

From Industrial to Knowledge Work: Five Challenges in Strategic Fit for Supporting Creativity and Innovation at the Fuzzy Front End

Phillip J. Ayoub and Irene J. Petrick
College of Information Sciences and Technology
Pennsylvania State University
University Park, PA
pja143@psu.edu; ijp1@psu.edu

Abstract. The shifting nature of work from industrial- to knowledge-based presents new challenges for supporting creativity and innovation, particularly with respect to the strategic fit between organizational dimensions and the nature of the work. The crux of these challenges stems from the uncertainty inherent in knowledge work. Within the innovation cycle, these challenges are most apparent, and most critical to solve, at the fuzzy front end. Drawing from multi-year actor-observer interactions with a large multinational aerospace company and extensive interviews and interactions with leading industry innovators, we identify five challenges for supporting creativity and innovation at the fuzzy front end.

Key Words. Creativity, Innovation, Knowledge Work, Organization Design

1. Introduction

There is little doubt that the ability to be creative and to constantly innovate is a key driver for long-term success and competitive advantage. The aptitude to generate new ideas coupled with the competence to implement them – often called the innovation cycle – is the trademark of success for many businesses, yet one with which many companies struggle. From an organizational perspective this is a constant and pervasive challenge in the strategic fit between organizational dimensions and the nature of the work.

Strategic fit indicates how well structural (i.e., formalization, specialization, centralization, and hierarchy of authority) and contextual (i.e., size, organizational technology, environment, goals and strategies, and culture) organizational dimensions are coupled with work practices to meet organizational goals and outcomes (Daft, 2004). For most of the 20th century, this coupling has been driven by industrial- and labor-based practices (at which organizations have become quite proficient). However, a shift in the dynamics of work toward knowledge-based activities over recent years (Barley and Kunda, 2001) and the emergence of the information organization (Drucker, 1998) suggests that there are new challenges in strategic fit.

At the heart of our logic lies our belief that there are real and meaningful differences between industrial work and knowledge work. The first critical distinction lies in the increased uncertainty inherent in knowledge work which arises because to the observer it is

mostly tacit and invisible. Second, knowledge itself is a constantly evolving sociotechnical phenomenon that is constructed within an emergent ensemble of people, technology, and the environment (Nonaka and Nishigushi, 2001); knowledge is found in the constant movement back and forth between explicit and tacit and the interplay between action and understanding. Finally, knowledge work is contextually dependent, where planning, decision making and action are highly dependent on the situation (Suchman, 1987).

In this paper we highlight five challenges to strategic fit in the context of creativity and innovation. We emphasize issues in the early stages of the innovation cycle in what is often referred to as the fuzzy front end (FFE) – where concepts and ideas originate and initial prototypes are developed (Smith and Reinersten, 1991; Zhang and Doll, 2001). The FFE is particularly important since the challenges of dealing with the characteristics of knowledge work are greatest because of the unpredictable and ill-defined conditions at this phase of the innovation cycle (Reid and de Brentani, 2004; Montoya-Weiss and O’Driscoll, 2000; Zhang and Doll, 2001). The FFE is also one of the most critical steps in the innovation cycle because of its significant impact on later stages including strategic orientation and vision building, product definition requirements, and the allocation of resources (Cooper, 1984; Zhang and Doll, 2001; Khurana and Rosenthal, 1997, 1998).

The remainder of this paper outlines our five challenges and seeks to explore how organizational designers and managers might reconsider their approaches to the FFE given the nature of knowledge work and the conditions under which it occurs.

2. Five Challenges in Strategic Fit

In offering these five challenges, we draw from multi-year interactions with a multinational aerospace firm where both authors have spent from 2 to 12 months as an *actor-observer* in new product development activities (Gioia, Thomas, Clark and Chittipeddi, 1994). The position of actor-observer enables firsthand experience with the rich knowledge structures and inner workings of the company. Our insights are further informed by extensive formal and informal interviews and interactions with leading industry innovators who work at the FFE in more than 65 companies (over 30 of which are listed in the Fortune 500) in aerospace, automotive, computer software and hardware systems, clothing and apparel, medical devices, office furniture and equipment, services, and theme park entertainment.

2.1 Challenge One: A Strategic Vision that Aligns the Individual, Team and Organization

The purpose of an organization is to focus resources to achieve a common goal, and it is the proper alignment of those resources through a shared strategic vision – a blue print, designed around organizational goals, for determining how resources are allocated, tasks are coordinated and decisions are made – that is the critical means for meeting those goals (Daft, 2004).

Unfortunately at the FFE *there is no single vision* around which to align tasks and workers. Traditional industrial organizational models successfully implement a shared strategic vision by using strong hierarchical and normative roles and centralized decision making. Tasks and resources are also more clearly defined. However, work at the FFE,

and the products of that work, are inherently uncertain, serendipitous, and emergent. Workers are more autonomous and have more authority to make and implement decisions. Consequently, organizations have moved to a more distributed organization design to provide knowledge workers with the necessary flexibility, openness, and autonomy to be creative (Kanter, 1988). Yet, this move brings with it the inherent challenge of balancing multiple visions. At the FFE we observed that workers are driven by both established organizational goals and by the push to create new innovations. Often the time frames of these two activities are very different, and we observed a tension between near term well-understood tasks and longer term, more uncertain activities. FFE workers struggle to balance near term individual assignments, longer term group goals, and still longer term strategic initiatives. Across the companies we have worked with, the alignment of resources around a shared strategic vision is the most significant of the challenges and one that pervades the entire innovation cycle. Recent initiatives in strategic roadmapping have had some success, but are often not company-wide, comprehensive or inclusive.

2.2 Challenge Two: Management vs. Leadership

Peter Drucker best distinguished management and leadership noting that “management is doing things right; leadership is doing the right things.” Management is necessary for developing standards of work and for providing measurable business deliverables. On the other hand, leadership is extremely critical for instilling a sense of direction under conditions of uncertainty.

The challenge at the FFE comes when the line between manager and leader is blurred. More specifically, in industrial work the roles of manager and leader are typically played by the same person. This is not always the case at the FFE where we noted that much of the work was improvisational. We observed different individuals assuming a leadership role at different times, given the situation and task at hand and the experience, character, and expertise of the worker. At the FFE, expertise is often the critical input to decision-making, and since most FFE groups are cross functional, shared, task-dependent leadership is the norm. The role of manager, on the other hand, is often a single individual formally charged with oversight of the larger group and who most often does not directly participate in project work, rather only typical management tasks.

The separation of management and leadership creates an uncertainty related to authority and decision making. We frequently observed instances where autonomous work groups established their own leaders and sourced and developed a strategic direction and motivation for pursuing a project. Interventions, both intentional and unintentional, by a formal manager often significantly disrupted the group’s processing. Since the FFE activities establish the direction for the remainder of the innovation, these disruptions often result in rework and schedule delays. Even general, good-willed suggestions by managers can skew a group’s progress since the group is unsure of how to interpret the manager’s input. This type of uncertainty led at least one group we worked with to pursue almost every suggestion made by the manager, even when his intention was simply to play “devil’s advocate.”

Models developed for management of routine settings may not generalize to the leadership of creative people undertaking innovative tasks. Instead, the manager should be

a facilitator, with a clear (and non-competitive) relationship with whichever individual(s) is leading the group at any point in time. Moreover, policies that focus on efficiency and control (Daft, 2004) should give way to shared leadership and management roles that stress adaptability, knowledge and learning (Uhl-Bien, Marion and McKelvey, 2007).

2.3 Challenge Three: Motivation and Control

A direct extension of the challenge resulting from the management-leadership dichotomy is the way employees are motivated and controlled. Workers must share social agreements for the organization to function efficiently. Formal theories of agency (Eisenhardt, 1989) and behavioral and outcome control systems (Ouchi, 1979) provide organizations with standardized means for motivating workers, which are particularly effective for industrial organizations, and which often lead to rigid bureaucratic behavior, a reliance on standardized and extrinsic motivations, and measures only observable and objective behaviors and outcomes. Across our observations and interviews we saw that individuals working at the FFE required a much higher level of self-discipline and intrinsic motivation. Workers both wanted and were required to undertake self-initiated and often unofficial activities in order to pursue and foster creative ideas. Also, in creative work much of a person's time is spent learning, thinking and reflecting, and in dialogue with others. None of these activities are easily measurable as visible behaviors. Outcomes from the FFE are also difficult to assess because they range from a prototype to a white paper or simply a workshop, where the fruits of the labor may not be recognizable until well beyond their initial occurrence.

Policies and practices at the FFE to motivate employees will need to be more tailored for the subjective and situated motives of the individual and work group. Control should be less about standardized practices and more customized to local needs, tasks and environments. Unfortunately, our observations suggest that many companies still send an implicit signal to employees about the types of behavior that are prized. In new product development, we see that the cowboy who rides to the rescue of a struggling project is often rewarded and recognized. This encourages a "fix it" approach, rather than the more prudent "do it right" approach. This reward structure is completely at odds with the actual behaviors needed for overall success at the FFE (Reid and deBretani, 2004).

2.4 Challenge Four: Role vs. Skill

All workers need both the *skill* (capability) and the *role* (job requirements and authority) in order to perform a given task. In contrast to industrial work, the ease of defining knowledge-intensive creative tasks, and subsequent skills and roles, is not as clear because of the tacit, emergent, and evolving nature of the work. We observed workers who were managed by what was visible or prescribed by the manager and other group members, but this often led to workers being "labeled" according to their initial role or job title. Such labeling based on role precludes skill development. At the FFE where expertise influences leadership roles, developing skills that create new capabilities within individuals is a critical aspect of sustainability. Across many of our interactions, we observed that those individuals who can play multiple roles and who bring a diverse skill set to the group add greater value and do so consistently over time.

The challenge that managers and groups at the FFE encounter is how to leverage skills and develop roles that go beyond what is initially prescribed in a worker's job description. Therefore, organizations will need to rethink how they define roles at the FFE and how the organizational structure and policies support flexibility and opportunities for learning and growth (Unsworth, 2001; Uhl-Bien et al., 2007). Since many of the companies we have observed maintain formal job descriptions that drive compensation and promotional paths, this role versus skill challenge will remain particularly thorny.

2.5 Challenge Five: The Role of Technology

Technology plays a critical role in organizations by supporting and automating information processing tasks, providing means for awareness and the coordination of tasks, and supporting interaction in collaborative activities. Rather than being an objective force alone, recently emerging technology is viewed as both socially and technologically constructed (Orlikowski, 1992). Because of this, technologists, managers and users can have different interpretations or "technological frames" that can lead to conflicts about how technology is developed and used in organizations (Orlikowski and Gash, 1994).

There are two aspects to this technology challenge. First, variances in the interpretation of how technology represents and transfers information can lead to breakdowns in the integrity and properties of a new concept, in how information is processed, and in how tasks are coordinated. Second, as information and knowledge are contextually situated and emergent, technology plays a critical role in sense-making and the sociotechnical construction of new concepts (Orlikowski, 1992; Montoya-Weiss and O'Driscoll, 2000). In our observations, workers at the FFE frequently modified and adapted various technologies to support their work, where the modifications were often beyond the scope of the technology's intent. Hence, technologies that successfully supported one group's activities could not always be reused by other groups or even the same group over time. More importantly, technologies used to capture and transfer new ideas and concepts were limited in their ability to capture and express critical tacit knowledge and the design process itself. This limitation was seen as particularly challenging when sharing and transferring concepts to individuals and groups outside of the group that generated them. At the FFE, this can lead to revisiting the same issue multiple times over multiple groups since learning is not captured.

Our observations and interviews suggest that companies are consistently struggling with the IT and infrastructure issues underlying the support of the innovation cycle as a whole, particularly at the FFE. Organizations will need to understand and take advantage of how technology shapes cognition and collaboration, and how it supports the divergence of ideas while also providing a means for the convergence and integration of concepts across individuals and groups.

3. Future Directions and Conclusion

The FFE portion of the innovation cycle is characterized by intensive knowledge work, shared leadership, and uncertain tasks, with only limited visibility of progress toward a goal. The aptitude of organizations to be creative and innovative will be dependent on how

well they are able to strategically fit organizational dimensions with work practices to meet these five interdependent challenges. A better understanding of how a shared strategic vision is developed and then transferred across multiple levels of an organization is needed, with particular attention to the role that IT might play in capturing learning over time. Further distinction between management and leadership, as well as better metrics for individual and group creativity and knowledge-work, would help organizational designers more carefully develop formal recognition and reward systems that take into account the self-directed and emergent nature of the FFE's work environment.

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