

# Functional and Visionary Leadership in Self-Managing Virtual Teams

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U. Yeliz Eseryel<sup>1</sup> ,  
Kevin Crowston<sup>2</sup>,  
and Robert Heckman<sup>2</sup>

## Abstract

In this conceptual article, we present a theory of leadership in self-managing virtual teams. We describe leadership in this setting as a process that results in the creation, reinforcement, and evolution of shared mental models and shared norms that influence team member behavior toward the successful accomplishment of shared goals. We distinguish two types of leadership. We identify leadership that works within and reinforces existing models and norms to influence team contributions as “functional” leadership. We identify leadership that results in changes in models and norms as “visionary” leadership. We propose that successful self-managing virtual teams require both types of leadership and that they will exhibit a paradoxical combination of shared, distributed functional leadership complemented by strong, concentrated, and centralized visionary leadership and that visionary leadership is enabled by functional leadership in the form of substantive team member contributions.

## Keywords

self-managing teams, virtual teams, structuration theory, leadership, visionary leadership, functional leadership

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<sup>1</sup>East Carolina University, Greenville, NC, USA

<sup>2</sup>Syracuse University, Syracuse, NY, USA

## Corresponding Author:

U. Yeliz Eseryel, Department of MIS, College of Business, East Carolina University, 330 Slay Hall, Mailstop 503, Greenville 27858-4353, NC, USA.

Email: [yeliz@eseryel.com](mailto:yeliz@eseryel.com)

In this conceptual article, we develop a theory of the nature of leadership in self-managing virtual teams and its contribution to team success. While there are many definitions of leadership, we define it as influence that guides team members in the accomplishment of shared goals toward team success (Northouse, 2019). We define team success (also referred to in the literature as team effectiveness) as teams achieving the two critical functions of a team: team performance (task accomplishment) and team development (maintenance of the team) (Northouse, 2019, p. 375). Team performance is the “quality of decision-making, the ability to implement decisions, the outcomes of teamwork in terms of problems solved and work completed, and finally the quality of institutional leadership provided by the team” (Nadler, 1998, p. 24). Team development is the cohesiveness of the team and the ability of group members to satisfy their own needs while working effectively with other team members (Nadler, 1998; Northouse, 2019, p. 375).

This article is about leadership specifically in self-managing virtual teams, teams that combine features of two atypical types of teams: virtual teams and self-managing teams. By virtual teams, we mean groups of people working on a shared task while interacting primarily or exclusively via information and communication technologies. Virtual teams are commonly employed in organizations to bridge discontinuities of time and geography, allowing the organization to leverage human and intellectual capital wherever it resides globally (Duarte & Snyder, 2001), to create flexibility in staffing to meet changing demands and to reduce travel costs (Hoch & Kozlowski, 2014). By self-managing teams, we mean teams with the collective autonomy and responsibility to plan, manage, and execute tasks interdependently to attain a shared goal (Magpili & Pazos, 2018). Self-managing virtual teams combine the benefits of both types of teams and so have become increasingly pervasive (Lim, 2018).

The distinctive features of virtual and self-managing teams affect the nature and processes of team leadership. Unlike conventional co-located teams, whose members work in relatively close proximity and interact regularly face-to-face, members of virtual teams are geographically and often organizationally or culturally separated (Watson-Manheim, Chudoba, & Crowston, 2002). Virtual teamwork is often characterized by “behavioral invisibility” (Wilson, Straus, & McEvily, 2006, p. 16) meaning that leaders cannot easily observe team member behavior, making it difficult for them to manage team task and social dynamics. Team process is more difficult to moderate because of the reduction in social interaction. Traditional forms of social control such as direct supervision, physical proximity, and shared physical experiences are largely absent (Pinsonneault & Caya, 2005). Finally, opportunities to give and

to receive feedback are reduced, as are opportunities to assess perceived commitment to project or team goals (Konradt & Hoch, 2007). Leadership structures observed in virtual teams may include permanent leaders, rotating leaders, managing partners, structures in which facilitators or coordinators assist teams in completing their work, as well as leaderless (self-managing) structures (Beyerlein, Nemiro, & Beyerlein, 2008). However, the literature suggests that virtual teams are more likely to be self-managing, regardless of whether a formal leader is appointed.

In self-managing teams, power, authority, and ownership are distributed, resulting in a shared leadership model with members holding collective responsibility for project outcomes (Magpili & Pazos, 2018; Mathieu, Maynard, Rapp, & Gilson, 2008; Yang & Guy, 2011). Self-managing teams have been the topic of much theorizing and empirical inquiry. However, the theorizing has primarily focused on the dynamics of self-management in co-located teams (Bell & Kozlowski, 2002; Hertel, Geister, & Konradt, 2005; Mathieu et al., 2008) typically with external leadership. Hoch and Dulebohn (2017) suggest that the underlying dynamics by which self-managing leadership structures emerge will differ in virtual teams because the discontinuities present in the virtual environment impact all forms of leadership structures and dynamics. In sum, when teams exhibit high levels of both virtuality and self-management, their leadership dynamics challenge existing leadership theories, particularly many theories designed to explain interactions between subordinates and a single individual who occupies a formal, appointed managerial, or supervisory position in a hierarchical organizational setting (House & Aditya, 1997).

The purpose of this article is to develop a theory of leadership in self-managing virtual teams, teams in which the majority of teamwork is done and coordinated virtually and where leaders, if any, lack formal influence, which is central to our definition of leadership. Another difference we seek to address is that in much of the organizational leadership literature, the leader is positioned as an individual who develops strategies and then motivates others to do the work. In contrast, self-managing virtual teams are typically action-oriented, where contribution to the team's work is crucial part of leadership (Eseryel & Eseryel, 2013), and where the leaders do not have the luxury of only focusing on strategy, motivation, and task coordination.

For our theorizing, we integrate different leadership theories from the management literature and combine findings from the virtual team literature from the management information systems field, using the structuration theory as a metatheory to guide the integration. A new theory of leadership is needed to address leadership in self-managing virtual teams because past research has addressed some of these teams' distinctive dynamics but so far in a piecemeal

fashion. There are different theories for when leadership is emergent (Carnabuci, Emery, & Brinberg, 2018; Hoch & Dulebohn, 2017) or shared (Hoch & Kozlowski, 2014) or when there are assigned external or internal leaders (Morgeson, DeRue, & Karam, 2010; Sharma & Kirkman, 2015). However, there is not as yet an integrated perspective that focuses specifically on self-managing virtual teams, the gap that we seek to address with our theorizing.

## Literature Review

Since the literature has not yet integrated leadership in self-managing and virtual teams, in this section, we review the distinct literature studies on leadership in these two settings. The literature on leadership is voluminous, so we necessarily focus on the subset most relevant to our topic. Northouse (2019) provides a more complete picture of the general leadership literature.

### *Leadership in Self-Managing Teams*

A self-managing team is a group of individuals with diverse skills and knowledge, given the collective autonomy and responsibility to plan, manage, and execute tasks interdependently to attain a common goal (Magpili & Pazos, 2018). In a true self-managing team, power is distributed among team members and all members are collectively responsible for project success (Magpili & Pazos, 2018; Yang & Guy, 2011). Although this definition may appear to suggest that self-managing teams are “leaderless,” that is, that formal leadership is absent, this is not necessarily the case. Self-managing teams range from teams embedded within formal organizational hierarchies in which a formal leader is appointed by upper-level management to loosely configured groups of individuals who come together to discuss or solve some issue or problem. In the former case, the external leader may be appointed to facilitate and develop team motivation and ability of members to lead themselves (Rapp, Gilson, Mathieu, & Ruddy, 2016). Indeed, much of the self-leadership literature has examined the conditions under which such a team becomes fully self-managing (Druskat & Wheeler, 2003; Stewart & Manz, 1995; Stoker, 2008; Wageman, 2001). The later arrangement, a loosely configured group, is frequently seen in community-based organizing or in Internet-based groups such as open source software development teams. As such, self-management can be thought of as a continuum rather than as a state (Offermann & Scuderi, 2007; Stewart, Courtright, & Manz, 2010).

If a team has no appointed leader or a leader focused on team development rather than day-to-day outcomes, then who in the team influences team

members toward their shared goals, our definition of leadership? Pearce and Conger (2003, p. 1) suggests that leadership processes are dynamic and interactive and often involve peer or lateral influence and at other times upward or downward hierarchical influence, reflecting the interdependencies among social networks or networks of influence (Fletcher & Kaufer, 2003, p. 21). This perspective, similar to the notion of distributed leadership (Gronn, 2002), indicates that leadership is a relational process, a shared phenomenon occurring at different levels of hierarchy. It differs from the conventional leadership theory by conceptualizing leadership as a group-level rather than an individual-level phenomenon. Fletcher and Kaufer (2003) noted that in doing so, it creates an important theoretical link between leadership research and research on teams that had been largely absent in prior work.

Accordingly, Yang (1996) identified shared leadership as an outcome of successful self-management in teams. Indeed, the phenomenon of shared leadership may be more general than our focus on self-managing teams. Decades of research on small-team interactions supports the notion that even in ordinary teams, different individuals may perform different leadership roles as circumstances warrant. Houghton, Neck, and Manz (2003) observed that when the task-oriented and social supportive-oriented leadership roles in small teams have been examined empirically, these leadership roles are often split between two or more individuals. They attribute this outcome to the tensions created when one individual attempts to fulfill both roles, noting that “the directive or task-oriented leader often creates tension within the group through the assignment of tasks... (and) may not be in the best position to fill the social supportive role of solving or soothing the problems created by the task-related tension” (Houghton et al., 2003, p. 126). Alternately, the split may be due to differing levels of expertise. For example, Klein, Ziegert, Knight, and Xiao (2006) described how attending surgeons, fellows, and residents dynamically shared leadership in a trauma care unit, as the surgeons stepped back to allow fellows and residents to assume leadership roles. Pearce and Sims (2002) similarly note that team members can and do perform leadership roles that had previously been performed by managers.

The scope of a self-managing team’s authority seems to depend on context. Wageman (2001) describes self-management as a behavioral process in which self-managing teams are given the authority to execute work and to monitor and manage work processes, for both of which they are held accountable. On the other hand, specification of team goals, objectives, and constitution are often assumed to be outside the domain of self-management. However, this limit may be a function of the context in which the teams are embedded. As technology facilitates the development of new means of interacting and organizing, the degree to which decisions about goals, objective, and

constitution are integrated within the scope of teams' authority may change. For instance, open source software development teams typically do take responsibility for determining goals and objectives as well as team membership. External leadership may in fact be nonexistent, or in the presence of the discontinuities present in the virtual environment, ineffective in providing this type of direction.

The definition of leadership as helping a team to achieve shared goals implies that the success of leadership can be assessed by whether the team achieves its goals. Shared leadership has been shown to have a clear impact on team performance, which is an element of team success. Wang, Waldman, and Zhang (2014) carried out a meta-analysis of 42 studies of shared leadership and found a positive relationship between shared leadership and performance, with a strong effect for "cumulative, overall shared leadership," meaning situations where many or all team members were perceived as providing leadership. Cohen, Chang, and Ledford (1997) suggested that degree of team member involvement is the strongest predictor of team success, and that managerial, or supervisory, behaviors performed by formal, appointed team leaders are ineffective in self-managing teams. The implication of their findings is that a focus on external leadership does not adequately capture the team's internal and emergent leadership dynamics. A meta-analysis of 50 studies found a positive relationship between shared leadership and performance (D'Innocenzo, Mathieu, & Kukenberger, 2016) and went on to note that many studies had adopted "hierarchical leadership themes," suggesting that the actual effect could be even stronger.

Empirical investigations of shared leadership have often examined it in organizational settings in which both vertical and shared leadership were present. For example, in Klein et al. (2006's) study, attending surgeons formally outranked fellows and residents. Nevertheless, studies investigating the relationship between vertical and shared leadership and team success suggest that shared leadership is a useful predictor of performance even in the presence of vertical leadership (Ensley, Hmieleski, & Pearce, 2006; Pearce & Sims, 2002). A meta-analysis of 52 articles found that shared leadership correlated significantly with team performance, explaining 12.2% of the variance in team performance, about the same impact on performance as vertical leadership (Nicolaidis et al., 2014).

Research has identified additional factors as crucial for the success of self-managing teams. We focus in particular on the role of shared mental models, which we will argue are intimately tied to the process of leadership in this setting. Shared mental models are a common understanding or a form of team knowledge that members have regarding their tasks and how they need to interact in order to accomplish such tasks. Researchers (Cannon-Bowers,

Salas, & Converse, 1993, p. 4; Druskat & Pescosolido, 2002; Maynard & Gilson, 2014) argue that it is critical that self-managing work teams develop shared mental models. Researchers identify shared mental models of psychological ownership of team outcomes and they identify processes that support continuous learning and that promote heedful interaction as underlying success in terms of team process and outcomes. Barnett and Weidenfeller (2016) similarly note the importance of shared cognition. Shared mental models have likewise been found to affect team success in virtual teams (Maynard & Gilson, 2014). In a study of global software development, Nordbäck and Espinosa (2019) found that shared mental models about shared leadership in particular were critical for success.

On the whole, the literature on self-managing teams reinforces the notion that leadership is often shared in these teams (Pearce & Manz, 2005). When external team leaders are appointed, their responsibilities are largely to facilitate, mentor, or enable shared leadership rather than to direct the work of teams. The empirical findings also suggest that observed behaviors related to the process and the substance of the task are important factors related to team success. Finally, research has identified the importance of shared mental models to enable team members to work together effectively in the absence of direction from a singular leader.

### *Leadership in Virtual Teams: Functional Theories of Leadership*

We turn next to research on leadership in virtual teams. This research stream has most often adopted theoretical frameworks initially developed to investigate leadership dynamics in co-located teams. The majority of studies have been either implicitly or explicitly informed by *functional behavioral leadership* theories (Hackman & Walton, 1986; Kayworth & Leidner, 2002; McGrath, 1962b; Tyran, Tyran, & Shepherd, 2003; Weisband, 2002; Yoo & Alavi, 2004) that focus on the leadership behaviors, behavioral styles, orientations, or patterns that leaders manifest (Denison, Hooijberg, & Quinn, 1995; Hooijberg, Hunt, & Dodge, 1997; Lord, 1977).

A key interest of leadership researchers guided by this perspective has been empirically identifying the specific task- and relationship-oriented behaviors that distinguish leaders from nonleaders in teams (e.g., Carte, Chidambaram, & Becker, 2006; Hoyt & Blascovich, 2003; Kayworth & Leidner, 2002; Piccoli, Powell, & Ives, 2004; Wickham & Walther, 2007). Typically, in these empirical investigations, individuals are assigned to virtual teams and required to complete a task that may range in duration from a week to several months. In some of these studies, a team member was appointed as the team leader at the outset. In others, no team member was appointed as the team leader. Once

teams completed their tasks, team members were asked to identify who the team leader(s) had been and the behaviors of those leaders are then examined. Other studies have taken a similar approach to studying intact teams (e.g., Hoch & Dulebohn, 2017; Johnson, Safadi, & Faraj, 2015).

A first finding concerns the emergence of leadership in virtual teams. While some teams evolved a leadership structure in which one or two team members emerged who were recognized by others as the team's leader, other teams evolved less-centralized leadership, interaction, influence, and participation behaviors in which the leadership of the team was shared among its members (Yoo & Alavi, 2004). In the latter case, no single individual or core group of individuals was identified as the team leader(s). Even in studies in which a team member was appointed as the team's leader at the outset, individuals other than the appointed leader were often identified by other team members as having performed leadership behaviors (Kayworth & Leidner, 2002; Weisband, 2002).

As in self-managing teams, such shared leadership seems important for virtual team success. In a field study of 101 virtual teams, (Hoch & Kozlowski, 2014) found that hierarchical leadership was less associated with team performance as the degree of virtuality increased, while shared team leadership was significantly related regardless. Hoch and Dulebohn (2017) proposed a framework for virtual teams that included both shared and emergent leadership impacts on team performance, while Liao (2017) suggested that leaders of virtual teams should facilitate shared leadership. In other words, whether or not a leader is appointed, virtual team leadership structures seem to emerge based on the interactions of team members (Jarvenpaa & Leidner, 1999; Kayworth & Leidner, 2002; Weisband, 2002; Wickham & Walther, 2007; Yoo & Alavi, 2004). Northouse (2019, p. 5) suggests that when a person is perceived by their peers as the most influential member of a team, regardless of their position in the hierarchy or title, the person is exhibiting emergent leadership. According to Northouse (2019), the leadership in this case is acquired through others in the same setting who observed the behavior of the individual over a period of time. To determine such leaders, one should first ask the team members whether they think the team has one or more leaders, and if so, who they perceive to be leader(s) in the team.

Having identified which individuals are perceived as leaders, the next crucial and unanswered question in the literature is which behaviors of these individuals predict these leadership perceptions. While status, power, or hierarchical position within an organization often are associated with leadership attributions in co-located teams, these cues are potentially absent in virtual teams where leadership does not correlate with hierarchical position, status, or power, especially in those in which membership crosses



organizational boundaries and where formal hierarchical leadership is not present. The literature suggests that leadership attributions are made instead on the basis of observed behaviors: the team leader or leaders are those who are perceived by team members as having performed a leadership function within the team (Fairhurst & Connaughton, 2014; McGrath, 1962b; Weisband, 2002; Yoo & Alavi, 2004). Accordingly, quantity and initiation of communication have been consistently associated with being identified as a virtual team leader (Piccoli et al., 2004; Tyran et al., 2003; Yoo & Alavi, 2004).

Turning to the content of the communication, the two-factor theory that underlies the functional theory of team leadership has been a common theoretical framework. Derived from Bales (1950) work on small group dynamics, this theoretical perspective suggests that leaders engage in both task-oriented and relationship-oriented behaviors. Task-oriented behaviors are those that move the team forward in the accomplishment of its task, such as scheduling and planning work, initiating activity, coordinating subordinate activities, elaborating, problem-solving, proposing solutions, removing barriers or providing resources, providing feedback, and providing, elaborating, or summarizing information (Yukl, 2002, p. 53). Relationship-oriented behaviors are those that allow the team to maintain a positive psychosocial dynamic, such as gate-keeping, showing trust and confidence, expressing group emotion, conflict resolution, maintaining a positive atmosphere, showing concern for others, expressing gratitude, keeping subordinates informed, and providing recognition for subordinates' accomplishment (Yukl, 2002, p. 53). Morgeson et al. (2010) offered a similar list of leadership behaviors, suggesting that informal internal leadership, which we argue characterizes virtual teams, is best positioned in the action phase to behaviors including performing the team task, solving problems, supporting the social climate, monitoring the team, and managing team boundaries but not to challenging the team, providing resources, or encouraging team self-management.

Empirical research has shown that all of these behaviors are related to perceptions of leadership in virtual teams. Pescosolido (2002) and Hart and McLeod (2003) find that emergent leaders increase their task-oriented communication in order to reduce ambiguity, provide direction, and move the work of the team forward. Bell and Kozlowski (2002) note the initial importance of "development and shaping of team processes" and "coaching to establish 'team coherence'" and the ongoing importance of "monitoring and management of ongoing team performance" (p. 17). Carte et al. (2006) found that higher performing teams engaged in significantly more concentrated behaviors oriented toward performance and more shared behaviors focused on

process (i.e., keeping track of the team's work) than lower performing teams. Jarvenpaa, Knoll, & Leidner (1998, 1999) suggested that social exchanges establish "thick" relationships among virtual team members as long as social exchange does not detract from the team's task focus. As well, leaders share knowledge either in the form of technical knowledge, expert opinion, or procedural knowledge (Faraj, Kudaravalli, & Wasko, 2015).

Finally, recent research has shown that beyond communication, individuals' substantive contributions to the shared goal ("performing the team task") contribute to leadership perceptions in virtual teams (Eseryel & Eseryel, 2013; Faraj et al., 2015). Eseryel and Eseryel (2013) found that in virtual information systems development teams, the action-based leaders influence the team's vision and strategy for technology development by "significantly contributing to the software development effort... over long periods of time" (p.109). While knowledge creation and sharing has been important for virtual teams, such as open source software teams (Eseryel, 2014), Faraj et al. (2015) connected this behavior to leadership and showed that individuals perceived as leaders in a software team contribute to knowledge by providing software code, meaning they contribute to the software development by doing work, not only by providing technical knowledge and guidance. This focus on work is different from traditional leadership theory's view of leaders who provide influence by communicating a vision or strategy, rather than by doing work that achieves a vision and strategy piece by piece over time.

## **Summary**

The self-managing teams and shared leadership perspectives, and the results of empirical investigations of emergent leadership in virtual teams based on functional behavioral leadership theory, suggest that leadership in teams can be both shared and emergent and that shared leadership can be an important contributor to team success. In Morgeson et al. (2010)'s leadership framework, these teams thus rely more on informal internal leadership. The behavioral leadership theory provides additional insights into the classes of leadership behavior that leaders in these types of teams manifest, such as task-oriented and relationship-oriented behaviors. Furthermore, individuals' substantive contributions to the shared work contribute to leadership perceptions in virtual teams and such engagement is predictive of success. However, the existing theory and empirical research also do not completely explain how leadership behaviors enacted by individuals guide team interaction in self-managing virtual teams. While the studies from which these conclusions are drawn are informative, they most often sought to work within existing theories, even while providing evidence that the basic assumptions

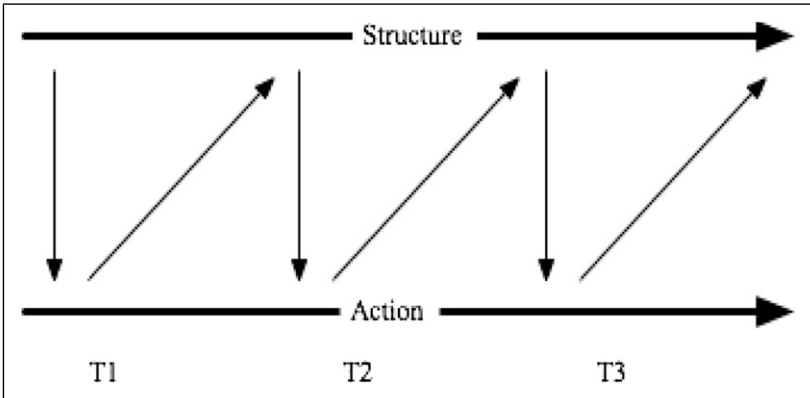
about the nature of leaders underlying much of traditional leadership theory (e.g., trait and new leadership theory, contingency and situational leadership theories, social exchange and strategic contingency theories, and leader–member exchange theories) need to be adapted to describe leadership in the self-managing virtual team setting. Understanding these adaptations is the motivation for our theorizing.

## **Model Development**

In this section, we synthesize a model for leadership in self-managing virtual teams by building on the findings about leadership in virtual and self-managing team reviewed above and on other theories of leadership. We started this article with a definition of leadership as “influence that guides team members in the accomplishment of shared goals toward team success”. The questions we seek to answer with our theorizing are what are the types of influence (and thus leadership) that are important? How do such leaders emerge to exert the influence mentioned above in a setting in which interaction is virtual and where leaders, if they are identified at all, lack formal authority or other supports for influence? And how do various types of leadership contribute to shared mental models and shared norms that are important for team success in the challenging setting of self-managing virtual teams?

### *Structurational Perspective on Leadership and the Role of Shared Mental Models and Shared Norms*

To answer our research questions, we integrate findings from the streams of literature reviewed into a theoretical framework that addresses leadership in self-managing virtual teams. Our integration is guided by a structurational perspective (Giddens, 1984). The structurational perspective combines microsociology, focused on everyday social interactions and agency on a small scale, with macrosociology, which observes social systems at the structural level, requiring a high level of theoretical abstraction. It posits a recursive relation between team “structure,” defined as the rules and resources that influence, guide, or justify individual action, and the actions of those that live within and that help to create and sustain this structure (See Figure 1). Numerous authors have used a structurational perspective to frame empirical analyses of team activities (e.g., Barley, 1986; Orlikowski, 1992) and, in particular, the development of virtual teams (e.g., Sarker, Lau, & Sahay, 2001). We chose this framework because it provides a way to conceptualize how the behaviors of one team member might shape the actions of others even



**Figure 1.** Sequential model of the relation between structure (shared mental models and shared norms) and action (leader behaviors) (from [Barley & Tolbert \(1997\)](#)).

in the absence of traditional modes of authority, a key issue in our theorizing about leadership in self-managing virtual teams.

The structuration theory is perhaps best described as a metatheory: that is, rather than identifying particular factors of leadership and their relations, it describes the form that such a theory might take. Specifically, the structuration theory suggests that a theory of leadership in self-managing virtual teams should consider structure (i.e., rules and resources) and action in these teams and how the two are interrelated as a way to analyze different forms of leadership. Structure matters because the development of shared structure enables team members to identify how to contribute to the shared goal of the team and thus achieve team success. In this way, structure may serve as a substitute for conventional leadership in as much as it guides individuals' actions toward desired group outcomes. It is thus not a question of the presence or absence of structure but rather its nature and the degree of agreement concerning structure among team members. Our emphasis on the role of structure is consistent with [Kerr and Jermier \(1978\)](#)'s substitutes for the leadership theory, which suggests that a range of factors, such as an important task or organizational formalization, can substitute for the influence of a leader.

For our theorizing, we consider structure as comprising three kinds of rules and resources identified in prior work ([Barley & Tolbert, 1997](#); [Stein & Vandembosch, 1996](#)): (1) interpretive schema, (2) norms and rules, and (3) authority and control of resources (named in the original framework as structures of signification, legitimation, and domination). For example, a team

member may follow a known process for a task (an individual action) because the individual knows the process and believes that following it is the accepted norm within the team (a structure). It should be noted that this division into three kinds of structure is an analytic convenience: in practice, they are overlapping and mutually reinforcing.

It might first appear that a consideration of leadership would be relevant primarily to an understanding the third form of structure, authority, and control of resources, factors that would distinguish a leader in a traditional vertical power structure. However, as discussed above, leaders of virtual teams (if identified as such) often lack formal authority over members or control over resources. Discontinuities in the virtual environment lessen the ability to influence via traditional sources of hierarchical power and attempts to exert influence via these means may be detrimental to team dynamics and success (Bligh, 2006; Hiller, Day, & Vance, 2006; Mathieu et al., 2008; Van der Vegt, De Jong, Bunderson, & Mollman, 2010). Furthermore, in their analysis of 250 group studies McGrath (1962a) stated in an original finding that authoritative leadership does not produce success. Last, as Barley and Tolbert (1997) point out, control of resources does not necessarily equate to formal power to reward and sanction. For instance, knowledge-based power, in the form of specialized knowledge or expertise, is a kind of resource when the team is dependent on the specialized knowledge of a team member to assist in problem-solving.

We focus instead on the effects of two other structures, namely shared mental models (“interpretive schema” in Giddens’ model) and shared norms for behavior (“norms and rules” in Giddens’ model). As noted in the prior section, extensive research on teams of all kinds has demonstrated that the degree of convergence or sharing of team member mental models is an important predictor of success generally (DeChurch & Mesmer-Magnus, 2010), that is, shared mental models help teams achieve shared goals. We suggest that these models are especially important in self-managing and virtual teams. The tendency for individuals to interpret tasks according to their own perspectives is exacerbated when working in a virtual environment, with its more varied individual settings and less opportunity for informal discussion and mutual observation. Schmidtke and Cummings (2017) note specifically the need for more complex shared mental models in teams facing a higher level of virtualness.

Shared norms seem less studied, but also important. Shared norms are legitimate, socially shared standards against which the appropriateness of behavior can be evaluated (Birenbaum & Sagarin, 1976). They influence how a group’s members perceive and interact with one another, approach decisions, and solve problems (Chatman & Flynn, 2001, p. 956).

While less studied than shared mental models, research has also shown the importance of shared norms for teams. Howell, Bowen, Dorfman, Kerr, and Podsakoff (1997) suggest that organizational members receive task guidance from factors including professional norms and standards. Locke (2003) suggested a number of basic shared norms needed for team success, such as commitment to work and respect for facts and reason. In a study of a small, geographically-dispersed software development team, Ghosh, Yates, and Orlikowski (2004) identified the importance of norms for communication to facilitate teamwork. Similarly, Henderson, Stackman, and Lindekilde (2016) found a positive impact of communication norm alignment on team success and other group states. Pearce and Ensley (2004) found the importance of a team shared vision, a related construct. And contrariwise, in the absence of developed team norms, team members will draw on norms they have acquired in other settings to guide their actions, but these diverse norms may conflict and so not guide the team toward its shared goal.

In summary, we propose that leadership, that is, influence that guides team members toward the accomplishment of shared goals, is expressed in self-managing virtual teams in part through creation of shared mental models and of shared norms that guide the actions of team members, enabling them to work together effectively and to overcome challenges created by discontinuities. Shared mental models and norms are especially important in self-managing virtual teams in which members decide for themselves what they will do (and not do) based on discussion with other members and observation of what they are doing (and not doing) (Paoletti, Reyes, & Salas, 2019). In order to be able to contribute effectively, team members must have common ideas about what is important to the team, the kinds of actions that are appropriate or necessary. As well, shared purpose and goals have been argued as a necessary condition for shared leadership (Carson, Tesluk, & Marrone, 2007). Although some research has considered the accuracy of mental models, we follow prior research on virtual teams that focus on the importance of teams having overlapping mental models and norms (e.g., Ayoko & Chua, 2014; Maynard & Gilson, 2014).

### *What Types of Leadership Operate within Self-Managing Virtual Teams?*

Our argument above is that team members are guided in their day-to-day contributions not by direction from a leader but rather by shared mental models of the work and shared norms about how to work and what constitutes high-quality work that is acceptable to group members and others. If we accept

that shared mental models and norms act as substitutes for leadership in self-managing virtual teams, a first question is how those models and norms are maintained and made salient to team members and how they emerge and evolve.

The structurational perspective suggests that some actions taken by team members serve to reinforce existing structures, while others have the effect of creating and modifying structures. That is, while agents are influenced by existing structures in their actions, their actions over time influence and change structures (See [Figure 1](#)). The key notion here is the “duality of structure,” meaning that the structural properties of a social system are seen as both the means and the ends of the practices that constitute the social system. As [Sarason \(1995\)](#) explains, in the structuration theory:

*The central idea is that human actors or agents are both enabled and constrained by structures, yet these structures are the result of previous actions by agents. Structural properties of a social system consist of the rules and resources that human agents use in their everyday interaction. These rules and resources mediate human action, while at the same time they are reaffirmed through being used by human actors or agents. (p. 48).*

Simply put, by doing things, members of a team create the way to do things.

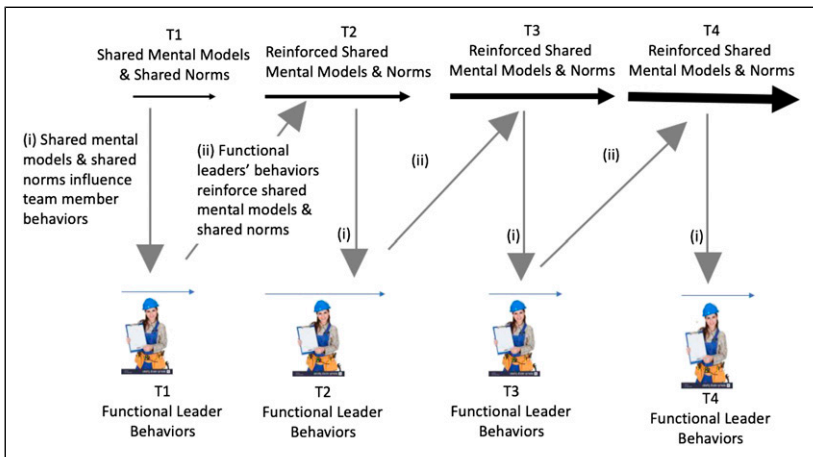
More specifically, we argue that the shared mental models and norms that guide the actions of team members are themselves shaped by the continuing contributions of the team members, either to reinforce them or to modify them, as shown in [Figure 1](#). While there has been extensive research on the impact of these forms of structure on success, there has been less attention on the mechanisms through which they are built and maintained ([Maynard & Gilson, 2014](#), p. 12). We suggest that the role of leadership in this context is to contribute to the reinforcement and evolution of the structures in increasing team success. We distinguish between two modes of leadership, which we label “functional” and “visionary,” which play different roles: functional leadership operates within and reinforces existing structures, while visionary leadership operates to modify or transform structures.

*Functional leadership reinforces existing shared mental models and norms.* We label as functional leaders as those who operate within existing structures to strengthen the mental models and shared norms of the team, thus making them more effective in guiding team members. We therefore define *behavior that influences other team members to make successful contributions to the team task, while working within and reinforcing shared mental models and norms*

as functional leadership behavior. By engaging in these behaviors, functional leaders do provide leadership as we have defined it since they influence other team members toward accomplishment of shared goals. Figure 2 exhibits how functional leader behaviors are influenced by existing structures, namely, existing mental models, and norms, and how their behavior further strengthens existing structures.

Behavioral theories of leadership reviewed in the prior section have identified classes of behaviors that we view as associated with functional leadership and have shown how these behaviors reinforce shared mental models and shared norms. First, research has emphasized the importance of intragroup communication for maintenance of shared mental models (e.g., He, Butler, & King, 2007; Kennedy & McComb, 2010). Boies and Fiset (2018) found that through intellectual stimulation and inspirational motivation, leaders were successful in building shared mental models through the mediating effect of task- and team-related communication. In support, in our review of virtual teams, we noted the recurrent finding of a relation between the amount of communications and perceptions of leadership (Piccoli et al., 2004; Tyran et al., 2003; Yoo & Alavi, 2004).

As well, we suggest that task- and relationship-oriented behaviors provide functional leadership when they work in the context of existing structures, drawing on them as resources to guide, legitimize, enable, and give meaning to these behaviors. Stewart and Manz (1995) identify similar leadership behaviors as those associated with the most significant long-term



**Figure 2.** How functional leadership operates within given structures.



improvements in self-managing teams. Shared norms seem less studied within the IS literature, though Taggar and Ellis (2007) gave an example of how a leader was able to increase the norm of collaborative problem-solving in a group.

Finally, a key finding of research on virtual teams reviewed above was that contributing work to a project is a form of leadership. These contributions constitute an important contribution to leadership because being seen doing work reinforces shared mental models and norms, making them more salient and appropriate. For example, the appropriate process for a task is not a given, but rather is the outcome of prior actions by team members. By visibly following a process, members reinforce the saliency of the steps and the legitimacy of the approach (“we always do it this way”); by taking different actions (e.g., skipping a step because it is seen to be too time-consuming or using a different approach because the accepted approach seems unable to deal with important problems), they undermine its legitimacy, perhaps eventually changing the shared mental models and norms about how to address the task. Paoletti et al. (2019) noted the importance of shared experiences as a basis for shared mental models; Fernandez et al. (2017) suggest using simulations for the same purpose. We suggest that having the work done by team members made visible via the information system linking them will have the same effect.

*Visionary leadership changes shared mental models and norms.* The second type of leadership that is important for self-managing virtual teams is what we label as visionary leadership. As teams evolve, there may come a time that the existing norms and rules are no longer appropriate for the team’s work. Visionary leaders are those who evolve structures to fit changing circumstances by revising the shared mental models and norms. For instance, Foldy, Goldman, and Ospina (2008) discussed how a leader was able to help members of an organization understand an important element of the organization’s work. Reiter-Palmon, Herman, and Yammarino (2008) suggested that a leader can help a team form a shared mental model by encouraging discussion. In a field study of 55 R&D teams, Reuveni and Vashdi (2015) found that leaders helped heterogenous team members develop shared understandings.

Visionary leadership is a key topic of both leadership and organizational change management research under the term “change leader” or “change agent”. If leadership is essential for innovating, it is equally clear that leaders should play a role in implementing change (Caldwell, 2003; Kanter, 1989; Kirton, 1980). Caldwell (2003) identified that inspiring vision, entrepreneurship, integrity and honesty, learning from others, openness to new ideas, risk-taking, adaptability

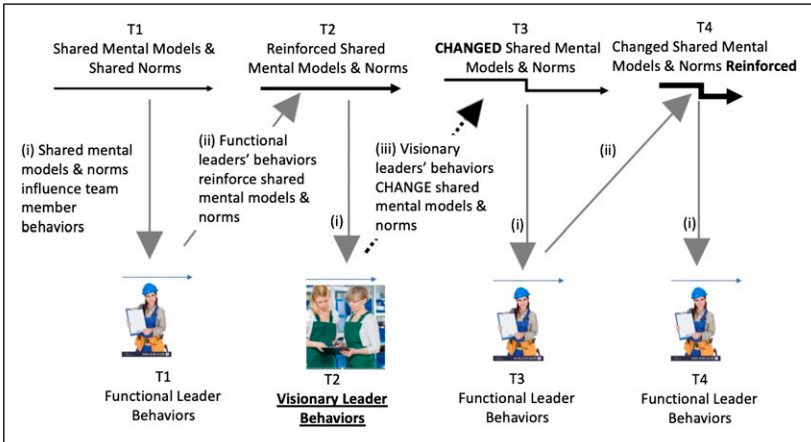
and flexibility, creativity, experimentation, and using power are the top 10 attributes of change leaders. Higgs and Rowland (2005) took a behavioral approach to change leadership and identified the leadership behaviors at various phases of change. While the authors took a leader as a manager of change, the behaviors they identified include that “what leaders say and do” matter (p.35), and they find that visionary leaders take active role at every step of the change.

An example of visionary leadership is provided by Eseryel & Eseryel (2013). They suggested that visionary leaders in self-managing global information systems development teams have a strategic influence on systems development. This influence affects the success of the team by transforming the team’s technology vision. This change of vision influences the shared mental models and norms of the team members as described below and therefore changes the structures within the team. They gave an example of a visionary leader who changed the vision and structure of the software that was being developed. A visionary leader says “*Part of it (pursuing your vision) is to take baby steps, because you will never get a community to understand and accept massive change...Which is the hard part. Therefore, I worked on one piece at a time, until it built up to change the way project went. And they joined me in making it happen*” (Eseryel & Eseryel, 2013, p. 112).

While literature typically deals with functional leadership at the expense of visionary leadership, we suggest that this dichotomous conception is because (1) formal leaders are not necessarily the emergent and informal leaders that operate within self-managing virtual teams and (2) studies may have examined teams that were in a stage where a major change in the team’s shared mental models and norms was not needed. Our argument is that these both forms of leadership are both necessary. Visionary leaders start from within the given structures; however, their work accumulates to change existing structures in a way that is then accepted and reinforced by functional leaders. Figure 3 exhibits how functional and visionary leaders operate together in a way that complements each other.

In summary, considering together the two forms of leadership presented above, we define two types of leadership.

**Definition:** In self-managing virtual teams, a) functional leaders are those who influence others by reinforcing existing shared mental models and shared norms, thus reinforcing the structures that guide the actions of team members, and b) visionary leaders are those who influence others by changing shared mental models and norms, thus facilitating the development of new structures that guide the actions of team members (Figure 4).

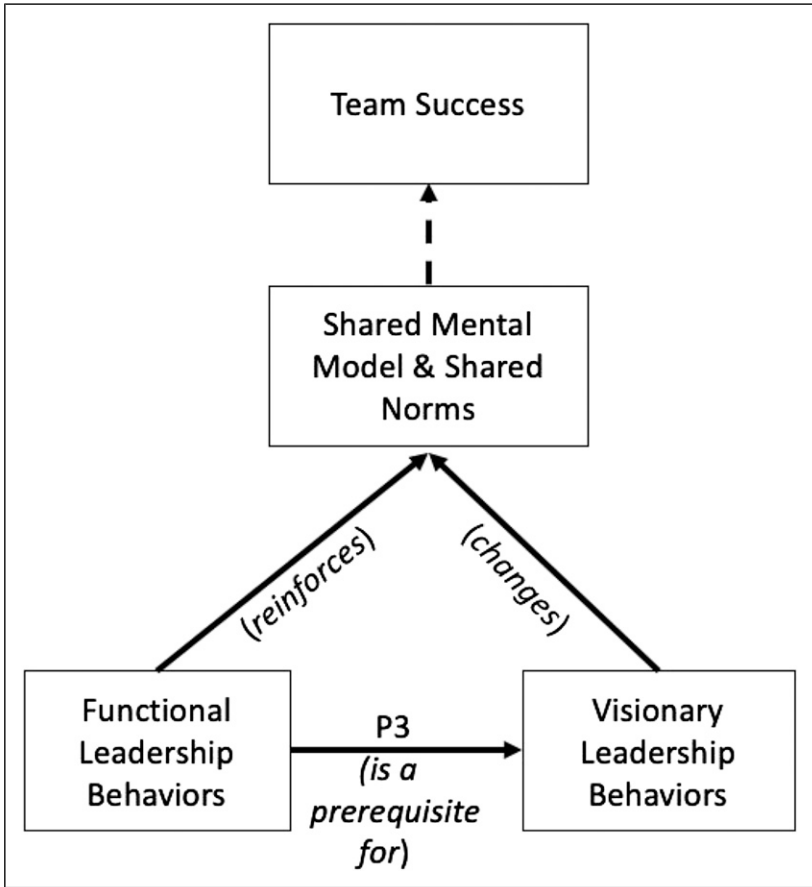


**Figure 3.** How functional and visionary leadership operate together.

### *Functional Leadership is Most Effective in Reinforcing Shared Mental Models and Shared Norms When Broadly Shared*

We turn next to the question of who performs the different leadership behaviors identified above. We propose first that successful self-managing virtual teams will exhibit broadly shared functional leadership. Extant research suggests that functional leadership is best for enabling team success when it is shared. As noted above, research on face-to-face teams (e.g., Bales, 1950; Yukl, 2002) suggests that the same individual is unlikely to perform all functional leadership roles equally well. The complexity and ambiguity that teams often experience make it unlikely that a single leader can successfully perform all necessary leadership functions (Carson et al., 2007; Day, Gronn, & Salas, 2004; Sun, jie, Wang, Xue, & Liu, 2016). Faraj et al. (2015) found that “being identified as a leader was distributed among many participants (p. 406)”; 42 individuals to be exact. This result shows that the 300 individuals they queried had observed distributed leadership within their team.

Further, we argued above that substantive task contributions are a kind of functional leadership in that they present a visible model of how work should be done that influence the convergence of shared mental models and norms about work. Such exemplary contributions are particularly likely to be widely distributed. Teams that attempt to integrate diverse, specialized knowledge workers may require many different kinds of functional leadership in the form of varied substantive task contributions (Grant, 1996). Knowledge-based work requires high levels of expertise (DeNisi, Hitt, & Jackson, 2003),



**Figure 4.** Research model-I.

and it is “ever more difficult for any leader from above to have all of the knowledge, skills, and abilities necessary to lead all aspects of knowledge work” (Pearce and Manz, 2005, p. 132). Further, experts typically seek autonomy in how they apply their knowledge and skills (DeNisi et al., 2003), therefore desiring greater opportunity to shape and participate in the leadership functions for their teams (Carson et al., 2007, p. 1217).

As an example, Eseryel (2014) found that in successful open innovation teams, knowledge contribution to innovation creation was a key functional leadership behavior that could take the form of doing work and developing

ideas. In a study of a group with seven core members (functional and visionary leaders) and 132 participants, she found that the functional leadership behaviors were not only distributed across the seven functional leaders but also across the other 132 participants, each of whom provided one to two leadership behaviors. The total contribution to innovation and functional leadership by the 132 participants was roughly equal to that from the seven functional leaders, which shows how important distributed functional leadership is. Due to the distribution of functional leadership behaviors, the team exhibits twice as much innovation as it would have if functional leadership was centralized only in the seven leaders, and many times more than if functional leadership was limited to what can be provided by a single individual.

Consistent with our argument, research suggest that distributed functional leadership is a more powerful predictor of team success than vertical leadership (Nicolaidis et al., 2014; Wang et al., 2014). The argument is that when members of a team take on functional leadership, they bring more resources to the task, share more knowledge, and demonstrate a higher commitment to the team. Meta-analyses of shared leadership have found that shared “new-genre” leadership is related to success (Wang et al., 2014) after controlling for vertical leadership. Nicolaidis et al. (2014) confirmed this result, showing that shared leadership accounted for an additional 5.7% of the variance in team performance beyond vertical leadership; Ensley et al. (2006) found that shared leadership explained an additional 14% to 20% of the variance in firm revenue growth over vertical leadership; and Small and Rentsch (2010) reported that shared functional leadership accounted for an incremental 2% to 9% of the variance in outcomes, depending on the measure. To sum up, many authors have found the positive influence of shared leadership and argued that shared leadership results in higher team-level performance than traditional hierarchical leadership (Avolio, Jung, & Sivasubramaniam, 1996, p. 1965; D’Innocenzo et al., 2016).

The review above has described research that has examined the direct effect of shared functional leadership on team success. We hypothesize that this impact in self-managing virtual teams is at least partially mediated by the development of shared mental models and shared norms, factors that were not considered in prior studies. Research show that when functional leadership is distributed among individuals and when the knowledge is shared on a virtual platform, the combined effect of having more contributions, more resources, and more knowledge shared with the team by numerous functional leaders bring about stronger shared mental models and shared norms, resulting in higher levels of team performance (D’Innocenzo et al., 2016). In an agent-based model study, Dionne, Sayama, Hao, and Bush (2010) found that in the absence of high mutual interest, broad participation was needed for mental

model convergence. Finally, as noted above, research shows a connection between shared mental models and improved team performance (Marks, Sabella, Burke, & Zaccaro, 2002; Mathieu, Heffner, Goodwin, Salas, & Cannon-Bowers, 2000).

Looking in more detail, research has suggested three key phases of shared mental model development: orientation, differentiation, and integration (McComb, 2007). Leaders play a key role in the activities of these phases, such as information acquisition, exchange, organization assimilation, and reconciliation of team's perspectives (Dionne et al., 2010). When the functional leadership is distributed, the activities related to orientation, differentiation, and integration are spread among team members, so information assimilation and reconciliation affects more of the team. These processes may initiate numerous conversations among the team members, facilitating a convergence of individuals' mental models. When there are more communications and dynamic interactions, more ideas are integrated (i.e., the integration phase of shared mental models take place) due to the involvement of numerous functional leaders.

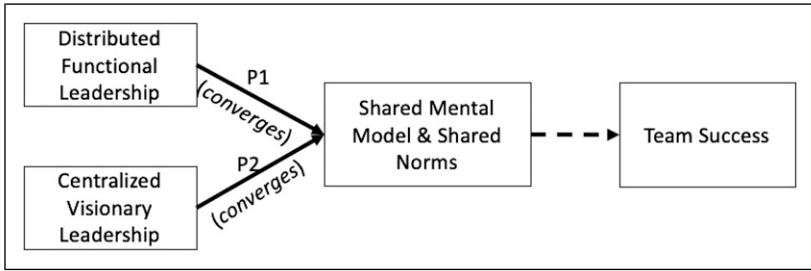
Another way to frame the argument is to consider the structure of self-managing teams as networks. The positioning of leaders and followers within the network affects how leaders catalyze information, resource diffusion (Balkundi & Kilduff, 2006), and thus collective learning (Dinh et al., 2014, p. 32). When functional leadership is distributed, the influence of these leaders is distributed across the network, thus facilitating collective learning and shared mental model development more broadly. McIntyre and Foti (2013) found this influence with informal leadership. They found that the distribution of informal leadership was related to the degree of similarity and accuracy of team members' mental models as well as subsequent team performance. In summary, the nature of work in self-managing virtual teams creates a pressure for what we have labelled distributed functional leadership.

We thus offer the following proposition:

**Proposition 1:** Distributed functional leadership behaviors will be positively associated with extent of shared mental model and shared norm convergence in self-managing virtual teams (and thus with team success) (Figure 5).

### *Visionary Leadership is Most Effective in Changing Structure When Centralized*

We next consider changes in structure. We label behaviors that create or change structures, that is, new mental models or new norms for behavior, as



**Figure 5.** Research model-II.

“visionary” leadership. Visionary leaders help other team members make sense of the world in different ways and to develop new norms of behavior and new mental models to match changing needs.

Given our definition of visionary leadership, we might ask whether change in structures is incremental or discontinuous. Advocates of double-loop learning (Argyris & Schön, 1978) believe that change in underlying structures is only possible when teams have consciously reflected on conditions eliciting a need for change, have surfaced the team’s deep assumptions and beliefs, and engaged team consensus for change. In effect, the double-loop learning theory requires that team members be consciously aware of team structures before they are able to change them. Before changes in theory-in-use (*i.e.*, the tacit structures that govern behavior) are possible, members “...require external references. There must be public representations of organizational theory-in-use to which individuals can refer.... These are the shared descriptions of the organization which individuals jointly constructed and used to guide their own inquiry” (Argyris & Schön, 1978, p. 17).

In contrast to this highly rational, discontinuous change model, we propose that the structural change influenced by visionary leadership may sometimes also result from a more incremental process. For example, a team’s role structure may gradually evolve as the overall task is divided into pieces suitable for different kinds of participants. The job of coordinating task assignment is an example of functional leadership on a day-to-day basis, and in line with our argument above, this coordination could be distributed, for example, individuals voluntarily taking on tasks for which they have particular skills or interest. However, as structure evolves, visionary leadership will call attention to and clarify the newly emergent structure and influence the team to embrace it. The process of surfacing and describing underlying structures may be less necessary in virtual teams that use information and communication technology to collaborate because the transparent dialogues

themselves, archived for subsequent viewing, become the external reference called for by [Argyris and Schön \(1978\)](#)'s original theory, the public representation of organizational theory-in-use to which individual members can refer. However, there is still an important role of influencing the team to adopt the new vision.

As with functional leadership, we propose that self-managing virtual teams can exhibit a variety of visionary leadership behaviors, but in the case of visionary leadership, we propose that a more centralized or concentrated form of leadership (i.e., from a small core group or even an individual) will be associated with shared mental model and norm convergence and thus team success. As self-managing virtual teams progress in their work, to be successful, they must have a high degree of shared consensus about shared mental models and norms. This consensus is more likely to be achieved after a change in teams in which centralized visionary leaders are able to clearly articulate a vision of these revised structures that can be broadly embraced by all team members. Thus, we argue that centralized visionary leadership will be more successful because of the need for clarity and agreement among team members about changes to the structures that govern and constrain their behavior. [Locke \(2003\)](#) similarly argued that even in a setting with shared leadership, a top leader should retain control of setting a vision and establishing core values.

Empirical studies of self-managing teams support this view. [Eseryel \(2014\)](#) found that while all team members provided some knowledge and leadership to the team, the core team members provided visibly more leadership regarding the resolution of critical issues, which were central to the success of the team. Similarly, while [Faraj et al. \(2015\)](#) found functional leadership was distributed, they identified a second pattern, namely, that among the identified leaders, the top few received disproportionately large share of the leadership vote, showing that a second type of more centralized leadership. Only 8 individuals (out of 42) were identified as leader by 9 or more people, with the individual who seems to be seen as the strongest leader being identified as leader by 90 individuals. This result can be seen as reflecting two different types of leadership. Studies by [Kayworth and Leidner \(2002\)](#) and [Piccoli et al. \(2004\)](#) suggest that the most successful self-managing virtual teams were those in which one or two team members took the initiative to clarify team members' responsibilities and work process structures. [McIntyre and Foti \(2013\)](#) found in an experimental study of programming teams that teams that in which centralized leadership emerged in which the leaders mutually recognized each other "demonstrated significantly higher levels of team mental model similarity, team mental model accuracy, and team success" (p. 46). Indeed, researchers stated that while decentralization has benefits, it can



inhibit learning, resources, and strategic coordination (Ganz, 2010) and thereby suggesting that in cases of strategic change, centralized leadership may be more helpful for shared mental model convergence.

Accordingly, we offer the following proposition:

**Proposition 2:** Centralization of visionary leadership behaviors will be positively associated with extent of shared mental model and shared norm convergence in self-managing virtual teams (and thus with team success) (Figure 5).

### *Functional Leadership is a Prerequisite for Effective Visionary Leadership*

So far, we described how distributed functional leadership behaviors influence other team members to make effective contributions to the team task, while working within and reinforcing existing structures of that emerge during initial team interactions (Figure 2). Turning to visionary leadership, we ask our final question: how do the individuals who are able to influence change in underlying team structures gain the influence to be able do so (*i.e.*, why do some member's actions change structures and others do not)? Indeed, studies of visionary leadership seem to suggest that it is less successful in virtual teams (Eisenberg, Post, & DiTomaso, 2019; Wong & Berntzen, 2019). However, these studies have examined virtual teams with appointed leaders. We propose that the answer to our question lies in the nature of the interrelationship between functional and visionary leadership as we have defined them.

DeRue and Ashford (2010) argued that leadership implies others accepting one as a leader. We suggest that in self-managing virtual teams, where individuals do not have power or authority structures, would-be leaders need to gain trust by showing functional leadership before they can implement major changes. In other words, visionary leadership derives its authority from prior substantive action-oriented functional leadership that provide evidence to other team members of the individual's abilities and thus ability to lead, making their attempts to alter structure credible and successful. Eseryel and Eseryel (2013) conversely suggested that individuals who provide substantive action-based leadership gain influence over team success and strategic direction. By contributing significantly to work, they cause others to perceive them as highly knowledgeable (IT-knowledge perception). Further, they show that they care about the project's and the team's well-being (guardian perception). And last, they become a role model to others by leading by doing (role model perception). As a result, their contributions add up over time to

contribute both to team effectiveness and to the transformation of technology vision, what we have labelled visionary leadership.

Accordingly, we propose:

**Proposition 3:** Individuals successfully performing visionary leadership behaviors will have previously performed a high level of functional leadership behaviors (Figure 4).

## Discussion

We have presented a theory of leadership in self-managing virtual teams. We include ideas both from functional leadership in supporting a team's regular operations and from visionary leadership, forms of leadership that influence changes in the structure that guides team behavior. We have proposed that successful self-managing virtual teams will exhibit a paradoxical combination of widely shared, distributed functional leadership complemented by strong, concentrated, and centralized visionary leadership. Finally, we have proposed that there is a relationship between functional and visionary leadership that evolves with continued team interaction.

### *Suggestions for Future Research*

Our propositions were developed deductively from the prior theory and empirical studies rather than inductively from systematic empirical observations. Supporting these propositions requires that they are systematically tested in future research. Our propositions both agree with and extend current research findings. Current research clearly shows the importance of shared mental models for team success. Our model suggests that shared norms are also important, though these seem less studied. Proposition 1 builds on prior work on shared leadership by adding the mediating variable of shared mental models and shared norms. Future research could determine their relative impacts. Similarly, for proposition 2, research has examined shared mental models as moderating the impact of visionary leadership (Ayoko & Chua, 2014), but future research could examine shared norms and determine the relative size of effects. Finally, proposition 3 suggests a novel basis for emergence of leader perception in self-managing virtual teams, namely, the extent of functional leadership, and a specific impact, namely, what we have called visionary leadership.

As well, the theory (like all theories) is only partial. Future research should extend the framework presented here by further exploring the antecedents, specific functional and visionary leadership behaviors, and consequences of leadership in self-managing virtual teams. Identifying the specific leadership

behaviors that cause individuals to emerge as leaders will help guide training for future generations who will work within self-managing virtual teams. As with studies of emergent and shared leadership, we expect to see impacts from all kinds of leadership, with different importance in different circumstances. Other connections to examine are those among leadership, shared mental models and norms and motivational factors such as team empowerment (Burpitt & Bigoness, 1997; Kirkman & Rosen, 1999), as empowerment has also been shown to have a positive impact on virtual team performance (Kirkman, Rosen, Tesluk, & Gibson, 2004).

### *Methodological Issues for Future Research*

A variety of research approaches could be applied to study the processes of leadership in self-managing virtual teams (Walsh, 1995). The literature has demonstrated empirical techniques to measure the degree of convergence (DeChurch & Mesmer-Magnus, 2010; Mohammed, Ferzandi, & Hamilton, 2010). Interview data would enable exploration of the team members' perceptions of the leadership process and allow direct comparison between different members' perceptions of structures, thus explicitly examining how these are developed. On the other hand, content analysis of the interactions between members of self-managing virtual teams would enable detailed analysis of the influence process as it unfolds (Fairhurst & Connaughton, 2014; Kennedy & McComb, 2010). Lastly, content analysis of the work being done will help with identifying the contribution of action to reinforcement and modification of structure. Such analysis infers the deep structures and processes from informed examinations of the artifacts that these surface level dialogues provide. This approach has the advantage of avoiding reliance on the recollections of team members, which may degrade over time or be unreliable in other ways. We recommend combining these three approaches as much as possible to create a well-rounded study. Such research may be feasible in some cases. For example, many Internet-based collaborations maintain archives of their interactions that are publicly available and corporate virtual teams may have similar data that could be accessed. However, two guidelines for such research should be kept in mind. First, observations should be longitudinal and dynamic, carefully observing changes that occur over time. The phenomenon of leadership is inherently rooted in the passage of time and cannot be observed in a snapshot, and a structural process can only be seen through a longitudinal lens. Second, the unit of coding and analysis in such research should be the episode. Leadership is fundamentally an interaction process among team members, and such interactions are best observed episodically.

## *Managerial Implications*

This theory suggests specific actions that members of self-managing virtual teams can take to facilitate team functioning and to improve success. These include ensuring that all functional leadership functions are performed well, and preferably by many team members, in a decentralized and shared mode. It also suggests that there is value in centralized visionary leadership functions. Self-managing virtual teams might more explicitly recruit or select members who are particularly skilled at these functions and pay more attention to the ongoing process of developing shared mental models and rules and norms. Since virtual work is increasingly common, educational programs for all kinds of workers might incorporate these ideas. For example, distance education classes that use technology support for instruction should provide instruction for students on the nature of leadership in self-managing virtual teams and thus set expectations for how the work can best be accomplished, as well as requiring team projects to provide an opportunity to practice these skills. We further suggest that it is important for self-managing virtual teams to develop shared mental models and norms early in their interaction. Shared mental models enable self-managing virtual teams to reach agreement concerning the substance (i.e., the “what”) of the team’s work. Group norms, defined as legitimate, socially shared standards against which the appropriateness of behavior can be evaluated (Birenbaum & Sagarin, 1976), enable self-managing virtual teams to more quickly develop agreement concerning the process (i.e., the “how”) of the team’s work (Chatman & Flynn, 2001, p. 956).

Whether these propositions are confirmed or disconfirmed by future research, understanding how teams of independent knowledge workers can more effectively work in self-managed virtual teams and virtual environments will improve both the traditional and nontraditional organizations within which they exist. The results of the research we hope to stimulate will then serve as a road map to improve organizational success and foster innovation.

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**ORCID iD**

U. Yeliz Eseryel  <https://orcid.org/0000-0003-2734-4498>

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## Author Biographies

**U. Yeliz Eseryel** is an Assistant Professor of MIS at East Carolina University. She received her PhD in Information Science and Technology from Syracuse University (2010). Her research includes the theory and practice of open innovation enablement through information systems, Open Source Software Practices, and IT-Enabled Leadership.

**Kevin Crowston** is a Distinguished Professor of Information Science in the School of Information Studies at Syracuse University. His research examines new ways of organizing made possible by the extensive use of information and communications technology. He is Editor-in-Chief for ACM Transaction on Social Computing and Information, Technology & People.

**Robert Heckman** is Professor Emeritus in the School of Information Studies at Syracuse University. His research interests include design of work-based learning experiences, learning strategies for information professionals, self-directed learning, and collaboration in virtual communities and teams.