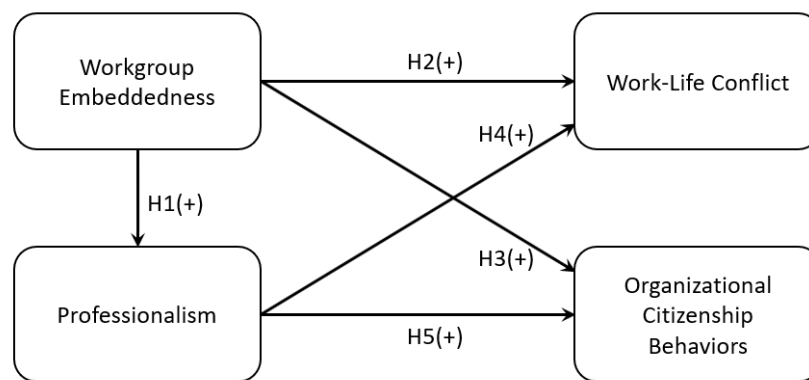
To understand the implications of WGE, we performed a three-stage analysis process. First, we used a pilot study to validate an operational measure of the construct and then conducted a study of IT professionals using data gathered at two points in time. The sequencing of studies, data samples, and associated steps of analysis are presented in Table 3. Our two-phase pilot study provided an initial understanding of the reliability and validity of our proposed constructs. The full study, using data collected from a panel of 150 IT professionals at two points in time, placed WGE within the broader nomological network of negative outcomes (work-life conflict) and behaviors or behavioral intention (organizational citizenship behaviors). The description of our two-phase pilot analysis is presented in Appendix B.

4.1 Full Study: WGE, Attitudes, and Behaviors

This section maps the full nomological network illustrating the proposed impact of WGE on professionalism, work-life conflict, and organizational citizenship. First, we consider the impact of WGE on the formation of professionalism among IT workers. Second, consistent with organizational behavior research, we examine the relationship between WGE and organizational citizenship behaviors, a commonly studied outcome.

Table 3. Research Process

	Study		
	Pilot (Appendix B)		Full Study
Characteristic	Sample A	Sample B	Sample C
Sample description	38 graduate students	41 IT professionals	Panel at Time 2 150 IT professionals
Sample source	Research university	Study Response	Study Response
Sampling technique	Cross-sectional	Cross-sectional	Outcomes measured at Time 2
Sample purpose	Preliminary statistical analyses and measure validation	Establish convergent validity, discriminant validity, and factor structure	Analyze the full research model to assess the nomological network
Constructs measured	WGE	WGE	WGE, professionalism, work-life conflict, organizational citizenship behaviors

**Figure 1. Research Model**

Third, we connect WGE with IT workforce research that examines how stress and strain impact IT professional experiences and behavior through work-life conflict (Ahuja et al., 2007; Moore, 2000). Considering such negative outcomes is important because IT workforce research suggests that IT professionals' work results in more work-life conflict, overload, and exhaustion (Ahuja et al., 2007; Dinger et al., 2010; Moore, 2000; Rutner et al., 2008; Sarker et al., 2018). Finally, we consider the influence of professionalism on work-life conflict and organizational citizenship, a novel relationship not explored in IS or management research. Our research model (see Figure 1) captures the manner in which strong ties to the IT workgroup influence the development of professional attitudes and mindsets and the personal lives and professional behavior of IT professionals.

4.2 Workgroup Embeddedness and Professionalism, Experiences, and Behaviors

To further extend the understanding of IT professionals' mindsets and behaviors, we consider

how WGE impacts professionalism, how WGE drives negative outcomes such as work-life conflict, and how WGE is associated with positive outcomes such as extra-role behaviors—e.g., organizational citizenship behaviors.

Professionalism is the mindset with which an individual perceives their profession, and professionalism results from engaging with colleagues in the field to develop and maintain these views based on perceived collective norms (Hall, 1968). Professionalism is composed of a constellation of related beliefs regarding a profession and its place in society, including beliefs about public service, self-regulation, professional autonomy, professional identification, and a sense of calling. Professionalism and its dimensions have been found to impact various attitudes and organizational outcomes, including performance, satisfaction, commitment, and motivation (Bartol, 1979; Bartol, 1983; Dinger et al., 2010; Dinger et al., 2012; Dinger et al., 2015; Kalbers & Fogarty, 1995; Shafer et al., 2001). In addition, professionalization is related to context-based job specialization and training, and it is shaped through socialization with professional peers (Lui et al., 2003),

with the workgroup being a key source of socialization (Moreland & Levine, 2006). For IT professionals, socialization into workplace norms and IT processes may be particularly important for highly interdependent environments, such as with agile software development (Hoda et al., 2012; Maruping et al., 2009; Rising & Janoff, 2000).

Belief in public service indicates that a professional perceives that their profession is critical to the functioning of organizations and society (Hall, 1968) and indicates a sense of the social importance of the profession and a feeling of obligation to fulfill its role in an organization or society (Shafer et al., 2001; Thomas, 2020). For IT professionals, this is a perception that developing and maintaining information technologies are necessary and valuable contributions to society in general, as well as a perception among IT professionals that their work is critical to organizational success (Pawlowski & Robey, 2004). *Belief in self-regulation* is the view that only professional peers can validly assess the quality of professional work (Hall, 1968). Among IT professionals, this is the notion that non-IT personnel are not capable of judging the quality of an IT professional's work properly and peers are the appropriate source of review and feedback—for example, through peer code review processes (Wang et al., 2008). *Professional autonomy* is the belief that professionals are given the freedom to organize and manage the structure of their work because they are highly trained, qualified, and do not require careful micromanagement (González de Bustamante & Rely, 2016; Hall, 1968). For IT professionals, this relates to the perception that they are given more control over how to structure their work due to their extensive expertise in how IT work should be done. For many IT professionals, high levels of professional autonomy may be a necessary condition to enable productive work processes, such as with traveling IT consultants (Ahuja et al., 2007) or software developers participating in geographically distributed development (Espinosa et al., 2007; Sarker et al., 2018). *Professional identity* captures how fully a professional associates their identity with their profession and professional peers (Avidov-Ungar & Forkosh-Baruch, 2018; Hall, 1968; Riemenschneider & Armstrong, 2021; Tajfel & Turner, 1985). For IT professionals, a strong professional identity suggests that their role as an IT professional is at the forefront of their identity (Riemenschneider & Armstrong, 2021), which is exhibited through proudly seeing themselves as IT professionals and actively engaging with the profession through IT conferences and forums or by closely following professional events. The *sense of calling* suggests a strong internal draw pulling a professional toward working in a given profession (Duffy et al., 2011; Duffy & Sedlacek, 2007; Hall, 1968; Ugwu & Onyishi, 2018). For an IT professional,

a sense of calling provides confidence that they have chosen the correct field for their career.

Professionalism suggests that an individual has developed an understanding of the shared norms in their field (Hall, 1968). Given that this mindset results from the perception and understanding of field-based norms, it is difficult if not impossible to fully internalize a sense of professionalism through classroom education only. A significant body of research exists concerning the valuable influence of professional socialization in developing professional mindsets and adapting individuals to the role of a professional (Howkins & Ewens, 1999). Research in various fields suggests that professionalism develops over time through socialization with professional peers and mentors (Lui et al., 2003). Different professionalized fields like medicine (Hafferty, 2008), nursing (Kelly, 2020; Mariet, 2016), accounting (Lui et al., 2003; Thomas, 2020), education (Dixson & Dingus, 2008; Graber et al., 2016), and journalism (McDevitt et al., 2002) highlight the importance of socialization in the process of developing professionalism among individuals.

IS research supports the notion that the behavior and professional mindsets of IT professionals are highly informed by membership within an organization's IT group. Within the IT profession in general, IT groups within organizations form unique group-level cultural environments that create pressures to conform to group standards (Guzman et al., 2008; Guzman & Stanton, 2009). Accordingly, we argue that IT professionals are shaped by IT group-level pressures (Guzman et al., 2008; Riketta & van Dick, 2005) as they develop distinct aspects of their professional mindsets and professional identity (Riemenschneider & Armstrong, 2021). The logic underpinning this argument is simple: even though professionalism and profession-related attitudes are broad in nature, most IT professionals are likely to interact with group-level IT peers far more often than with IT peers across other organizations (Moreland & Levine, 2006).

Further, the IT profession is broad and varied, and IT lacks the infrastructural frameworks to reinforce professionalized values through structural frameworks like extensive educational, training and certification requirements or formalized codes of ethics found in fields like medicine, law, or accounting. Therefore, we expect that professionalized mindsets flow from IT peers as opposed to formalized IT professional structures. For example, in agile development teams, high levels of interdependence exist due to peer review processes including pair programming, collective code ownership, and refactoring (Barlow et al., 2011; Cockburn & Highsmith, 2001). Such practices that provide workgroup visibility and feedback on the nature and quality of IT peers' work are likely to drive higher levels of professionalism through motivating

compliance with expected group norms and may drive professionalized mindsets by reinforcing identification with the IT function and highlighting the importance of self-regulation through peer evaluation and professional autonomy. Accordingly, we argue that strong bonds with IT workgroups significantly contribute to the development of more professionalized mindsets for IT professionals. Therefore, we hypothesize:

H1: Workgroup embeddedness increases professionalism.

Organizational citizenship behaviors refer to an IT professional's set of voluntary, prosocial behaviors that contribute to promoting and maintaining the well-being of their employing organization (Chou & Pearson, 2011; Paré & Tremblay, 2007). Embeddedness research indicates support for highly embedded professionals contributing to the workplace through voluntary prosocial OCBs (Lee et al., 2004; Singh et al., 2020). We argue that WGE in the IT setting is well-suited to drive citizenship behaviors.

Group-level embeddedness offers an especially appropriate level of analysis for understanding IT professionals' OCBs. WGE confers strong attachment to peers within the professional group in a firm, fit with group culture and work demands, and the sacrifice of the tangible and intangible benefits incurred by leaving the workgroup. Peers and colleagues within the same functional group share several commonalities, such as similar professional expertise, experiences, and work expectations (Hall, 1968), or in IT, for example, the need to collaborate using the same software development practices (Tripp et al., 2016). Professionals who feel a high sense of social acceptance or belonging within a workgroup become more likely to help or assist others voluntarily (Den Hartog et al., 2007) and, similarly, those who feel a strong sense of social fit with the workplace culture will contribute prosocial behaviors to help sustain that culture (Kristof-Brown et al., 2005). Accordingly, when highly embedded within a professional workgroup in an organization, we argue that there is much more to be gained by engaging in OCBs, such as sharing expertise with professional peers, helping peers with projects, helping to socialize new colleagues into the group, and so forth.

The characteristics of the IT work environment suggest that workgroup embeddedness may be a particularly valuable driver of prosocial citizenship behaviors. To begin, we recognize that IT professionals form a distinct work environment within their occupational subculture (Guzman et al., 2008; Guzman & Stanton, 2009; Jacks et al., 2018) and that groups have a tendency to form distinct group cultures and socialize new members into the group culture (Anderson & Thomas, 1996; Kim & Toh, 2019; Levine & Moreland, 1991). IT occupational culture uniquely reflects high

levels of esoteric/contextual knowledge, autonomy in decision-making, and a focus on innovation in technology (Jacks et al., 2018).

Highly embedded IT professionals are attached to this group culture among their fellow IT staff and will be more likely to engage in prosocial behaviors that sustain the culture (Jacks et al., 2018; Kristof-Brown et al., 2005). This is because high-WGE professionals feel that they possess a high level of fit within their IT work role, value feeling comfortable and accepted within their IT group, and thus want to maintain the culture. Because the IT occupational culture values technical knowledge and enjoyment in the workplace, even above and beyond that of non-IT cultures (Jacks et al., 2018), high-WGE IT personnel may seek to perpetuate IT-specific cultural values through OCBs such as sharing technical knowledge or seeking ways to create "fun" at work. To support a collegial work atmosphere, high-WGE IT professionals may help others overcome time pressures to meet deadlines or might volunteer for projects that IT peers might not have the capacity to join. In a technical support environment, high-WGE IT staff might demonstrate OCBs by helping peers clear backlogs of support requests. (Jacks et al., 2018).

Additionally, IT work is highly stressful and demanding (Ahuja et al., 2007; Dinger et al., 2010; Moore, 2000; Rutner et al., 2008; Sarker et al., 2018). Factors such as constant change, continuous learning, time pressures, and stress are major factors contributing to the perceived distinctiveness of the IT profession relative to other fields (Riemenschneider & Armstrong, 2021). WGE becomes a mechanism through which colleagues bond (Elder & Clipp, 1988) and cope to collectively deal with work-related stress (Armstrong et al., 2016; Cockshaw et al., 2013). That is, IT professionals are likely to demonstrate support for close relationships forged through challenging work experiences and marked by mutual concern about well-being among peers and feelings of belongingness (Baumeister & Leary, 1995) and may thus willingly engage in OCBs (Den Hartog et al., 2007). In this area, research suggests that emotional intelligence, which underlies the understanding and management of emotions and social relationships, is a key factor in mitigating stress among software developers (Rezvani & Khosravi, 2019). Such prosocial behaviors are particularly important among IT professionals charged with supporting potentially idiosyncratic IT environments (Sambamurthy et al., 2003) or working in a demanding globally distributed software development environment (Sarker et al., 2018) that might require IT professionals to be "always on" and available when valued peers or subordinates need help—be it after hours, on weekends, or during vacations.

Accordingly, the IT workplace creates a setting where IT professionals have extensive opportunity and demand to voluntarily help peers. Therefore, we argue that professionals who are highly embedded within the workgroup will engage in OCBs in order to help colleagues and maintain their workgroup's cultural environment. As a result, we hypothesize:

H2: Workgroup embeddedness increases organizational citizenship behaviors.

Higher levels of WGE may also drive negative outcomes. We argue that when professionals have a high level of WGE, they may disregard other life commitments, driving up feelings of stress and strain in the form of work-life conflict. Probing such an explanation is important because, within the IT setting, WGE is particularly salient, as the work environment creates demands known to lead to negative spillover effects.

WGE implies tight attachment to the professional group or function within an organization through strong social bonds and fit with the workgroup culture and expectations, as well as the significant value in the form of tangible or intangible benefits that would be sacrificed upon leaving. This strong attachment to the workplace leads to the organization and peers assuming a more central role in the life of an IT professional at the expense of time with family and friends (Ng & Feldman, 2012). Accordingly, we argue that greater WGE in any professional field, but particularly for IT professionals, increases the rate at which work spills over into and negatively impacts professionals' personal lives.

WGE may exacerbate work-life conflict among IT professionals. First, given tight bonds among colleagues (Armstrong et al., 2016; Cockshaw et al., 2013; Elder & Clipp, 1988), highly embedded IT professionals may push themselves farther and try harder at work, leading to spillovers that create work-life conflict (Bolino & Turnley, 2005; Ng & Feldman, 2007; Ng & Feldman, 2009). This may happen because IT professionals feel obligated to expend more energy supporting colleagues through citizenship behaviors due to high levels of belongingness and engagement with coworkers (Bolino & Turnley, 2005). This is exacerbated by IT professionals' tendencies to view their primary reference group within the organization as their IT peers (Jacks et al., 2018), leading them to be more likely to make strong efforts to deliver for their peers.

Against this backdrop of tight social relationships, IT professionals perform inherently stressful and demanding work (Ahuja et al., 2007; Dinger et al., 2010; Jacks et al., 2018; Moore, 2000; Rutner et al., 2008; Sarker et al., 2018). We argue that IT professionals who are tightly bound to inherently stressful work settings, especially given demands to be "always on" in order to fix problems or "put out fires," would experience more negative spillover effects such as work-life conflict. In terms of border theory,

leveraged by Sarker et al. (2018), stronger bonds with IT workgroup peers may create more permeable borders where peers or supervisors feel more comfortable infringing on an IT professional's work-life balance by asking them to work late, contacting them during nonwork hours or otherwise infringing on their nonwork lives. Finally, we suggest that the tendency for firms to create idiosyncratic IT ecosystems nurtures the potential for firm-specific IT skills and expertise that endow individual IT professionals with the sense that they are critical sources of knowledge and experience (Sambamurthy et al., 2003). Such highly embedded and expert IT professionals may feel a higher obligation to respond to their peers' pleas for help even after hours, which disrupts nonwork life. Therefore, we hypothesize:

H3: Workgroup embeddedness increases work-life conflict.

We also anticipate that professionalism drives increases in work-life conflict that go beyond that of WGE. As explored in prior IS research (Dinger et al., 2010), we argue that the level of professionalism indicates the extent to which one prioritizes their profession in their life. Research in other fields explores the dynamics of professionalism and work-life conflict for female professionals in particular (Mani, 2013; Sommerlad, 2016), generally suggesting that increases in professionalism drive work-life balance more toward work, which can strain personal lives. Highly professionalized individuals highly value their careers and believe that their profession plays a critical role in their organization or society (Hall, 1968). For IT professionals, high levels of professionalism may drive perceptions that the IT function plays an irreplaceable role in their organization and may capture an underlying understanding that their work as an IT professional may be a critical driver of technology and business integration (Bassellier & Benbasat, 2004; Riemenschneider & Armstrong, 2021). Accordingly, highly professionalized IT personnel may place great importance on completing and supporting work-related obligations, even at the expense of nonwork obligations. We thus hypothesize:

H4: Professionalism increases work-life conflict.

IT professionals with a strong sense of professionalism believe in the importance of their work to their organization and society (Dinger et al., 2015; Hall, 1968). Different dimensions of professionalism, such as the belief in public service and a sense of calling, are related to a professional's belief that their work is essential. These dimensions (e.g., professional autonomy and their belief in self-regulation) also characterize professionals who believe that they are uniquely qualified to help and support others through their work. Therefore, we anticipate that an IT

professional with a strong sense of professionalism would be convinced of the critical nature of their work to their employing organization and would also believe that they are especially qualified to assist others in the organization with IT-related issues. In fact, numerous characteristics that contribute to the distinctive work environment of the IT profession, including extensive change, continuous learning, varied skill demands, expectations of technology and business integration, and time pressures and stress (Riemenschneider & Armstrong, 2021) provide numerous opportunities for highly professionalized IT personnel to voluntarily help valued peers manage change, pick up new skills, work with business partners, meet deadlines, or relieve stress.

Further, professionalism includes a strong sense of professional identity. Highly professionalized IT professionals identify strongly with the IT profession and may consider themselves to be representative of their professional field; they may feel an obligation to uphold their self-perception of what a professional “should” be when asked for help or given a chance to guide peers toward higher standards. Therefore, we argue that highly professionalized IT professionals are more likely to be motivated and to self-identify as uniquely able to help others, leading to higher levels of organizational citizenship. For example, highly professionalized software developers might take it upon themselves to help “onboard” new developers by helping them get up to speed on the development environment or simply by socializing them into the group culture. Similarly, in an effort to encourage high standards, highly professionalized information security professionals might voluntarily assist peers with security audits or revising compliance reports. In this way, we expect that high levels of professionalism among IT professionals lead to higher levels of citizenship. Therefore, we hypothesize:

H5: Professionalism increases organizational citizenship behaviors.

5 Research Method

For our full study, we gathered data using the Study Response organization (see Appendix B for a full description of this sample and the establishment of the initial pool). Study Response is an academic, nonprofit organization based out of Syracuse University which enables online data collection by matching researchers with qualified survey respondents. We utilized the measures established in the pilot. For this phase, we had a potential pool of 233 candidates in the Study Response panel, and 220 members of our pool of 233 were randomly invited to participate. We received 200 completed surveys and 15 partially completed surveys. Duplicates and outliers were removed, resulting in a sample size of 195 (response rate of 88.6%). After one year, we invited all 195 IT professionals to participate in a follow-up survey. Of those 195 IT professionals, we

received 150 completed surveys (response rate of 76.9%). Of those 150 surveys, we screened out respondents who left their jobs between Time 1 and Time 2, which eliminated 23 respondents from the sample (turnover rate of 15.3%). The turnover rate is comparable to that reported in the work of Dinger et al. (2015), who documented a turnover rate of 15.9% after 12 months. Table 4 details the demographic characteristics of our sample at Time 1 and Time 2.

In order to determine if there was a systematic pattern of bias in the characteristics of the second sample, we performed *t*-tests for differences between those who turned over during the study. We found no significant differences when comparing age or organizational tenure. Also, we tested for nonresponse bias to ensure that our second-wave respondents were not significantly different from those who participated in the first survey only (Armstrong & Overton, 1977; Reid, 1942). We found that responders and nonresponders were not significantly different in terms of age and organizational tenure, suggesting that nonresponse bias was not a threat to Phase 2 of our study. We present the results of these tests in Table 5.

5.1 Measures

In addition to the measure of workgroup embeddedness that we developed, we used existing measures for professionalism (Snizek, 1972), work-life conflict (Kopelman et al., 1983), and organizational citizenship behaviors (Den Hartog et al., 2007). We present the full list of measures used in Phase 2 in Appendix C.

5.2 Analysis

To analyze our research model, we used partial least squares (PLS-SEM) and estimated models in SmartPLS 3.0 (Ramayah et al., 2018). First, we established convergent validity by evaluating the extent to which outer loadings are significant on their specified factors; significant loadings lend support for convergent validity. Evaluation of the loadings of the first and second order (where applicable) offer evidence of convergent validity among the factors. All first-order factor item loadings were significant at the $p < 0.000$ level, except for SR1. This item was dropped from further analysis. Table 6 provides the loadings and *t*-statistics for our measurement model.

Next, we established the discriminant validity of our first-order constructs by evaluating the construct correlation matrix and comparing cross-construct correlations against the square root of a construct’s AVE (see Table 7). When the square root of the AVE exceeds any cross-construct correlations, there is support for discriminant validity (Chin, 1998). To assess reliability, we used composite reliability (CR) (Barroso & Picón, 2012; Hair et al., 2017). All of our constructs meet the 0.7 threshold for CR.

Table 4. Full Study Demographic Characteristics

Characteristics		Time 1 (initial sample) N = 195 (88.6%)	Time 2 (final sample) N = 127 (76.9%)
Gender	Female	51 (26.2%)	32 (25.2%)
	Male	144 (73.8%)	95 (74.8%)
Race	Asian/Pacific Islander	25 (12.8%)	18 (14.2%)
	Black	3 (1.5%)	2 (1.6%)
	Hispanic	11 (5.6%)	7 (5.5%)
	White	155 (79.5%)	100 (78.7%)
	Other	1 (0.5%)	0 (0.0%)
Education	High school diploma	1 (0.5%)	1 (0.8%)
	Some college	9 (4.6%)	5 (3.9%)
	Associate degree	4 (2.1%)	2 (1.6%)
	Bachelor's degree	87 (44.6%)	58 (45.7%)
	Some graduate work	19 (9.7%)	7 (5.5%)
	Graduate degree	58 (29.7%)	43 (33.9%)
	Doctoral degree	17 (8.7%)	11 (8.7%)
Average years in:	Profession	9.66	9.73
	Organization	7.31	7.29
	Position	5.27	5.25
Average age		35.97	35.96

Table 5. Tests of Nonresponse Bias

Comparison of Phase 2 turnover vs. nonturnover respondents					
Age		N	Mean	SD	Sig.
	Turned over	23	33.22	4.56	0.08
	Stayed	127	36.12	7.49	
Organizational tenure	Turned over	23	7.30	2.60	0.09
	Stayed	127	9.94	7.24	
Comparison of Phase 2 respondents vs. nonrespondents					
Age		N	Mean	SD	Sig.
	Nonrespondents	45	36.02	6.85	0.83
	Respondents	150	35.75	7.23	
Organizational tenure	Nonrespondents	45	9.60	5.20	0.94
	Respondents	150	9.68	6.79	

Table 6. T-Statistics for Convergent Validity

Construct	Subconstruct (second-order loading, <i>t</i> -statistic)	Indicator	Outer loading	<i>T</i> -statistic
Workgroup embeddedness	Belongingness* (.307, 17.126***)	BEL1 ← Belongingness	.777	18.481***
		BEL2 ← Belongingness	.801	14.135***
		BEL3 ← Belongingness	.871	27.183***
	Fit (.368, 19.935***)	FIT1 ← Fit	.871	36.127***
		FIT2 ← Fit	.849	20.567***
		FIT3 ← Fit	.816	21.876***
	Sacrifice (Int.) (.289, 12.868***)	INT1 ← Sacrifice (Int.)	.876	37.435***
		INT2 ← Sacrifice (Int.)	.901	35.895***
		INT3 ← Sacrifice (Int.)	.900	40.055***
	Sacrifice (Tan.) (.290, 19.922***)	TAN1 ← Sacrifice (Tan.)	.865	38.967***
		TAN2 ← Sacrifice (Tan.)	.814	21.202***
		TAN3 ← Sacrifice (Tan.)	.801	20.375***

Professionalism	Autonomy (.279, 11.793***)	AUT1 ← Autonomy	.828	21.363***
		AUT2 ← Autonomy	.839	18.140***
		AUT3 ← Autonomy	.796	15.111***
	Identification (.289, 18.332***)	ID1 ← Identification	.836	17.722***
		ID2 ← Identification	.865	23.959***
		ID3 ← Identification	.714	12.026***
	Public Service (.281, 18.066***)	PS1 ← Public Service	.754	12.971***
		PS2 ← Public Service	.843	26.526***
		PS3 ← Public Service	.792	19.738***
	Sense of Calling (.259, 14.587***)	SC1 ← Sense of Calling	.730	9.592***
		SC2 ← Sense of Calling	.803	15.945***
		SC3 ← Sense of Calling	.763	15.968***
		SC4 ← Sense of Calling	.840	29.007***
Self-Regulation (.222, 12.350***)	SR1 ← Self-Regulation	.260	1.242	
	SR2 ← Self-Regulation	.923	56.897***	
	SR3 ← Self-Regulation	.908	36.710***	
Organizational citizenship behaviors	N/A	OCB1 ← Org. Cit. Behaviors	.703	6.034***
		OCB2 ← Org. Cit. Behaviors	.687	5.797***
		OCB3 ← Org. Cit. Behaviors	.643	4.546***
		OCB4 ← Org. Cit. Behaviors	.769	7.191***
		OCB5 ← Org. Cit. Behaviors	.707	6.792***
		OCB6 ← Org. Cit. Behaviors	.764	6.420***
		OCB7 ← Org. Cit. Behaviors	.651	5.398***
		OCB8 ← Org. Cit. Behaviors	.729	6.617***
		OCB9 ← Org. Cit. Behaviors	.763	6.919***
Work-life conflict	N/A	WLC1 ← Work-life Conf.	.847	20.087***
		WLC2 ← Work-life Conf.	.860	34.043***
		WLC3 ← Work-life Conf.	.852	26.011***
		WLC4 ← Work-life Conf.	.871	36.387***

Note: All item loadings are significant at the $p < 0.000$ level, except for SR1, which was dropped.

Table 7. First-Order Construct Correlations

	ICR	1	2	3	4	5	6	7	8	9	10	11
1. WGE – belongingness	.858	.817										
2. WGE – fit	.883	.716	.846									
3. WGE – sacrifice (intangible)	.921	.436	.491	.892								
4. WGE – sacrifice (tangible)	.867	.687	.654	.415	.827							
5. Professionalism – autonomy	.861	.057	-.004	.120	-.132	.821						
6. Professionalism – identification	.848	.387	.292	.281	.206	.441	.807					
7. Professionalism – public service	.839	.267	.170	.234	.116	.461	.608	.797				
8. Professionalism – sense of calling	.865	.575	.475	.302	.459	.140	.619	.540	.785			
9. Professionalism – self-regulation	.740	.042	-.102	.139	-.089	.597	.390	.517	.173	.745		
10. Organiz. citizenship behaviors	.905	.179	.309	.002	.223	.182	.256	.006	.125	.116	.717	
11. Work-life conflict	.917	.003	.020	.117	.010	.534	.412	.499	.181	.491	.269	.857

Note: *Diagonal contains the square root of AVE

Next, we examined the cross-loadings of our items. To establish discriminant validity in PLS-SEM, items should load highest on their construct and lower on all other constructs (Gefen & Straub, 2005; Hair et al., 2017). All of our retained items passed this test (see Table 8).

We evaluated the heterotrait-monotrait ratio of correlations (HTMT) to assess discriminant validity in PLS-SEM (Henseler et al., 2015). The HTMT is “the average of the heterotrait-heteromethod correlations (i.e., the correlations of indicators across constructs measuring different phenomena), relative to the average

of the monotrait-heteromethod correlations (i.e., the correlations of indicators within the same construct)” (Henseler et al., 2015 p. 121). The HTMT criterion outperforms classic approaches to discriminant validity assessment such as the Fornell-Larcker criterion and partial cross-loadings, which are largely unable to detect a lack of discriminant validity (Ab Hamid et al., 2017; Hair et al., 2017; Henseler et al., 2016; Henseler et al., 2015). When the HTMT ratio is below the conservative threshold of 0.85, discriminant validity is present. We present the HTMT ratios for our first-order constructs in Table 9. Based on the HTMT ratio test, all of our constructs demonstrate acceptable discriminant validity.

Table 8. Phase 2 PLS Factor Loadings and Cross-Loadings

Construct	Item	1	2	3	4	5	6	7	8	9	10	11
1. WGE – belongingness	1	.777	.712	.364	.653	-.044	.240	.121	.392	-.107	.303	-.014
	2	.801	.460	.346	.523	.089	.413	.302	.552	.159	.075	.040
	3	.871	.559	.356	.493	.106	.310	.247	.476	.070	.059	-.007
2. WGE – fit	1	.632	.871	.542	.561	.031	.294	.244	.470	-.063	.281	.074
	2	.508	.849	.396	.556	.010	.245	.071	.294	-.167	.328	.022
	3	.674	.816	.294	.543	-.056	.198	.106	.433	-.080	.191	-.048
3. WGE – sacrifice (intangible)	1	.405	.456	.876	.410	.191	.287	.281	.353	.221	.047	.208
	2	.348	.420	.901	.341	.057	.223	.188	.236	.147	-.059	.072
	3	.411	.436	.900	.357	.068	.240	.153	.215	.040	.070	.038
4. WGE – sacrifice (tangible)	1	.556	.589	.423	.801	-.100	.192	.071	.325	-.140	.170	.000
	2	.526	.524	.327	.865	-.103	.150	.107	.360	-.051	.211	.052
	3	.622	.507	.275	.814	-.125	.168	.112	.456	-.028	.190	-.018
5. Professionalism – autonomy	1	.020	-.077	.107	-.114	.828	.339	.489	.095	.627	.076	.576
	2	.024	.070	.084	-.102	.839	.383	.323	.107	.418	.235	.438
	3	.101	.006	.104	-.109	.796	.366	.307	.147	.363	.185	.276
6. Professionalism – identification	1	.269	.151	.242	.129	.429	.836	.522	.446	.389	.313	.412
	2	.303	.267	.223	.131	.403	.865	.568	.590	.366	.128	.345
	3	.401	.316	.221	.278	.197	.714	.354	.460	.095	.246	.221
7. Professionalism – public service	1	.309	.319	.203	.200	.357	.546	.792	.550	.314	.174	.317
	2	.086	-.038	.186	.043	.394	.394	.754	.284	.545	-.077	.509
	3	.232	.107	.169	.029	.354	.506	.843	.445	.416	-.037	.380
8. Professionalism – sense of calling	1	.410	.357	.256	.368	.018	.431	.310	.730	.053	.194	.136
	2	.556	.455	.268	.391	.071	.558	.410	.803	.092	.171	.088
	3	.389	.270	.169	.323	.167	.409	.476	.763	.164	-.063	.128
	4	.450	.409	.260	.365	.162	.537	.481	.840	.163	.134	.218
9. Professionalism – self-regulation	2	.018	-.148	.100	-.110	.529	.380	.494	.172	.923	.131	.467
	3	.058	-.068	.184	-.052	.535	.300	.471	.110	.908	.015	.398
1. Organizational citizenship behaviors	1	.055	.166	-.056	.083	.233	.177	.015	.002	.160	.703	.308
	2	.086	.182	-.055	.081	.164	.237	.136	.054	.204	.687	.189
	3	.054	.185	-.090	.120	.019	.047	-.121	.033	-.022	.643	.095
	4	.069	.226	-.102	.147	.019	.139	-.169	.000	-.079	.769	.161
	5	.203	.205	-.056	.231	.123	.224	.021	.113	.105	.707	.167
	6	.156	.229	.085	.197	.255	.246	.039	.136	.142	.764	.186
	7	.220	.239	.070	.167	.103	.123	.006	.180	-.036	.651	.085
	8	.105	.309	.168	.174	.129	.295	.128	.082	.054	.729	.381
	9	.146	.209	-.038	.206	.118	.158	-.036	.138	-.044	.763	.155
4. Work-life conflict	1	-.087	-.019	-.007	-.095	.495	.312	.383	.059	.450	.300	.847
	2	.040	.148	.193	.096	.473	.383	.444	.204	.412	.260	.86
	3	.004	-.073	.090	-.004	.412	.318	.442	.146	.360	.154	.852
	4	.051	.005	.122	.034	.451	.393	.440	.206	.407	.256	.871

Table 9. Heterotrait-Monotrait Ratios of Correlations

	1	2	3	4	5	6	7	8	9	10
1. WGE – belongingness										
2. WGE – fit	.716									
3. WGE – sacrifice (intangible)	.436	.491								
4. WGE – sacrifice (tangible)	.687	.654	.415							
5. Professionalism – autonomy	.057	.004	.120	.132						
6. Professionalism – identification	.387	.292	.281	.206	.441					
7. Professionalism – public service	.267	.170	.234	.116	.461	.608				
8. Professionalism – sense of calling	.575	.475	.302	.459	.140	.619	.540			
9. Professionalism – self-regulation	.042	.103	.139	.089	.597	.390	.517	.173		
10. Organizational citizenship behaviors	.179	.310	.002	.222	.182	.256	.006	.125	.116	
11. Work-life conflict	.003	.019	.117	.010	.534	.412	.499	.181	.491	.269

Finally, we checked for multicollinearity, where multiple independent variables predicted a single dependent variable by calculating the variance inflation factor (VIF). VIF indicates the severity of multicollinearity, with large values (>5) indicating issues with multicollinearity (Hair et al., 2011). The only factors predicted by multiple exogenous variables are organizational citizenship behaviors and WFC, both by WGE (VIF=1.210) and professionalism (VIF=1.153), indicating that multicollinearity is not an issue in this study.

Next, we tested our full structural model, using the two-stage approach (Hair et al., 2020; Hair et al., 2017; Sarstedt et al., 2019). We present the results in Table 10.

We then performed tests for mediation effects (Hayes, 2017) of *professionalism on workgroup embeddedness* and found evidence for the mediation of both indirect paths, from WGE to WFC, and from WGE to OCB through professionalism; we display those results in Table 11. As the direct effect of WGE on WFC was insignificant in the presence of professionalism, we determined that professionalism mediates the relationship between WGE and WFC. Further, WGE did have direct effects on OCB, and there was also evidence of positive indirect effects of WGE on OCB through professionalism.

Our analysis offers support for four out of five hypotheses. Workgroup embeddedness increases professionalism (H1, 0.316***) and organizational citizenship behaviors (H2, 0.205*). However, we did not find support for H3 because WGE does not significantly affect WFC (H3, -0.135), as the relationship is mediated by professionalism. However, this indirect effect of WGE on work-life conflict was in the hypothesized direction (0.196**). Consistent with prior literature, we found support for the effect of professionalism on WFC (H4, 0.620***), and OCB (H5, 0.155*). Our model accounts for 10% of the variance in OCB and 34.8% of the variance in WFC. These results are depicted in Figure 2.

5.3 Post Hoc Analysis

To better understand the relationship between WGE, professionalism, and our outcome variables, we conducted an additional post hoc analysis. Following the precedent set by prior professionalism research (Dinger et al., 2015; Shafer et al., 2001), we decomposed professionalism from a single second-order factor into its five individual first-order dimensions and reran the research model. This additional model was identical to our research model, except that we used each of the first-order factors of professionalism rather than the second-order factor. This decomposed model allowed for more granular insight into the impacts of WGE and professionalism

on work-life conflict and organizational citizenship behaviors. The results are presented in Table 12.

In our original model, WGE had a significant direct effect on OCB (H2, 0.205*). This remains the case in the post hoc analysis, but this effect is more substantial (0.265**). Also, in the post hoc analysis, WGE has a positive indirect effect (0.118*) on OCBs through professional identification (Hayes, 2017). In the original model, WGE did not have a direct effect on work-life conflict but did have an indirect effect on work-life conflict through professionalism. In the post hoc analysis, WGE had a positive indirect effect (0.072*) on work-life conflict through a professional's belief in public service. These findings demonstrate the importance of individual IT professional mindsets, in terms of IT professional identification and belief in public service (or a feeling of social obligation regarding the importance of the IT profession) in channeling the effects of embeddedness through to outcome behaviors, in the form of organizational citizenship, and experiences, in the form of work-life conflict.

6 Summary of Findings

Motivated by a desire to understand how embeddedness can influence the mindsets and behaviors of IT professionals, we investigated two research questions: *What is workgroup embeddedness? How does workgroup embeddedness influence the development of professionalism and the work experiences of IT professionals?* Using a series of studies of IT professionals, we developed and validated a measure of workgroup embeddedness. Further, we found evidence that WGE influences the development of highly professionalized mindsets. Additionally, WGE and professionalism exhibit a mix of influences (both direct and indirect) on beneficial and harmful work-related outcomes among IT professionals. On the positive side, WGE and professionalism are associated with higher OCBs; on the negative side, WGE increases the sense of the social importance of the IT profession (belief in public service), which increases work-life conflict.

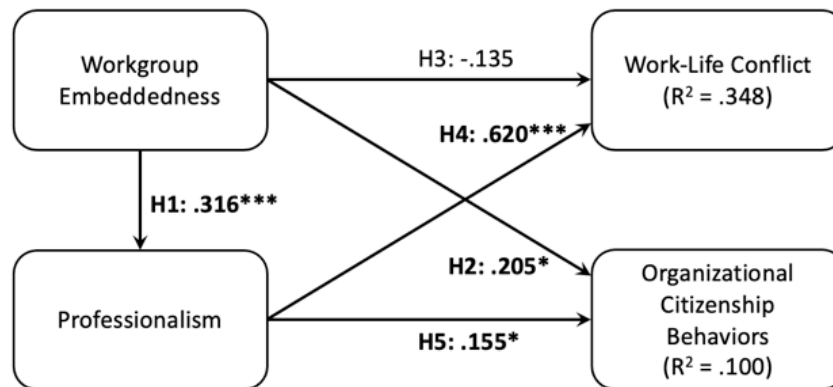
Our research advances the IT workforce literature by defining workgroup embeddedness, identifying its components, and considering its implications for IT professionals. In the pilot study, we established the psychometric properties of WGE. We validated the factor structure of WGE and assessed the construct's higher-order structure. In Phase 1, we established the validity and factor structure of the WGE construct. In Phase 2, we found that WGE positively impacts professionalism and directly increases organizational citizenship behaviors, along with indirect effects on OCBs via professionalism.

Table 10. Hypothesis Results

Hypothesis	Result	Support?
H1: Workgroup embeddedness increases professionalism.	.316***	Yes
H2: Workgroup embeddedness increases organizational citizenship behaviors.	.205*	Yes
H3: Workgroup embeddedness increases work-life conflict.	-.135	No
H4: Professionalism increases work-life conflict.	.620***	Yes
H5: Professionalism increases organizational citizenship behaviors.	.155*	Yes
*** $p < 0.01$, ** $p < 0.01$		

Table 11. Indirect Effects

Hypothesis	Result	Direct/indirect effects
WGE → Professionalism → Work-life conflict	.196**	WGE has only a positive indirect effect on work-life conflict through professionalism
WGE → Professionalism → Organizational citizenship behaviors	.049*	WGE has both a positive direct effect on OCBs and a positive indirect effect on OCBs through professionalism



Note: *** $p < 0.001$, * $p < 0.05$

Figure 2. PLS Structural Model Results

Table 12. Post Hoc Analysis

Path	Result	R ²
DV = Professional autonomy		
WGE → Professional autonomy	.014	.000
WGE → Professional identification	.356***	.127
WGE → Belief in public service	.240***	.058
WGE → Professional sense of calling	.554***	.307
WGE → Professional self-regulation	-.005	.000
DV = Organizational citizenship behaviors		
WGE → Organizational citizenship behaviors	.265**	.195
Professional autonomy → Organizational citizenship behaviors	.121	
Professional identification → Organizational citizenship behaviors	.353**	
Belief in public service → Organizational citizenship behaviors	-.301	
Professional sense of calling → Organizational citizenship behaviors	.031	
Professional self-regulation → Organizational citizenship behaviors	.098	

DV = Work-life conflict		
WGE → Work-life conflict	.012	.407
Professional autonomy → Work-life conflict	.245*	
Professional identification → Work-life conflict	.161	
Belief in public service → Work-life conflict	.299*	
Professional sense of calling → Work-life conflict	-.161	
Professional self-regulation → Work-life conflict	.200	
Significant mediation paths		
WGE → Professional identification → Organizational citizenship behaviors	.118*	
WGE → Belief in public service → Work-life conflict	.072*	
<i>Note: ***$p < 0.01$, **$p < 0.01$, *$p < 0.05$</i>		

Furthermore, the post hoc analysis suggests that the indirect effects on OCBs are specifically related to one's identification with the IT profession, reinforcing the importance of IT professional identity (Riemenschneider & Armstrong, 2021). Additionally, our results indicate that WGE has an interesting, mediated relationship with work-life conflict. In the presence of professionalism (modeled as a second-order factor), WGE does not directly influence work-life conflict—an unexpected result—but does have a mediated, indirect impact on work-life conflict through professionalism. When professionalism is decomposed into first-order dimensions, WGE still does not directly impact work-life conflict but has an indirect impact through belief in public service, sometimes called “social obligation” (Shafer et al., 2001). This finding suggests that among IT professionals, WGE creates a feeling of the importance of their work for their fellow IT colleagues, their broader organization, or society as a whole. This sense of social obligation and the importance of their work appears to then directly increase the propensity for these IT professionals to allow their IT work to negatively impact their personal lives. This finding moves research concerning the impact of embeddedness on work-life conflict (Ng & Feldman, 2012) forward by showing how the impact of embeddedness within an organizational environment may be channeled or mediated through a mindset of the sense of social obligation one feels toward one's peers. By demonstrating how WGE influences the development of professionalism and, in turn, OCBs and work-life conflict, we also contribute to the broader embeddedness literature, which has not previously examined how embeddedness can shape the development of career-oriented mindsets or how these mindsets can serve as channels through which embeddedness can impact behavior or workplace experiences.

7 Implications for Research

Our work contributes to the information systems and organizational behavior literatures. We develop the concept of workgroup embeddedness, which represents how a professional may become embedded within a specific functional or departmental group in a given

organization. When examining the IT workforce, we argue that the group is a particularly appropriate level of analysis to consider with embeddedness since peer group members may have a potent influence in socializing and helping to shape professional attitudes (Lui et al., 2003). We develop this concept and address how workgroup embeddedness can be applied across a wide variety of professional settings, including those beyond the IS field. Furthermore, we strengthen our understanding of embeddedness in the IT workforce by highlighting the power of social influence and how individuals may become embedded among workgroup peers through forces within the social structure and the desirable but less tangible elements of their workplace. These theoretical contributions can help frame future research seeking to extend the understanding of embeddedness and its influence within specific professional and task domains such as information technology.

Workgroup embeddedness helps to explain how attitudes become more professionalized in the IT workforce. Specifically, we found that the level of WGE has lasting, positive effects on professionalism reported by IT professionals after twelve months. Although these findings exist in an IT context, we believe they constitute a key contribution to management and organizational behavior research as well, by moving beyond direct workplace behaviors and experiences to demonstrate how embeddedness can shape career- and profession-oriented mindsets over time. Our findings show that strong bonds within a workgroup enhance and shape the formation of more professional attitudes among IT professionals. We found that WGE positively impacts the belief in public service, feelings of a sense of calling to the IT field, and identification with the IT profession. Interestingly, these elements of professionalism that are impacted by WGE seem to address an individual's perception of how important the field is to an organization and society (belief in public service) and the confidence of their belonging and attachment to the field (sense of calling and identification with the profession). WGE also exhibits an interesting mix of relationships with work-life conflict and organizational citizenship behaviors through the belief in public service and

professional identification: WGE has indirect effects on work-life conflict via the belief in public service, and WGE has indirect effects on OCBs via professional identification.

By using WGE to connect professional mindsets to positive (OCBs) and negative (work-life conflict) workplace outcomes for IT professionals, we go beyond the IT workforce literature's focus on turnover and turnover intention, which has long been a central concern of IT workforce research (Joseph et al., 2007) and move it toward focusing on a broader range of IT professionals' experiences and behaviors. Our work demonstrates that WGE may be a relevant and useful concept for understanding a broad range of organizational and personal outcomes among IT professionals because it helps to explain how IT work simultaneously relates to positive IT professionals' OCBs, and the well-documented negative effects of IT work such as stress, strain, and work exhaustion (Ahuja et al., 2007; Dinger et al., 2010; Moore, 2000; Rutner et al., 2008; Sarker et al., 2018). WGE offers rich insight into the "double-edged nature" of IT professionals' work life because it illustrates how embeddedness in IT jobs shapes a complex mix of professional and personal outcomes for IT professionals' employers and families. Our work thus suggests that future research should examine the mechanisms that draw IT professionals closer to their work while also examining those that may mitigate the adverse impacts of being overly connected to one's job.

8 Implications for Practice

Our findings indicate that promoting WGE can be a powerful lever for managers seeking to foster commitment and mitigate turnover among IT professionals. Our research supports managers employing socialization tactics (Allen, 2006) and human resource practices (Bergiel et al., 2009) that create stronger bonds between IT professionals, their peers, and their place in the IT function and thus foster WGE, which has positive implications for professionalism and organizational citizenship behaviors.

However, our research indicates that managers should be wary of encouraging their IT staff to become completely enmeshed within the work environment, as this can also lead to work-life conflict. Work-life conflict can undermine IT professionals' performance since it can increase the level of stress for IT professionals, which could, in turn, increase levels of work exhaustion and quitting behaviors (Ahuja et al., 2007). For IT managers, this finding has two important implications. First, IT managers should be mindful that by leaning too heavily on their most embedded IT professionals, they may create conflict between their professional and personal lives. Over time, this could drive IT professionals away from the workplace via turnover or potentially cause them to

leave the IT field entirely. Second, this study implies that workplace practices that enable and support a balance between professional and personal lives are powerful levers for encouraging commitment and retention. Human resource interventions that promote such balance might help maximize the long-term value of WGE, as such practices can reduce the level of work-life conflict and could even directly enhance the level of utility—and thus the positive implications of WGE—among IT professionals.

More specifically, our post hoc analysis suggests that the path through which WGE drives work-life conflict is through IT professionals' feelings of social obligation—their perception that their IT work is a critical public service to others. We found that by becoming strongly embedded within the IT workgroup, IT professionals tend to feel that their work is highly important to their peers and others in the organization and that this sense of social obligation to others directly drives the tendency for work to spill over into other aspects of their lives. Accordingly, managers may be able to mitigate work-life conflict and its effects by encouraging IT professionals to release this sense of social obligation after hours or when they are on vacation (Thomason & Williams, 2020). Furthermore, this sense of social obligation may be exacerbated when IT professionals feel they are the only appropriate source of expertise or knowledge on a topic. Thus, managers should consider training others to handle critical tasks and should seek to foster a sense of trust that there are other competent employees who can address demands or solve problems (de Roche et al., 2020).

WGE may lead to other adverse outcomes as well. For example, when IT skill sets become too context-specific, it is possible that long-term employees with high WGE may feel trapped in their role and may become dissatisfied with their job because they believe they lack the skills necessary to transition to other work, either in the organization or outside of it (Harden et al., 2018). Further, employees who do stay may lack the necessary skills and expertise to be able to adapt to the changing landscape of modern IT systems (Pflügler et al., 2018). Their more flexible and adaptable colleagues may feel far less embedded and more able to transition to other jobs within or outside the organization (Prommegger et al., 2020). These situations could lead to negative impacts on organizational performance and individual well-being over the long term.

WGE is likely to remain a relevant and pervasive issue. As changing technologies continue to evolve rapidly, and the shift from internally managed infrastructure toward utility cloud computing builds momentum, organizational boundaries may break down due to reduced transaction costs. On the one hand, IT professionals with highly context-specific skill sets

may find themselves either trapped in marginal roles or unable to transition to situations driven by these new paradigms (Schneiderjans & Hales, 2016). On the other hand, such a transition to more transferrable skill sets suggests that IT professionals may tend to become embedded in work settings that are strongly based on social connections and less tangible aspects of their work, as opposed to becoming embedded due to specific or potentially outdated skill sets (Prommegger et al., 2020). Further, given the trends toward cross-functional work and temporary or project-based work, the workgroup an IT professional becomes embedded in may not even necessarily comprise other IT people, yet we expect strong bonds with peers and group culture to nevertheless influence their work experiences and behavior (Buhari et al., 2020; Przybilla et al., 2020).

9 Opportunities for Future Research

This research opens several avenues for future work on workgroup embeddedness and IT professionals. First, given that WGE predicts positive and negative workplace and personal outcomes, future research should seek to extend the understanding of WGE within the nomological net of organizational, job, and individual characteristics, as well as the experiences that shape the attitudes and behaviors of IT professionals. It would be beneficial to conduct research on WGE that includes matched pairs of IT employees and IT managers or peers, enabling IS research to build a richer understanding of how WGE influences the task performance and work effort of highly embedded IT professionals (Ng & Feldman, 2009).

WGE could also help to explain gender differences in the IT profession. Future research should consider investigating potential differences regarding the extent to which female and male IT professionals become embedded in their IT workgroup and the impact of such embeddedness on potential differences in their work experiences. Given the body of knowledge regarding discrepant experiences for women in the IT workforce (e.g., Trauth, 2002), workgroup embeddedness could provide a useful perspective on gender differences in IT careers. Further, future research could consider the concept of “anticipated” embeddedness within the IT profession or a specific IT department and how this anticipated ability to successfully embed oneself within a field or a workplace might impact career or employment choices among potential female versus male IT professionals (Ahuja, 2002).

Additionally, future research should consider factors that contribute to WGE change as IT professionals’ careers unfold (Joseph et al., 2012). For example, it

seems probable that the unique IT skill sets developed within the idiosyncratic technical environment of a single organization meaningfully contribute to embedding IT professionals within that specific work environment. Accordingly, WGE research might benefit from perspectives on how IT professionals move and develop through their careers, including labor movement across organizations as opposed to career progression within a single firm. Other fields have studied how human resource mechanisms, such as promoting from within, can directly increase the embeddedness of employees (Bergiel et al., 2009). Information systems research might consider how internal labor market strategies can enhance the WGE of IT staff who are developing their careers and their value for the organization (Ang & Slaughter, 2004). Further, in terms of IT career paths (Joseph et al., 2012), future research should consider whether high WGE in IT environments contributes more heavily to remaining on IT/technical career paths and, conversely, whether lower WGE among IT professionals drives a tendency to switch to non-IT or managerial career paths.

Future research should also consider whether and how WGE may ebb and flow as technology changes and skills become more (or less) valued in IT labor markets. Changes in a firm’s technology ecosystem may alter an individual IT professional’s embeddedness in terms of skills and fit. However, changes in a firm’s IT platform may also influence embeddedness in terms of making IT professionals feel more (or less) vital to the firm’s IT function. In other words, a radical change in the IT context may psychologically or socially distance an IT professional from the firm and lower embeddedness, or vice versa. Such research could leverage a longitudinal design and track an IT professional’s skills portfolio over time, as well as their reported perceptions of WGE. Additionally, as new IT-based professions such as data analytics grow, there lies an opportunity to examine whether the characteristics of data and IT-enabled work differ compared to professional fields that require less responsiveness to new forms of data or technologies. Research in this area would need to consider the structure of professions (Hall, 1968) and identify critical differences between IT and other fields, such as the financial (Allen, 2006; Felps et al., 2009; Lee et al., 2004) and healthcare fields (Crossley et al., 2007; Holtom & O’Neill, 2004; Mitchell et al., 2001).

Further, given that WGE results, in part, from connections to colleagues and fit with group culture, there may be “clustering” effects among groups of IT staff who share tight bonds and feel highly embedded because of those bonds, shared values, and skill sets.

For example, IT security staff members may work closely together under tight deadlines and high demands to respond to the fallout of an information security breach. Research suggests that group members who share highly difficult and challenging experiences tend to form stronger social bonds with one another (Elder & Clipp, 1988); thus, such experiences may engender deeper levels of belonging to a workgroup and strengthen feelings of WGE among the members of a specific department or group. Future research should examine how the embeddedness of groups or clusters of IT professionals is tied to organizational performance. If core groups of highly embedded IT employees have outdated skills or a shared desire to minimize work effort, organizational performance will likely suffer.

Finally, because many IT professionals work in teams with non-IT professionals, future research should consider whether such IT professionals may develop perceptions of professionalism differently than those embedded in IT-only workgroups. On the one hand, an IT professional embedded among non-IT peers may become less professionalized due to less influence from IT peers but, on the other hand, such a professional may develop an even stronger sense of professionalism in terms of identifying as the only IT professional supporting a workgroup and may be even more convinced of the importance of their work and their place in the IT field as a result of being the primary person that their peers rely on for IT expertise. Similarly, not working with other IT professionals may reinforce their perceptions that only another IT person could tell if they are actually doing their work well or not and that other members of the group should therefore grant them the autonomy to structure their IT work as necessary. Future research should consider how group composition influences the professionalization, behaviors, and experiences of IT professionals.

10 Limitations

As with any study, this research has limitations. First, while we controlled for common method bias in our research design and separated the collection of constructs in terms of time, there is still the potential for social desirability bias when self-rating OCBs (Allen et al., 2000). Furthermore, other factors that merit future investigation may influence the level of WGE among IT professionals, such as the size and culture of the respondent's relevant IT workgroup, differences among IT departments, and the extent to which IT professionals need to interact with or socialize with IT peers (Guzman et al., 2008; Guzman & Stanton, 2009). Finally, there is a need for mixed methods research that examines WGE. Research that triangulates across interview and survey data will yield richer insights into the sources and implications of WGE among IT professionals.

11 Conclusion

Our work contributes to IS research by developing the concept of workgroup embeddedness and strengthening its theoretical underpinnings. We show that WGE contributes to the development of higher levels of professionalism. Also, we demonstrate that WGE influences positive and negative outcomes for IT professionals and that WGE exhibits a complex relationship with work-life conflict and organizational citizenship behaviors through individual dimensions of professionalism, namely the belief in public service and professional identification. Furthermore, this work creates opportunities for future research projects that would deepen our understanding of the experiences of IT professionals while guiding IT managers on how to improve the retention and motivation of their workforce. For the broader referent literature, our work shows how embeddedness at the group level influences professionalized mindsets and, in turn, work-related behaviors and experiences.

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Appendix A: Workgroup Embeddedness and Related Group-Level Constructs

In this appendix, we establish the conceptual validity of the *workgroup embeddedness* (WGE) construct vis-à-vis related group-level constructs by illustrating how WGE fits into similar multilevel conceptualizations in other domains such as attachment theory and emotion theory.

In this section, we compare and contrast WGE with other group- and organizational-level constructs and construct hierarchies. Although WGE is conceptualized as relevant to the context of group work, WGE is specifically an *individual*-level construct. This is one of the key ways that WGE is differentiated from the majority of “group-level” constructs. However, the concept of WGE fits into similar sets of constructs that have been theorized to operate at multiple levels in organizations. We illustrate that not only is WGE distinct from other group-level constructs, but also that its conceptual place in organizational research is congruent with these other multilevel theories of organizational behavior. We propose that WGE is a “missing piece” in the embeddedness literature. All of our constructs and their differentiating characteristics are summarized in Table A1.

Group cohesion is one of the most popular and commonly used group-level constructs; it refers to a group’s tendency to remain together to accomplish its goals (Cota et al., 1995). Group cohesion appears to be a generally desirable group-level characteristic, as meta-analysis suggests that group cohesion improves group performance (Evans & Dion, 1991). However, group cohesion is easily distinguished from WGE primarily due to the level of analysis: group cohesion is conceptualized and measured at the group level whereas WGE is conceptualized and measured at the individual level. Group cohesion is experienced by groups when the group “fits together” well and is able to stick together to accomplish the group’s goal. WGE is experienced by an individual when they feel highly bonded, or embedded, within their workgroup. There may potentially be a relationship between WGE, at the individual level, and group cohesion, at the group level, wherein groups with numerous high WGE individuals are more likely to experience higher levels of group cohesion.

Group-shared emotion captures the concept that groups that are engaged in a common activity (e.g., a software development project, a sales team) or possess a common characteristic (e.g., race) will respond collectively with group-level emotional responses regarding the state of the environment that may be independent of individual emotional responses (Barsade & Knight, 2015; Brief & Weiss, 2002). WGE is distinct from group-shared emotion because it focuses on connections to the group, through links, fit, and utility, as opposed to the extent to which members of the group experience common, group-level emotional states. This suggests two main distinctions: first, WGE focuses more on connections and attachments to the group rather than the potential emotional outcomes of group membership. Second, WGE occurs and is measured at the individual level whereas group-shared emotion is a group-level construct. However, there may potentially be a relationship between WGE and group-shared emotion, wherein a workgroup composed of numerous members who have high WGE may be more apt to experience shared emotions. In this way, WGE adapted to the group level may be predictive of potential group-level emotional outcomes.

As opposed to group-shared emotion, *group-shared cognition* focuses on cognitive outcomes at the group level. Group-shared cognition addresses how groups engaged in a common activity (e.g., a software development project, a sales team) rely on the cognitive abilities/processes of the group (e.g., shared mental models) to build a shared cognitive evaluation of the state of work (Burke et al., 2003). As with group-shared emotion, WGE is distinct in that it focuses on the extent to which an individual becomes embedded or “stuck” within the group and does not necessarily address shared outcomes in the form of affective or cognitive consequences. WGE is distinct in that its focus is on attachments as opposed to shared mental models, and WGE also is conceptualized and measured at the individual level where group-shared cognition is more of a group-level construct. Accordingly, group-shared emotion and group-shared cognition are more likely to be potential outcomes of a group consisting of numerous highly embedded members.

Group distributed cognition describes how groups that are engaged in a common activity (e.g., a software development project, a sales team) utilize individuals, artifacts (both analog and digital), and processes to distribute the cognitive load of the team and to better understand the state of work (Hutchins & Klausen, 1996). Group distributed cognition captures how groups allocate mental workloads to accomplish shared tasks. As with group-shared cognition, WGE is distinct in that its conceptual domain does not include such task-related cognitions or the processes by which they are allocated. Further, group distributed cognition again operates at the group level, though elements of WGE may be predictive of how or why cognitive loads are distributed within a group. Perhaps more highly embedded group members are more prepared to contribute to successful allocations of workloads than are members less embedded within the group. In this way, WGE may potentially serve as a useful antecedent that explains variations in different groups distributed cognition processes and outcomes.

Most related to WGE, perhaps, is the concept of *workgroup attachment* (Ricketta & van Dick, 2005). Workgroup attachment builds off and parallels research on organizational attachment. At first glance, the concept of attachment

would seem to heavily overlap with the concept of embeddedness and, accordingly, suggest little separation between the constructs of WGE and workgroup attachment or, at the organizational level, organizational (or on-the-job) embeddedness and organizational attachment. However, diving further into the conceptualization of workgroup and organizational attachment reveals significant differences.

For both workgroup attachment and organizational attachment, the concepts are used as overarching umbrella terms to include two distinct, but related concepts that imply attachment: identification and commitment (Riketta & van Dick, 2005). Accordingly, to identify and discuss the distinctions of embeddedness constructs relative to attachment constructs, we need to separate the attachment constructs into these two related components and discuss distinctions in terms of embeddedness relative to identification and embeddedness relative to commitment. Fortunately, embeddedness scholars have already worked to establish discriminant validity and develop theory underlying the relationships between organizational embeddedness and organizational identification as well as between organizational embeddedness and organizational commitment. We briefly review these arguments and then adapt our discussion to the group level and show how the distinctions between WGE and workgroup identification/commitment parallel the distinctions at the organizational level.

Organizational identification has been defined in numerous ways, but generally refers to the extent to which an individual's self-image aligns or overlaps with their image of the organization (Riketta, 2005; Riketta & van Dick, 2005). Conceptually, organizational identification is distinct from organizational embeddedness because identification focuses on the self-image of an individual and the manner in which they view themselves as aligned (or not) with their image of the organization, whereas organizational embeddedness focuses more broadly on connections within the organization, fit with the organization, and the sacrifices incurred by leaving the organization. Empirically, several studies examine both organizational embeddedness and organizational identification and demonstrate discriminant validity between the constructs but do generally find that a significant relationship exists between embeddedness and identification (Dechawatanapaisal, 2018; Ng & Feldman, 2014; Tang et al., 2018). However, the exact causal relationship between these constructs is still unclear, with some studies suggesting that higher levels of organizational identification lead to higher levels of organizational embeddedness (Dechawatanapaisal, 2018; Tang et al., 2018), whereas other research argues that changes in organizational embeddedness result in corresponding changes to organizational identification (Ng & Feldman, 2014). At this time, the research proposing that organizational embeddedness serves as an antecedent to organizational identification would appear to be more credible, given that there is stronger empirical support for causality due to a longitudinal design that measured organizational embeddedness five months before measuring organizational identification and found support for causality across time (Ng & Feldman, 2014). Regardless, prior research does establish that organizational embeddedness and organizational identification are conceptually and empirically distinct constructs.

When discussing *organizational commitment* under the umbrella of organizational attachment, scholars are referring specifically to the concept of affective organizational commitment (Riketta & van Dick, 2005), as opposed to less commonly used forms of organizational commitment, such as continuance commitment or normative commitment. Affective organizational commitment refers to the extent to which an individual likes and feels emotionally attached to their organization (Mowday et al., 1979). The relationship and distinction between organizational embeddedness and organizational commitment have a much longer and more thorough history than that of embeddedness and identification. In fact, in their original, seminal paper on job embeddedness, Mitchell et al. (2001) devote significant space to distinguishing between job embeddedness, specifically on-the-job (organizational) embeddedness, and closely related constructs like organizational commitment. In distinguishing between embeddedness and affective commitment, Mitchell et al. (2001) write: "Some of our on-the-job factors, such as fit, may reflect some positive affect toward jobs, but they may also reflect a relatively nonaffective judgment. People may stay specifically because they have found or created niches in their organizations that match their needs and talent" (p. 1106). Since then, scholars have generally accepted organizational embeddedness and affective organizational commitment as distinct constructs, and relatively little effort has been devoted to investigating the relationships between the two, with a few exceptions that position organizational embeddedness as an antecedent to affective commitment (Kim & Kang, 2015; Zhao et al., 2013) or, in one instance, suggest a more complicated relationship wherein organizational embeddedness moderates the relationship between organizational commitment and job search behavior (Welty Peachey et al., 2014).

This lack of interest in the pairing may partially be because Mitchell et al. (2001) presented job embeddedness as a more powerful predictor of turnover than traditional measures like organizational commitment and job satisfaction. Accordingly, embeddedness constructs may be conceived and used as a more sophisticated replacement for traditional constructs like job satisfaction and organizational commitment, rather than a supplement to such constructs in larger models. Regardless, organizational embeddedness is well-established as conceptually and empirically distinct from organizational commitment and organizational affective commitment, specifically.

As we move from the organizational level, concerning the distinctions between organizational embeddedness and organizational identification/commitment, to the workgroup level, concerning the distinctions between workgroup embeddedness and workgroup identification/commitment, we argue that the distinctions between embeddedness and identification/commitment hold. Workgroup identification refers to the extent to which an individual's self-image aligns or overlaps with their image of the workgroup (Riketta & van Dick, 2005). Accordingly, workgroup identification hinges on the individual's cognitive self-image and whether the workgroup maps onto this self-image. Workgroup embeddedness is a broader set of factors that includes social connections within the workgroup, fit with the workgroup, and utility derived from employment in the workgroup. Though some of these factors might potentially overlap with self-image, WGE is clearly a more broadly defined construct. In line with the work of Ng and Feldman (2014), we would argue that increases in WGE likely increase the extent to which an individual identifies with their workgroup. This argument is supported by our finding that WGE measured at Time 1 predicts professional identification measured one year later.

Finally, we address workgroup embeddedness relative to *workgroup commitment*. As with organizational commitment, when discussed under the umbrella of workgroup attachment, workgroup commitment implies affective workgroup commitment (Riketta & van Dick, 2005), which we define as the extent to which an individual likes and feels emotionally attached to their workgroup (Bentein et al., 2002). As with organizational embeddedness and commitment, though there may be overlap in terms of potential affective outcomes of the WGE construct, WGE and workgroup commitment remain sufficiently distinct. Our definition of WGE includes a sense of belonging or acceptance, which might be predictive of affective commitment to the workgroup but is not conceptually the same. For instance, one might feel that they "like" the workgroup and have positive affective feelings toward the group without necessarily feeling that they belong to the group; conversely, an individual might feel that they dislike or are frustrated with the group while nevertheless feeling that they belong to the group. Further, research demonstrates that the sense of belonging and affective commitment are distinct, at least in terms of the sense of belonging and organizational affective commitment (Dávila & García, 2012). Regarding fit, we repeat the arguments of Mitchell et al. (2001) that fit is more nonaffective and confers a level of cognitive judgment regarding the extent to which an individual matches with their workgroup environment. Similarly, we suggest that the individual's estimation of utility refers to a more cognitive calculation of the value of tangible and intangible aspects of their workgroup environment, which do not overlap with affective assessments of liking the workgroup. Accordingly, we argue that workgroup embeddedness and workgroup commitment are sufficiently conceptually distinct constructs, just as organizational embeddedness and organizational affective commitment are distinct.

Table A1. Workgroup Embeddedness and Other Group Constructs

Construct	Definition	Distinction vis-à-vis WGE
Group-shared emotion	Groups that are engaged in a common activity (e.g., a software development project, a sales team) or possess a common characteristic (e.g., race) will respond with group-level emotional responses regarding the state of the environment that may be independent of individual emotional responses (Barsade & Knight, 2015; Brief & Weiss, 2002).	WGE focuses on connection to the group based on social relationships, fit, and derived utility, as opposed to a level of shared experience, such as emotional responses.
Group-shared cognition	Groups that are engaged in a common activity (e.g., a software development project, a sales team) rely on the cognitive abilities/processes of the group (e.g., shared mental models) to build a shared cognitive evaluation of the state of work (Burke et al., 2003).	Group-shared cognition refers to a common mental model held by the group, whereas WGE refers to the strength of connection to the group based on relationships, fit, and utility.
Group-distributed cognition	Groups that are engaged in a common activity (e.g., a software development project, a sales team) utilize individuals, artifacts (both analog and digital), and processes to distribute the cognitive load of the team and to better understand the state of work (Hutchins & Klausen, 1996).	Group distributed cognition captures how mental workloads are spread throughout a group, where WGE captures the strength of ties to the group.

<p>Workgroup attachment</p>	<p>An overarching term that refers to the level of identification and affective commitment to the workgroup (Riketta & van Dick, 2005).</p>	<p>Workgroup attachment is used as an umbrella term that captures separate yet distinct constructs: identification with the workgroup/organization and affective commitment to the workgroup. Demonstrating that WGE is distinct from workgroup attachment hinges on demonstrating that WGE is distinct from workgroup identification and workgroup commitment, as seen in the next two rows.</p>
<p>Workgroup identification</p>	<p>Workgroup identification implies that the individual associates their self-image as being one with the group and strongly ties aspects of their identity to being perceived as a member of the workgroup (Riketta & van Dick, 2005).</p>	<p>Workgroup identification is distinct from WGE because identification focuses on the self-image of an individual, whereas WGE focuses more broadly on connections, fit, and the sacrifices incurred by leaving the workgroup.</p>
<p>Workgroup commitment</p>	<p>Affective commitment to the workgroup refers to the extent to which an individual likes and feels emotionally attached to their workgroup (Bentein et al., 2002; Riketta & van Dick, 2005).</p>	<p>Workgroup commitment is distinct from WGE because workgroup commitment is entirely based on liking or emotional attachment to the group, whereas WGE covers a broad array of forces, including social connections, fit, and sacrifices, mirroring the manner in which organizational embeddedness is distinct from organizational affective commitment (Mitchell et al., 2001).</p>

Appendix B: Development of the Workgroup Embeddedness Measure

Before we began our initial pilot, we used a standard item generation procedure and card sort to create our measure of WGE. We pretested these items using 38 graduate business students and assessed the psychometric properties of our measure using a sample of 41 IT professionals. We then proceeded to Phase 1 of our full study. These stages are summarized in Table B1.

Table B1. Pilot, Pretest, and Validation Phases

	Pilot pretest		Full study – Phase 1
	Sample A	Sample B	Sample C
Sample description	38 graduate students	41 IT Professionals	Panel at Time 2 150 IT professionals
Sample source	Research university	Study Response	Study Response
Sampling technique	Cross-sectional	Cross-sectional	Outcomes measured at Time 2
Sample purpose	Preliminary statistical analyses and measure validation	Establish convergent validity, discriminant validity, and factor structure	Analyze the full research model to assess the nomological network
Constructs measured	WGE	WGE	WGE, professionalism, work-life conflict, organizational citizenship behaviors

Pilot Phases 1 & 2

In Phase 1, we validated the factor structure and then assessed the higher-order structure of the construct. We adapted measures drawn from the literature to operationalize WGE. However, we tailored the measures to the IT work context by modifying the items' wording. Since the items were modified, and because the reuse of items in a new research context requires revalidation (Creswell, 2013), we performed five steps to create, test, and validate our measures.

Step 1. We created our measure of WGE using items drawn from the literature. WGE was operationalized as having four components: social links, fit, and tangible and intangible sacrifice. For belongingness, we use items from Hartog et al. (2007). The measures for fit and social links were adapted from Mitchell et al. (2001) and Ng and Feldman (2009). Based on utility theory (Dinger et al., 2012), we disaggregated the sacrifice measure into two types: tangible sacrifice (measuring quantifiable benefits and perks) and intangible sacrifice (measuring less easily quantified factors such as respect and autonomy).

Step 2. We tailored several of the items to the IT context. To evaluate the measures and their modifications, we enlisted an expert panel of four IS and organizational behavior faculty and IT three professionals to assess the items for content and clarity. The panel suggested several changes that we made before moving on to the next step.

Table B2. Workgroup Embeddedness Items

Workgroup embeddedness: Social links	
SL1	In the IT group, I really feel like I belong.
SL2	I never feel isolated from others in the IT group.
SL3	I feel connected to others in the IT group.
Workgroup embeddedness: Fit	
FIT1	Work in the IT group utilizes my skills and talents well.
FIT2	I feel like I am a good match for the IT group.
FIT3	I fit with the culture of the IT group.
Workgroup embeddedness: Sacrifice (tangible)	
ST1	The perks of working in the IT group are outstanding.
ST2	The benefits of working in the IT group are good.
ST3	IT work in this firm provides good insurance and medical benefits.
Workgroup embeddedness: Sacrifice (intangible)	
SI1	I feel that people in the IT group respect me a lot.
SI2	IT work in this firm gives me freedom to make my own decisions.
SI3	Being in the IT group enables me to control my own life.

Step 3. We performed a pretest to assess the clarity of the components' measures. We asked 38 graduate business students to evaluate the items' phrasing and content. Based on their feedback, we made minor wording adjustments to the measures to improve clarity. Further, we performed initial statistical validation to find initial evidence of appropriate psychometric properties. The final modified WGE Items used for the pilot appear in Table A2.

Step 4. We collected data from IT professionals to assess the psychometric properties of our measure. We drew data from IT professionals through Study Response (studyresponse.net), an academically oriented survey organization, which provided access to a panel of 1,200 IT professionals. We filtered the IT professionals panel based on employment status and job title. We dropped panel members who were not currently working full-time or reported job titles outside the mainstream IT workforce (e.g., IS professor). This resulted in 283 potential respondents. From the filtered panel, we invited a random sample of 50 respondents to participate in the pilot. We received 41 completed surveys (82% response rate). Of the 41 respondents, 26 were men and 15 were women, with an average age of 38.5.

Step 5. We theorize that workgroup embeddedness is a reflective-formative second-order construct. To test this, we performed a PLS analysis of only the workgroup embeddedness factors using the method outlined in Hair et al. (2020). We executed the analysis utilizing the factor weighting scheme, which is the appropriate method to analyze a reflective-formative second-order hierarchical component model. We assessed individual item reliability, construct convergent validity, and construct discriminant validity to validate our measurement structure.

Item Reliability: Table B3 shows the measurement model results for each of the first-order dimensions of WGE. Adequate individual item reliability is indicated when an item has a factor loading greater than 0.70 (Nunnally, 1978). This loading implies that the shared variance between the items is higher than the error variance (Carmines & Zeller, 1979). All of our items load at greater than the 0.70 suggested minimum and are significant at the $p < 0.001$ level. Also, all cross-loadings must be a minimum of lower than the factor loading, which is the case in our data. Although normal distributions are not a requirement when using PLS-SEM, we examined the skewness and kurtosis of all items. The items have skewness and kurtosis between +1 and -1, except for two, which have a maximum skewness of 2.495, indicating only minor non-normality. These metrics are presented in Table B3.

Table B3: Cross Loadings, Skewness, and Kurtosis

	Belongingness	Fit	Sacrifice (intangible)	Sacrifice (tangible)	Skewness	Kurtosis
BEL1	0.797	0.697	0.442	0.572	-0.248	-0.281
BEL2	0.789	0.420	0.363	0.441	-0.510	0.21
BEL3	0.837	0.520	0.395	0.492	-0.787	0.920
FIT1	0.615	0.856	0.536	0.547	-0.476	0.330
FIT2	0.521	0.879	0.448	0.557	-0.469	0.034
FIT3	0.623	0.820	0.396	0.578	-0.366	0.071
INT1	0.433	0.481	0.855	0.453	-0.608	0.323
INT2	0.432	0.453	0.887	0.391	-0.592	0.727
INT3	0.432	0.474	0.855	0.334	-0.605	0.604
TAN1	0.538	0.587	0.445	0.802	-0.461	0.395
TAN2	0.473	0.500	0.337	0.864	-0.531	0.478
TAN3	0.533	0.529	0.331	0.799	-0.735	1.041

Convergent Validity: We used composite reliability (CR) and average variance extracted (AVE) to test for convergent validity. These values are presented in Table A4. Composite reliability measures internal consistency—how closely related the items are as a group. For our first-order constructs, composite reliability ranged from 0.849 to 0.900, exceeding the recommended 0.70 (Nunnally, 1978) and 0.50 minimums (Fornell & Larcker, 1981). AVE assesses the amount of variance contributed by its variables, relative to measurement error (Chin, 1998). AVEs for our constructs are all above 0.85, greater than the suggested cutoff of 0.50. Together these tests support the construct validity of our measurement model.

To test construct discriminant validity, the square root of the AVE should be greater than the variance shared between the construct and other constructs in the model (correlation between two constructs). In Table A5, we show these metrics, and, in all cases, this standard is met, as each correlation is lower than the square root of the AVEs of the other correlated variables (Fornell & Larcker, 1981). Together these tests support discriminant validity.

Table B4: Evidence for Construct Validity

Construct / item	Item loading	Composite reliability	Average variance extracted	Variance inflation factor	WGE factor weight
Belongingness		.849	.652	2.181	.290***
BEL1	.797***				
BEL2	.789***				
BEL3	.837***				
Fit		.888	.726	2.428	.334***
FIT1	.856***				
FIT2	.879***				
FIT3	.820***				
Intangible sacrifice		.900	.750	1.493	.290***
INT1	.856***				
INT2	.879***				
INT3	.820***				
Tangible sacrifice		.862	.676	1.983	.293***
TAN1	.802***				
TAN2	.864***				
TAN3	.799***				

Note: ***Significant at the $p < 0.001$ level.

Table B5. Fornell-Larcker Criterion

	Belongingness	Fit	Sacrifice (intangible)	Sacrifice (tangible)
Belongingness	0.808			
Fit	0.689	0.852		
Intangible sacrifice	0.499	0.542	0.866	
Tangible sacrifice	0.628	0.658	0.455	0.822

Note: Diagonals are the square root of the AVE.

We examined potential multicollinearity by utilizing the variance inflation factor (VIF); multicollinearity is present if $VIF < 1$ or $VIF > 5$ (Thompson et al., 2017). The VIFs for our constructs are presented in Table B4. The lowest VIF was intangible sacrifice, at 1.493, while the highest VIF was fit at 2.428. As all VIFs are above 1 and are well below the conservative cutoff of 5.00, multicollinearity is not a likely problem. Finally, as illustrated in Table B5, the correlations between the components of workgroup embeddedness are moderate and do not follow a specific pattern. This indicates that they do not have a direct effect on the stability of the coefficients of the indicators (Collier & Binstock, 2006; MacKenzie et al., 2005).

Although the primary manner to validate the use of formative versus reflective measurement is theoretical reasoning, we evaluated the appropriateness of the second-order formative workplace embeddedness construct. To do this, we calculated the weights of the relationships between each of the first-order constructs and the second-order construct. The typical approach when evaluating a reflective-formative second-order construct is to utilize a two-stage approach. This approach provides a more parsimonious model on the higher level, as it utilizes the factor scores from the initial stage analysis rather than using the lower-level constructs. However, more recent literature suggests that it is more appropriate to estimate the formative weights by using the total effects (i.e., the sum of the effects on the lower-order constructs multiplied by the effect of the lower-order constructs on the higher-order construct) (Becker et al., 2012; Hair et al., 2020). Table B4 includes the total effects scores for each of the first-order constructs on workplace embeddedness. All are statistically significant at the $p < 0.001$ level. We also note that the correlations of the first-order factors (see Table B5) are not at consistent levels and are generally moderate. This provides additional evidence that the conceptualization of the second-order factor is more likely to be formative than reflective.

Appendix C: Measure Items

Table C1. Measure Items

Professionalism (Snizek, 1972)	
AUT1	I don't have much opportunity to exercise my own judgment. ®
AUT2	My own decisions are subject to review. ®
AUT3	I am my own boss in almost every work-related situation.
ID1	I systematically read the professional journals.
ID2	I regularly attend the professional meetings at the local level.
ID3	I believe that professional associations should be supported.
PS1	I think my profession, more than any other, is essential for society.
PS2	The importance of being in my profession is sometimes overstressed. ®
PS3	If ever an occupation is indispensable, it is this one.
SR1	My fellow workers have a pretty good idea about each other's competence.
SR2	A problem in this profession is that no one really knows what his/her fellow workers are doing. ®
SR3	There is no way to judge fellow workers' competence. ®
SC1	The dedication of people in this profession is really gratifying.
SC2	It is encouraging to see the high level of idealism which is maintained by members of my profession.
SC3	Most people would remain in this profession even if their incomes were reduced.
SC4	People in this profession have a real "calling" for their work.
Work-life conflict (Kopelman et al., 1983)	
WLC1	After work, I come home too tired to do some of the things I'd like to do.
WLC2	On the job I have so much work to do that it takes away from my personal interests.
WLC3	My family/friends dislike how often I am preoccupied with my work while I am at home.
WLC4	My work takes up time that I'd like to spend with family/friends.
Organizational citizenship behaviors (Den Hartog et al., 2007)	
CP1	I help others when it is clear their workload is too high.
CP2	I take the initiative to help orient newcomers in the organization even though it is not required.
CP3	I lend a helping hand to coworkers when needed.
CP4	I willingly assist others in meeting deadlines or requirements.
CP5	I think of ways to improve collaboration within the organization.
CP6	I work with others wherever possible to help improve the image of the group and organization.
CP7	I do not take unnecessary breaks.
CP8	I go beyond what is officially required in attendance.
CP9	I work as quickly and efficiently as possible.

Note: *Items marked ® are reverse coded

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