

TECHNOLOGY AFFORDANCES AND CONSTRAINTS  
IN MANAGEMENT INFORMATION SYSTEMS (MIS)  
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A. Majchrzak & M. L. Markus

The theory's central management insight is that the uses and outcomes of information systems and technology are best understood in terms of *relationships* between individuals or organizations and technology features.

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Information systems are combinations of devices, software, data, and procedures designed to address the information processing needs of individuals and organizations. Examples include electronic mail and social networking tools as well as enterprise-level applications for financial management, decision-making, production planning, and so forth. The pervasiveness of information systems in organizational practices and daily life makes their study increasingly critical for management theory. There is no single theory of "management information systems." Rather, the term refers to a broad class of conceptual frameworks developed to understand and explain the design, use, administration, and consequences of information systems. One framework that is used increasingly to study how people and organizations use information systems and how the use of information systems affects individuals, organizations, and their performance, is a framework we refer to as "Technology Affordances and Constraints Theory" (TACT). TACT's essential premise is that, to understand the uses and consequences of information systems, one must consider the dynamic interactions between people and organizations and the technologies they use. In this entry, we first explain the major theoretical constructs and focus of TACT and then discuss its importance for management theory.

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### FUNDAMENTALS

The concept of ***technology affordance*** refers to an action potential, that is, to what an individual or organization with a particular purpose can do with a technology or information system; ***technology constraint*** refers to ways in which an individual or organization can be held back from accomplishing a particular goal when using a technology or system. Affordances and constraints are understood as *relational concepts*, that is, as potential interactions between people and technology, rather than as properties of either people or technology. Affordances and constraints are best phrased in terms of action verbs or gerunds, such as "share knowledge" or "information sharing." Other examples include "working anywhere anytime" and "introducing like-minded people to each other" and "preventing proscribed organizational practices." Affordances and constraints are distinct from ***technology features***, which are functionalities built into information systems either by design or by accident. For example, "a shared communication space accessible by all users" and "the automatic calculation of raw material orders from data about a new sale" are examples of technology features and functionality. Affordances and

constraints are also distinct from *human and organizational attributes* such as tasks, needs, and purposes such as “wanting to be connected” or “need for improved order fulfillment efficiency.” Finally, a distinction is made between **affordances** and what was **afforded by** the use of the technology: affordances refer to action *potentials* that technologies represent for users with certain characteristics and purposes, while “afforded by” is employed when examining use that *occurred* for a particular purpose within a particular context.

The value of having the relational concepts of technology affordances and constraints that are distinct from both technology features and human purposes is that they help explain two common empirical observations. First, people and organizations do not always realize the apparent potential of a technology when they use it. Second, people and organizations sometimes or often use technology in ways that designers never intended. As relational concepts, affordances and constraints facilitate the scholarly understanding that what one individual or organization with particular capabilities and purposes can or cannot do with a technology may be very different from what a different individual or organization can do with the same technology. For instance, social networking software may afford different patterns of technology use and consequences in organizations with cultures that reward information sharing than in organizations with cultures that reward information hoarding. At the same time, patterns of technology use and consequences cannot be understood solely by reference to human and organizational attributes such as culture, but must also be understood in relation to the features of particular technologies. For example, the uses and outcomes of social networking technology in organizations may depend on differences in the social-networking software they use (text-based messaging software versus a virtual reality system).

TACT can be used to study either the unique technology-involved practices of particular individuals or organizations or the patterns of similarity and difference in technology uses and consequences across individuals or organizations. Scholars employing TACT can come at technology uses and consequences from either direction. That is, they can hypothesize about affordances and constraints by first analyzing the features and functionalities of a technology, such as asynchronous message transmission. Or they can start by analyzing human and organizational purposes such as the desire to have effective teams with geographically distributed members. However, scholars employing TACT do not stop either at features or purposes, but rather they continue by examining interactions among them. Thus, one TACT researcher may describe how an organization uses the affordances of electronic communication technology to keep projects going non-stop: At the end of a work day, one co-located team “passes” the project to another co-located team just starting its workday elsewhere in the world. Another TACT researcher may determine that electronic communication technology affords development of shared identity in some virtual teams, while affording the development of enhanced individual self-efficacy in another.

Regardless of whether a scholar’s focus is on the unique practices observed in particular settings or in trans-contextual patterns, researchers who employ TACT emphasize the potential actions that technologies with particular features afford (or hinder) for people and organizations with particular purposes and characteristics. TACT scholars then use the concepts of affordances and constraints to interpret or explain people’s technology uses and consequences. Again, affordances and constraints are understood as conceptual relations between people and

organizations and their technologies—they are the action potentials or potential stumbling blocks that people can draw on or may encounter when using a particular technology.

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## IMPORTANCE

Management scholars commonly explain technology uses and consequences with psychological, social psychological, or sociological theories. When they consider technology at all, they use simplifying assumptions, for instance, about communication being “synchronous” or “asynchronous” or about media being “rich” or “lean.” These theories have several limitations for scholars interested in the role of technologies in human and organizational behavior. First, existing theories may privilege “natural” human behavior over behavior that involves or is mediated by technology. For example, face-to-face communication is considered to be the baseline against which all mediated communication seems impoverished or diminished in some way. This privileging of the “natural” ignores the possibility that humans using technology can often enact new practices or achieve outcomes that could not occur without the use of technology. An example is the ability of people using social media to find and develop intense personal relationships with like-minded others that they have never met face-to-face.

Second, existing theories may assume that technology is fixed and immutable. This assumption blinds researchers to the possibility of people using technology in “unintended” ways. For instance, electronic mail is commonly understood as a technology that supports asynchronous and cross-location communication. However, people sometimes use electronic mail to communicate synchronously with people sitting right next to them. They may do so because email affords them creating a written record of the communication that can be shared with third parties and referred to later to follow up on requests and promises. Alternatively, they may do so because email affords them the opportunity to engage in organizationally required communication with people they do not like. In addition, people and organizations often modify apparently fixed technologies, such as by combining them with other technologies and practices. For instance, some organizations combine enterprise software with “business intelligence” technology in ways that afford dramatic changes in their decision-making processes and performance.

By contrast to most existing management theories, TACT avoids both limitations discussed above by explicitly focusing attention on the non-deterministic interactions between people or organizations and the technologies they use. On the other hand, TACT itself has a few disadvantages. First, because TACT is a relatively new framework for the study of individual and organizational technology uses and outcomes, there is inconsistency in the terminology used by TACT scholars, and controversies exist over some core concepts and assumptions. For example, some scholars refer to what we call TACT using the label of “socio-materiality.” One core controversy concerns the ontological status of “technology.” Some TACT scholars assert that technology is inseparable from (that is, has no ontological existence apart from) the ways in which people and organizations use it. These scholars refer to “technology-in-use” and consider the distinction between technology and human or organizational use of technology to be analytical only. Other TACT scholars accept an ontological distinction between technology and

individual or social practices; that is, they believe that technologies have features and functionalities regardless of whether humans recognize or use them. These scholars acknowledge, however, that technology and social practices are tightly intertwined in a way that is sometimes called “imbrication.”

A second limitation of TACT attributable to its relative newness is that there are as yet few empirical studies, and most TACT studies to date are individual case studies. As a result, TACT scholars have not made much progress toward consensus about the existence, nature, and naming of technology affordances and constraints across contexts or technologies. In part, this is a function of the granularity of analysis. If technology analysis is fine-grained and each setting is treated as unique, there are virtually infinite combinations of technology and human or organizational behavior. Conversely, if the scope is broad enough, that is, if all instances of a class of technologies (e.g., enterprise systems) or even all information technologies are considered at once, the “general” affordances and constraints may be so few in number and so abstract that they are not useful to other scholars. For instance, for the class of decision support systems, the accepted affordances and constraints (“guidance” and “restrictiveness”) are quite general and can be interpreted as synonyms for “affordance” and “constraint.” Similarly, “simplification” has been proposed as an essential affordance or constraint of information technology as a whole. The abstractness of such concepts seems likely to hinder efforts by other scholars to apply them. Over time, an accumulation of TACT studies may enable scholars to agree on the most productive levels of abstraction and generality for the identification and description of affordances and constraints.

In sum, for TACT to generate testable predictions about human and organizational behavior and outcomes, the concepts of “affordance” and “constraint” should be concretely examined for particular categories of technologies and use settings. While examining technologies and uses concretely may deter some scholars, it actually makes TACT appealing to some scholars, including those who aim to build theory, those who aim to interpret human and organizational technology-use behavior, those who aim to construct post-hoc explanations of behaviors and outcomes in individual case studies, and those who are interested in more precisely defining “alignment” or “fit” between people and technology.

Despite its recentness and current limitations, Technology Affordances and Constraints Theory holds great promise for contributing to the scholarly management literature. TACT overcomes the limitations of theories that focus only on psychological or social behavior, thereby ignoring the features and functionalities of information technology altogether, and of theories that make simplistic and deterministic assumptions about the effects of information technology on human behavior and organizational outcomes. TACT overcomes these limitations by advancing technology affordances and constraints as relational concepts linking people and technology.

TACT also has significant implications for improving management practice. Specifically, insights from TACT can help managers achieve more successful technology implementations, that is, higher levels of expected uses of technology, beneficial innovations in technology use, positive outcomes, and fewer unintended negative consequences. Using TACT gives managers guidance about what to do before technology implementations: how to assess users’ needs and capabilities, modify technology features (e.g., by disabling some capabilities and setting default

parameters), make changes in work practices and processes to achieve greater alignment, and provide proper support structures (e.g., training, communication, and help services). In short, considering the relationships between people and information technology using TACT makes better “systems thinkers” of today’s managers.

-- Ann Majchrzak and M. Lynne Markus

***See also:***

actor-network theory, structuration theory, adaptive structuration theory, information richness theory, socio-technical theory, systems theory of organizations, decision support systems

***Further Readings:***

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