

Chapter 5

Knowledge Management in Emergent Amateur Organizational Cultures: Observations From Formula SAE Student Engineering Teams

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ABSTRACT

This chapter examines issues of knowledge management and cultural knowledge in the context of Formula SAE student engineering teams. Approximately 500 student teams field a small formula-style racecar in a series of annual competitions held globally. Despite being small, student-run teams with limited resources and high organizational turnover, strong teams have developed strategies to sustain knowledge creation and work to build the team's cultural knowledge over multiple annual design cycles. This chapter highlights three knowledge management challenges: organizational renewal due to graduation of senior members, capturing vital yet departing tacit and explicit knowledge, and engaging multi-year and collaborative projects. The chapter recommends that strong faculty and institutional support can help FSAE teams develop into stable knowing organizations with deep tacit, explicit, and cultural knowledge bases.

INTRODUCTION

This chapter looks at how organizational culture and cultural knowledge influence knowledge creation and decision making in a specific and somewhat unique domain – student engineering racing teams. These teams organize to design, manufacture, test, refine and field a fully-functional small formula-style autocross racecar in intercollegiate competition, conforming to the standards set by the Society for Automotive Engineers (SAE, 2021b). Such teams and their competition will be henceforth referred to as FSAE for short.

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Compared to larger, more diversified organizations, these student-led organizations are smaller and coping with limited human and financial resources. They are also consistently reinventing themselves due to high turnover due to student graduation. Because of their student membership, participants are also in the process of learning their professional craft as well as how to manage a complex, year-long systems engineering project. These factors lead to particular challenges that can frustrate the team's hopes for success in competition.

This unique contextual environment poses particular challenges to knowledge management and creating a sustained organizational culture. This chapter examines three particular issues teams face and shares observations from the field based on interviews and surveys conducted with student team members and faculty advisors. This chapter concludes that increased institutional support and more active faculty advisors can provide teams with a strong footing to develop cultural knowledge and give them a competitive advantage over schools with newer, more fragmented and more ad hoc organizational structures.

BACKGROUND

Schein defines organizational culture as a pattern of shared basic assumptions that assists the group with adaptation and integration, and are perceived by the group to be worthy of dissemination to new members as the correct way to perceive the group's problems and challenges (Schein, 1992). Organizational culture is the milieu which defines how an organization perceives and addresses problems and affects the overall working climate and behavior of the organization (Saffold, 1988).

With respect to knowledge management, organizational culture defines the social context of what knowledge has value, how new knowledge should be created, validated and shared, and what tools and technologies are best suited to capture and disseminate knowledge created by the organization (De Long & Fahey, 2000). While knowledge management does investigate the use information technology as a facilitative tool to capture and disseminate explicit knowledge, knowledge management research has evolved to understand the overall information ecology of an organization (Nonaka & Konno, 2008). An organization's cultural knowledge helps define a collective identity, purpose and orientation of an organization and informs sensemaking, knowledge creation and decision making, the core information challenges of a knowing organization (Choo, 2006).

While organizational culture is not immutable, attempts to change information discovery, creation, and use without consideration of existing cultural practices risks creating significant crisis points which can derail even the most necessary of change goals (Hayes, 2018). A solid understanding of an organization's cultural knowledge and organizational culture helps shape knowledge management efforts that best fit existing practice and mitigates the consequences of poor fit.

Organizational culture is complex and can vary among and within specific organizations. Martin (1992) notes three perspectives of organizational culture – integration, differentiation and fragmentation. In an integrated organizational culture, there is a high degree of consensus, clarity and consistency, but at the potential expense of groupthink and rigidity. For example, an integrated organizational culture may find internal or external change threatening and respond by doubling down on core values rather than adapting to new circumstances. At the opposite pole, a fragmented organizational culture revels in complexity, with consensus, clarity and consistency being tenuous, fluid and tied to immediate and pressing concerns. While more adaptable to change, such organizations risk being too conflicted to en-

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