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KNOW THYSELF: THE IMPORTANCE OF IDENTITY IN ACHIEVING SOFTWARE DEVELOPMENT PROJECT TEMPORAL SUCCESS

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Abstract

This theoretical work draws on group development literature to propose a model for increasing the likelihood of achieving temporal success within a software development (SD) environment. The study addresses a group's temporal performance through a punctuated equilibrium (PE) lens. As a means of extending the PE model of group development for a SD project context, this research will consider social and temporal aspects of identity within each group in order to address the varying nature of temporal success. First, anthropological research on rituals in society will be applied to present a "project as ritual" perspective, where social and temporal identity are suggested to flow from the rites of passage that exist during the initial meeting and temporal midpoint of a group. Second, social identity theory will be applied to posit that both types of identity are positively associated with a group's ability to meet temporal deadlines.

This theoretical piece is expected to make two primary contributions to literature. First, group development literature is enhanced by providing an extension of the PE model to address environments where social and temporal identities are variable. This contribution is significant since it will allow researchers to apply a PE perspective in real world project team environments. Second, the research contributes to SD literature by offering a clear perspective regarding key factors that can serve to impact a SD project team's ability to meet temporal deadlines.

Keywords: project success, software development, punctuated equilibrium, rites of passage, identity

Introduction

Software development (SD) literature has often stressed the challenges inherent in achieving project success. Researchers have frequently attempted to uncover ways in which an organization can improve their ability to deliver SD projects on-time and within specification, some focusing on the benefits of various SD methodologies and others addressing the project management (PM) activities surrounding the SD process. While SD structures vary between and even within organizations, the principles guiding SD initiatives are often similar. For example, regardless of whether a development group subscribes to predictive (i.e., waterfall, spiral, prototyping) or adaptive (SCRUM, Extreme Programming) development methodologies, project success is nonetheless strongly influenced by a group's ability to work together towards a common goal. Since SD projects are often the result of team efforts, a key source of SD project success lies in how the group develops and approaches their tasks over time.

This theoretical work attempts to provide insight into how an organization can increase the likelihood of one key project success attribute, that of meeting temporal deadlines. A punctuated equilibrium (PE) model of group development (Gersick 1988) will be utilized to address the temporal pacing of work activities within a SD project. While a PE model provides a general framework from which we can address SD project temporal success, it fails to address some of the idiosyncrasies inherent in SD project work. For example, SD environments are often characterized by fluid project specifications, shifting task and project deadlines, workplace demands which compete with project expectations, and a need to interweave independent development activities within interdependent project goals. As a means of extending the punctuated equilibrium model of group development for a SD project context, this research will consider both the social and temporal identity possessed by each SD project team in order to address the variance that often exists in project team temporal success.

This paper will begin by presenting a PE model of group development and providing a motivation for its use in a SD project context. Immediately after this will be a discussion of the limitations of applying a PE perspective to SD project temporal success followed by an overview of how identity will often vary in different SD environments. Next, the paper will present an extension of the PE model whereby social and temporal identities are suggested to impact a SD project team's ability to productively handle the temporal midpoint shock. Finally, the research model will be presented followed by a discussion of the expected contributions of this theoretical work.

Theoretical perspectives on group development

Group development literature has a long, rich and somewhat divided history (for a succinct treatment of the topic, see Chidambaram and Bostrom, 1997). Early researchers of group development suggested that productive groups progress sequentially through a series of well defined stages during their life (Tuckman and Jensen 1977). While a sequential view of group development doesn't preclude the existence of behaviors in any given stage (i.e., work activities in the forming stage), it does suggest that each phase is characterized by a dominant set of behaviors specific to that phase (Wheelan 1994). A sequential perspective suggests that groups must be able to navigate through the various developmental stages first before they can have a chance of attaining success (i.e., completing their tasks). In the late 1980s, the idea of gradual sequential development was challenged by the research of Connie Gersick (1988; 1989), who utilized an evolutionary perspective to illustrate that project groups exhibited long periods of stasis punctuated by a radical shift surrounding the group's temporal midpoint. Unlike sequential models of group development, the PE model theorized that group development should be viewed in terms of the key periods that shape how group work is completed and not through a series of pre-defined developmental stages. The PE perspective illustrated that groups are likely to complete tasks on-time provided they share a consistent sensitivity to temporal deadlines and demonstrate that sensitivity through increased activity at the group's temporal midpoint. While often positioned as competing and tangential explanations of group development (Wheelan, Davidson and Tilin 2003), recent work has suggested that both perspectives offer valid explanations of group behavior, but from different points of reference. Sequential models of group development focus on the socio-emotional development of groups throughout their life while a PE model illustrates group development in light of work activity over time (Chang, Bordia and Duck 2003). Since this research focuses on the temporal nature of SD projects, a PE model of group development will be used to provide a framework for understanding temporal project success. The following paragraphs provide a description of the perspective and detail how it might apply within a SD environment.

A punctuated equilibrium model of group development

A PE view of group development grew out of evolutionary perspectives which sought to understand how biological systems change over time (Wollin 1999). Rather than proposing that species evolve only through incremental change, researchers began to recognize that new forms often result from revolutionary events. In her research on the work activities of project focused groups, Gersick (1988) observed that groups didn't follow the sequential models of development suggested by earlier

researchers (Tuckman et al. 1977), but rather exhibited characteristics that were similar to that found in the development of biological systems. Specifically, she found that groups tended to experience two stable periods of their life, punctuated by a radical shift at their temporal midpoint (Gersick 1988; Gersick 1989). During the first half of a group's life, a group's modus operandi results from the first meeting and is followed until the temporal midpoint. At the midpoint, a group experiences a period of uncertainty regarding completion of the task which results in a radical re-evaluation and reformation of group activities. The restructuring of a group's approach to work is then applied into the second stage of inertia, where members focus on activities and behaviors defined at the midpoint which will help them complete the assigned work task.

Central to a PE view of group development is the idea that windows of opportunity for influencing a group's trajectory are small, yet predictable. Specifically, Gersick found that both inertial phases of a group's life are preceded by a window of opportunity (1988; 1989). The first was evident during a group's initial meeting, where members were brought together to consider the assigned task and member roles for the first time. Decisions made during this first period were found to shape behaviors during the first period of the group's life. The second window of opportunity was evidenced during the midpoint transition, where group members were forced to reconsider their progress in light of a rapidly approaching deadline. Rather than incrementally changing direction, the midpoint was shown to result in a radical shift which served to define group operations during the second period of inertia. The lion's share of task productivity was found to occur during the second period of inertia ***provided that teams exhibited a proper awareness of time and deadlines***. Groups unable to refocus at their temporal midpoint were found to be prone to failure (Gersick 1989).

This perspective holds several promises for SD research addressing temporal project success. First, the PE model suggests two key points in a group's life, the initial meeting and the temporal midpoint, that can serve as windows of opportunity for management to help direct SD project teams towards a successful end. At the initial meeting, efforts made to promote a unified view of project expectations and goals can help to ensure that the first period of inertia isn't wasted time but rather a period when a strong foundation is established and put into place. Regarding the midpoint, the model suggests that attention to project deadlines can serve as a proverbial kick in the pants for SD project teams in order to move them into a highly productive period where attaining project deadlines are more likely. Second, a PE model of group development illustrates the importance of identity in achieving positive group outcomes. PE research has typically investigated groups convened to complete a ***specific task*** within a ***clearly understood time frame*** (Chang et al. 2003; Gersick 1988; Gersick 1989), focusing on project teams with strong project identification both in terms of goals and deadlines. In turn, PE research has found that a project team's ability to productively handle the midpoint shock will accentuate their ability to meet temporal deadlines. In SD project contexts where a strong project identity exists, a PE model then suggests the following:

> ***P1: SD project temporal success is positively related to a project team's ability to successfully navigate their temporal midpoint.***

However, there are several idiosyncrasies within a SD project environment that prevent one from directly applying the findings of PE research when investigating SD project temporal success. First, groups studied in PE research have a very clear project-related social identity. While some SD projects are characterized by developers working solely on one project, many developers are saddled daily with competing organizational demands. For example, it is not uncommon for a developer to provide support and maintenance for past SD projects while also working on new development initiatives. In addition, developers are often assigned to projects based on their expertise (i.e., security expert, database expert, etc.) which can force them to span multiple projects at one time. In situations where developers are asked to identify with multiple initiatives, it is likely that they will experience problems in identifying with any one particular project. Second, the PE perspective has typically been applied to groups where members were required to "make interdependent decisions about what to create and how to proceed" (Gersick 1988, p. 13). While SD projects do require interdependent activity, developers often function independently of the project team while completing tasks within the project. As such, developers are frequently insulated from the overall project through their attention to the completion of specific project-related tasks. Third, the idea of a temporal midpoint transition requires that group members have a clear understanding of the project deadline. Gersick acknowledged this in her work when she stated that "synchrony in group members' expectations about deadlines may be critical to groups' abilities to accomplish successful transitions in their work" (1989, pp. 305-306). SD projects often require SD methodologies which embrace need for user requirements to be progressively elaborated over time (DeGrace and Stahl 1990; McConnell 2004), limiting the degree to which team members can clearly understand the project deadline. Even when a project deadline can be crystallized, developers are often required to focus on the completion of individual tasks rather than the project as a whole, and as such are not tuned into the overall project deadline.

While there is value in drawing on a PE model for understanding SD project temporal success, it is clear that the model alone won't address the complexities of SD environments. The next paragraphs will illustrate how the concept of identity can be used to extend the PE model to a SD project context. To do so, I begin by using a rite of passage metaphor to explain why identity can vary within different project contexts.

The variable nature of project identity in SD projects

A PE model of group development has been examined and validated within groups that possess two distinct types of identity. First, groups seem to have possessed a strong *social identity*, defined as the summation of group member "self-concept which derives from his knowledge of his membership of a social group (or groups) together with the value and emotional significance attached to that membership" (Tajfel 1981, p. 255), as evidenced in the group's consensus regarding project goals and objectives. Second, groups examined in PE research also evidenced a strong *temporal identity,* defined as group member understanding for and allegiance to the final project deadline, because of the lucid project deadlines.

SD project environments are subject to variations in social and temporal identities within the project, so it is important to address how identity is achieved within a SD project as a means of inducing positive project outcomes. A PE perspective suggests two points in a group's life where a group is most susceptible to change, periods that can be viewed as times when rites of passage are used to transition individuals into a new project-related identity. The first begins during the group's initial meeting, where individuals are faced with creating a social identity relating to the project itself. At this early stage of the project, individuals must unfreeze their current social identity in order to incorporate new roles and responsibilities required within the project. The second is evident at the group's midpoint transition, where group members must solidify a temporal identity, locking into the project's completion date in order to encourage and support productive behaviors.

Organizational worker identities shift over time within an organization, as can be evidenced within the day to day roles required of a SD project worker. For example, a software developer will often wear different hats based on specific organizational needs, playing the part of coder, mentor, standards bearer, technical support, project worker, manager, etc. With so many potential outlets for identity, how does a project worker acquire a social and temporal identity within the context of a SD project? Within organizations, worker identity is often altered through the use of rites of passage, such as that of a worker being promoted to management whose existing workspace (cubicle) is abandoned for an office with a door (a transitory rite of passage). Rites are prevalent within the software development process (Robey and Markus 1984) and often serve as mechanisms through which developer identity is aligned with the project.

Rites can be defined as "relatively elaborate, dramatic, planned sets of activities that consolidate various forms of cultural expressions into one event, which is carried through social interactions, usually for the benefit of an audience" (Trice and Beyer 1984, p. 655). The existence of rites provides a means of achieving stability within an organization in the face of unpredictable change (Robey et al. 1984; Trice et al. 1984). Within the context of project work, rites of passage become paramount since they provide a door through which member identity can be morphed into one that is project-focused. Anthropological research on rites of passage in society, originating in the early 1900s with French anthropologist Arnold van Gennep (1960) and coming to prominence in the later half of the 20th century with the ethnographic work of Victor Turner (Turner 1974), provides a procedural view which provides an important insight into the formation of developer identity within a SD project. Drawing on the work of van Gennep, Turner formalized a ritual as process perspective where individuals are suggested to traverse three separate stages of behavior during an identity transition: (a) separation, (b) liminality, and (c) aggregation (Deflem 1991). In the initial stage of separation, the individual divorces from existing social structures in preparation to receive their new identity. This initial stage is followed by a liminal period where the individual is "betwixt and between", having abandoned their previous identity but yet to take hold of the new one (Turner 1995). Finally, a period of aggregation occurs where the individual absorbs their new identity and finalizes the shift between social roles. Turner's intense interest in this process focused on the liminal period since he was convinced that "liminality is not only *transition* but also *potentiality*, not only 'going to be' but also 'what may be'" (Turner and Turner 1978, p. 3). As such, Turner suggests that the liminal period can be dangerous to the existing institutional environment since communitas (anti-structure) develop which can produce social structures incompatible with existing norms (Turner 1995).

In SD project environments, the social and temporal identities of a SD project team cannot be assumed to be strong. Regarding social identity, team members are often tasked with competing organizational demands that preclude them from deeply identifying with the project. In addition, temporal identity might be discouraged because of competing and/or ambiguous project deadlines. Using a rites of passage perspective, SD environments would exhibit weak social or temporal identities in light of two conditions. First, project-related rites of passage might not encourage sufficient separation for members, preventing them from shedding existing identities. In the case of a SD project, this might be evidenced by an e-mail message replacing the initial project meeting which could signal a low importance to the team member. Second, project-related rites of passage might not be sufficient to move an individual from the liminal stage into aggregation with the new identity. For example, a SD group might not develop a concrete and cohesive understanding of the project deadline at the midpoint but rather continue living in a state of project-related temporal ambiguity.

The preceding paragraphs demonstrate a means of understanding the development of identity and how a SD project environment can often differ from the strong identity environments previously examined in PE group development studies. As such, the paper will now proceed to address how variations in identity can impact a SD group's ability to meet temporal deadlines.

Extending the PE model of group development for a SD context: The role of identity

Project identity is expressed in the PE model of group development through both social and temporal identities. While social identity is established in the initial meeting of a group, temporal identity grows from the group's inception and is only solidified at the group's temporal midpoint. The impact of identity on temporal success will first be addressed through social identity since it occurs early in the group's life, followed by a discussion of the influence of temporal identity on success.

The role of social identity on group outcomes can be understood through a social identity theory lens. Social identity theory was developed to explain the means by which individuals ascribe identification with a given group, and the resulting dynamics of relationships with other groups (Tajfel 1981). Social identity is important since it provides the individual with cognitive structuring regarding the social environment while also enabling a means of positioning themselves within that environment (Ashforth and Mael 1989). While social identity theory has most frequently been used to explain the drivers of group identification (Bhattacharya, Rao and Glynn 1995; Dwyer, Richard and Shepherd 1998; Laverie and Arnett 2000; Underwood, Bond and Baer 2001), the theory has also been applied to understanding outcomes such as adherence to organizational norms (Hogg and Terry 2000) and stakeholder mobilization (Rowley and Moldoveanu 2003).

Social identity theory offers several important lessons with regards to a SD group's ability to meet temporal deadlines. First, individuals possess multiple social identities which might impose competing and conflicting demands upon them (Ashforth et al. 1989). Research has consequently suggested that individuals in organizations are more likely to participate in activities that are viewed as consistent with their identities (Ashforth et al. 1989), or conversely that individuals might eschew activities that aren't consistent. Further, research has posited that social group attraction encourages compliance with in-group norms (Hogg et al. 2000), consequently discouraging compliance with out-group norms. These two assertions suggest that a project team's social identity, defined as "the intersection of the social identities of the individuals in that group" (Rowley et al. 2003, p. 211), should positively influence that team's attention to project tasks, which has a direct bearing on their ability to navigate the temporal midpoint transition described in a PE perspective. As such, the PE model of group development is extended for a SD project environment through the following proposition:

> **P2:** **The project-related social identity within a group is positively related to a project team's ability to successfully navigate their temporal midpoint.**

Another important application of social identity theory to this research is its implications for a project team's ability to muster a temporal identity. Temporal identity is more than just knowing the date a project should be complete. Rather, temporal identity requires that a group ingest the due date in a way that is reflected through their collective behavior. While SD project team members are understood to have multiple social identities within the organization, there are likely to be inconsistencies between these different identities. Rather than integrating the various social identities, research has suggested that individuals will identify more strongly with one than the others and as such exert more efforts on activities that support that foremost identity (Ashforth et al. 1989). In the case of SD projects, this suggests that the strength of a SD project team's social identity will impact the formation of their temporal identity by providing a justification and motivation for project work over other competing demands.

> **P3: The project-related social identity within a group is positively related to a project team's project-related temporal identity.**

Finally, the temporal identity of a SD project team is also expected to have direct implications on their ability to manage the temporal midpoint transition suggested in a PE perspective. Research on polychronic orientations within a workgroup suggests that as worker preferences regarding polychronicity (i.e., a desire to work on multiple tasks simultaneously) align with the reality of how activities are actually accomplished in the group, members have a greater willingness to exert effort and in fact increase their desire to remain in that group (Slocombe and Bluedorn 1999). This finding underlies the idea that temporal synchrony within a group provides an intra-group paradigm that allows them to more closely focus on project activities regardless of other temporal pressures. As such, it is expected that the strength of a SD project team's temporal identity will provide a means for effectively handling the shock of the temporal midpoint transition.

> **P4: The project-related temporal identity within a group is positively related to a project team's ability to successfully navigate their temporal midpoint.**

Figure 1 provides a graphical depiction of the process theory outlined in this paper.

Figure 1. Proposed Research Model[1]
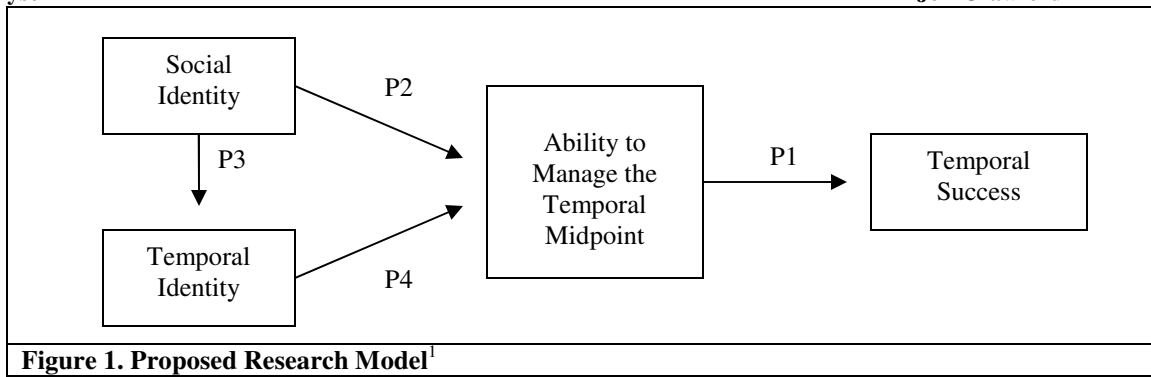
Conclusion

The preceding theoretical argument has suggested that a PE model of group development can be used to predict temporal success within a SD project team provided that social and temporal identities are sufficient to provide a team the ability to survive and thrive in light of the shock at the group's temporal midpoint. The resulting model is expected to make three primary contributions to literature. First, group development literature is furthered by extending the PE model to address "real-world" project environments where project identity can substantially vary. Second, the research contributes to SD literature by offering a theoretical view regarding conditions that can encourage SD project team's ability to meet temporal deadlines. Finally, this research contributes to project management literature by stepping outside the procedural aspects of project management and addressing social considerations in enabling project success.

In addition, the propositions in this research offer a platform from which managerial interventions can be derived to induce temporal project success. For example, the proposed model stresses the importance of two points in a group's life (the initial meeting and the temporal midpoint) that are most conducive to altering the trajectory of a group. While this assertion has been provided in PE literature, this research contributes to practitioners by providing a project as ritual view, where individual identity is shaped through rites of passage at each key point in time. As such, the model suggests that interventions aimed at increasing project team identity (for example, providing a greater emphasis on the initial project meeting) can improve the project team's ability to meet temporal deadlines.

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[1] Antecedent variables in Figure 1 are considered necessary, but not sufficient, conditions required in attaining temporal success. The model in Figure 1 is an example of a process theory, as discussed in Markus, M.L., and Robey, D. "Information Technology and Organizational Change: Causal Structure in Theory and Research," *Management Science* (34:5), May 1988, pp 583-598.

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