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Interpersonal and Technology-Based Trust Research: Gaps and Opportunities for Research and Practice

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Interpersonal and Technology-Based Trust Research: Gaps and Opportunities for Research and Practice

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ABSTRACT

Trust is something we encounter every day in our personal lives, but it becomes increasingly important in technology-based transactions because traditional interpersonal trust factors cannot be applied as usual. The last “special issue” on trust in the IS research literature appeared in 2008. Given the lead time associated with published research, the studies that were reported in that special issue occurred just prior to the introduction of the first iPhone, when Facebook was in its infancy, and several years prior to the introduction of digital currency or AI-based assistants such as Siri and Alexa. Much has changed since then. A comprehensive review of trust research, from both a non-technology and a technology perspective, provides an opportunity to identify gaps and opportunities for research and practice. Because trust is a very complex construct, we first review the term, the boundaries between it and IT trust, and the history of non-technology-based trust. This review is organized in

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the context of personal, professional, and organizational relationships, looking at initial trust and the long-term evolution of trust. Next, an overview of existing technology-based trust studies published in *MIS Quarterly*, *Information Systems Research*, and other IS research outlets is provided. Finally, we identify where research and practical gaps and opportunities exist for future technology-based trust studies by balancing acquired and practical relevance.

Keywords: Technology-based trust; Interpersonal trust; Initial trust; Long-term relationship; Information systems.

1

Introduction

All transactions involve some degree of trust. We trust reliable editors of online encyclopedias to ensure accuracy in the online content, that ordered goods will be delivered as expected, that the weather will be as predicted, that a navigation system guides us to our destination, or that our privacy is respected by intelligent personal assistants like Siri or Alexa. Trust is a complex construct, such that even when the weather is not as predicted we do not lose trust in the entire prediction model. In contrast, we may not trust the data security of a foreign country's companies even though we have no experience to the contrary. We claim to trust organizations and roles, governments and even in religions, societies, and cultures. When we make such claims, we often mean we are trusting people to fulfil their obligations and to put those obligations ahead of their own immediate interests or expected benefits (Barber, 1987).

“If the people cannot trust their government to do the job for which it exists-to protect them and to promote their common welfare-all else is lost” *Barack Obama, 2006.*

All else is lost-as the quote makes clear, trust is a fundamental component of our coexistence.

Technology has become another fundamental component of our coexistence. When we speak of trust in technology, we have at least two connotations. First, we rely on the technology to operate as it is expected to operate. We “trust” our mobile banking transactions to execute properly. We “trust” the technology used in hospitals, homes, businesses, and automobiles to operate properly. Indeed, we “trust” many technologies with our lives. Second, we trust that people behind the technology in various contexts will act professionally and competently. For example, we trust that the vendor who operates an e-commerce site will deliver the merchandise we have purchased via the e-commerce technology.

Research in trust as a construct began over seventy years ago, but the research in trust in a technology context is a more recent phenomenon. This monograph examines the rich history of trust research outside of a technology context to assess existing trust studies in technology contexts and to inform the design and execution of future trust research in technology contexts. One work could never review every non-technological study on trust. Due to the very large number of studies published in the non-technology literature, we focused our review to seminal papers and papers from a range of disciplines (e.g., business ethics, economics, management, and law, among others). Our review of trust research in technology contexts includes forty-one papers published in *MIS Quarterly* and *Information Systems Research*, thirteen papers from special issues on trust in *Journal of MIS* and *Journal of Strategic Information Systems*, and selected other papers from *European Journal of Information Systems*, *Communications of the ACM*, *Journal of the Association for Information Systems*, *IEEE Transactions on Engineering Management*, as well as a few other IS-related outlets. In total, we examined over one hundred sixty publications. As technology becomes more and more ubiquitous in our lives, we need to understand how trust in technology contexts is created, maintained, destroyed, and possibly rebuilt. This knowledge is important for the developers of technology, to create successful technology uses, and for the users of technology, to be aware of the vulnerabilities and potential risks of technology use.

1.1 What Trust Is and Is Not

As noted earlier, trust has been studied as a distinguishable construct for over 70 years. An early definition of trust is: “*An individual may be said to have trust in the occurrence of an event if he expects its occurrence and his expectation leads to behavior which he perceives to have greater negative motivational consequences if the expectation is not confirmed than positive motivational consequences if it is confirmed*” (Deutsch, 1958, p. 267). Authors have expanded the individual in this definition to be an actor, corporation, or community in which fiduciary obligations and responsibilities are assigned (Barber, 1987; Fukuyama, 1995; Zaheer *et al.*, 1998). Trust is a product of our relationships, it is on the one hand the credibility, goodwill or gratification towards others, while feeling vulnerable or taking a risk (Doney and Cannon, 1997; Friedman *et al.*, 2000; Lewicki and Bunker, 1995) and on the other hand a (subjective) deviation between positive and negative consequences or even opportunism (Flores and Solomon, 1998; Williamson, 1993). Some indicate that trust is based on commonly shared norms, a social practice, a social relationship, or ethical behavior (Fukuyama, 1995; Gefen, 2000; Shapiro, 1987). Trust is a complex and multidimensional construct which makes it difficult to operationalize (Simpson, 2007), observe, interpret, and measure (Gulati, 1995). Some posit that trust seems to be an intractable concept (Li and Betts, 2011).

How trust is defined depends on the level of analysis, the discipline, and the specific dimensions of trust that are being considered. Consider Table 1.1 (adapted from Cho *et al.*, 2015), which provides a glimpse into the wide range of trust definitions.

Trust has been extensively studied in psychology, sociology, and philosophy to examine its influence on personal behavior, social order, and social behavior. Additionally, research on trust has occurred in areas of professional ethics, examining topics such as ethical behavior in business, science, leadership or management and its influence on trust and also in relation to law. Another major field of research is the consideration of trust in economics, the most prominent examples being the role of trust in transaction costs (Williamson, 1993) or trust as exemplified by the prisoner’s dilemma (Deutsch, 1958). Trust in the

Table 1.1: Trust as defined in various disciplines

Discipline	Meaning of Trust	Source
Automation	Attitude that one agent will achieve another agent's goal in a situation where imperfect knowledge is given with uncertainty and vulnerability.	Lee and See (2004)
Computing & Networking	Estimated subjective probability that an entity exhibits reliable behavior for particular operation(s) under a situation with potential risks.	Cho <i>et al.</i> (2015)
Economics	Expectation upon a risky action under uncertainty and ignorance based on the calculated incentives for the action.	James Jr (2002)
International Relations	Belief that the other party is trustworthy with the willingness to reciprocate cooperation.	Kydd (2007)
Management	Willingness to take risk and being vulnerable to the relationship based on ability, integrity, and benevolence.	Mayer <i>et al.</i> (1995)
Management	The expectation that an actor (1) can be relied on to fulfill obligations (Anderson and Weitz, 1989), (2) will behave in a predictable manner, and (3) will act and negotiate fairly when the possibility for opportunism is present (Anderson and Narus, 1990; Cummings and Bromiley, 1996).	Zaheer <i>et al.</i> (1998)
Marketing	One party's belief that its needs will be fulfilled in the future by actions undertaken by the other party.	Anderson and Weitz (1989)
Organizational Behavior	Reliance on another person under conditions of dependence and risk.	Soule (1998)
Organizational Behavior	The willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control that party.	Soule (1998)
Organizational Behavior	The reliance by one... upon a voluntarily accepted duty on the part of another... to recognize and protect the rights and interests of all others engaged in a joint endeavor or economic exchange.	Soule (1998)

Continued.

Table 1.1: Continued

Discipline	Meaning of Trust	Source
Philosophy	Risky action deriving from personal, moral relationships between two entities.	Lahno (1999)
Philosophy	Accepted vulnerability to another's possible but not expected ill will (or lack of good will) toward one. Reliance on others' competence and willingness to look after, rather than harm, things one cares about.	Soule (1998)
Philosophy	An attitude of optimism about her goodwill and to have confident expectation that, when the need arises, the one trusted will be directly and favorably moved by the thought that you are counting on her.	Soule (1998)
Psychology	Cognitive learning process obtained from social experiences based on the consequences of trusting behaviors.	Rotter (1980)
Psychology	The confidence an individual has that another will act in ways that promote the fulfillment of desired goals.	Rempel <i>et al.</i> (2001)
Science Ethics	An expectation or prediction that an assigned or accepted task will be competently performed.	Barber (1987)
Sociology	Subjective probability that another party will perform an action that will not hurt my interest under uncertainty and ignorance.	Gambetta (1988)
Sociology	Confidence in the reliability of a person or system, regarding a given set of outcomes or events, where that confidence expresses a faith in the probity... of another.	Soule (1998)

economics discipline examines trust between and within organizations, in leadership or management, and in a corporation's alliances. More specialized research has led to deeper examinations of trust in narrower areas, such as trust as a marketing instrument or as a basis for information systems. As a marketing instrument it is studied for brand equity, brand identity and brand personality to increase revenue. In general, economic theory is often grounded in the idea that all behavior is driven

by the market. Granovetter (1985) claims that relational ideas such as trust are rendered as unneeded in the economic model, since buyers simply move on to other sellers in cases of distrust or misbehavior. This idea is countered by salespeople who depend on the social context of trust to cultivate customer loyalty in business relationships.

Some authors distinguish strong trust from weak trust. Strong trust is mutual trust while weak trust is typically a one-way trust. Notably, weak trust is not distrust. Distrust is not a lower level of trust, but its opposite, a separate construct based on different emotions than trust (McKnight *et al.*, 2002b). Nor is lack of trust distrust. Interestingly, trust may be heritable, whereas distrust is not (Reimann *et al.*, 2017). Trust has been shown to stimulate oxytocin production and elevated levels of oxytocin (introduced via nasal spray) reduce the fear of trusting a stranger without a concomitant increase in risky behavior (Zak, 2017).

Trust is a nuanced concept that can be very context dependent. This can be seen in the definitions in Table 1.2, which lists many distinctions of trust.

Trust is the expectation, confidence, probability, predictable manner, or willingness (Brenkert, 1998; Rempel *et al.*, 1985) of others on whose goodwill one depends that an event, task, or action will be performed (Barber, 1987; Soule, 1998). Definitions of trust typically involve a relation between two parties. It is a psychological state, it is relational, and it is a choice (Li and Betts, 2011).

While building an understanding of trust over the years, researchers have also clarified what trust is not. Trust is not related to academic success or achievement (Rotter, 1980), nor is it necessarily the same as morality or moral action (Brenkert, 1998). Trust certainly does not enable people to control the behavior of others or even to predict it without error (Gefen, 2000). More trust is not always better. Less trust among our enemies is likely to be a good thing for us, and healthy competition often involves a less than trusting relationship among competitors (Gambetta, 2000).

Trust is not exactly an expectation, although expectation may exist. Expectation is a cognition of the trustor and may be an antecedent to trust, but it is not trust (Li and Betts, 2011). Trust is not trustworthiness, for that is a characteristic of the trustee (Li and Betts, 2011).

Table 1.2: Various nuanced definitions of trust

Term	Definition	Source
Affective trust	Confidence one places in a partner on the basis of feelings generated by the level of care and concern the partner generates.	Johnson and Grayson (2005)
Authentic trust	Trust reflected upon, its risks and vulnerabilities understood, with distrust held in balance.	Flores and Solomon (1998)
Basic trust	Physical and emotional security which most happily take for granted; it is most blatantly violated in war and in acts of random violence.	Flores and Solomon (1998)
Blind trust	Trust that is not Naïve, but stubborn, obstinate, possibly even self-deluding.	Flores and Solomon (1998)
Brand trust	The willingness of the average consumer to rely on the ability of the brand to perform its stated function.	Chaudhuri and Holbrook (2001)
Calculus-based trust	An on-going, market-oriented, economic calculation whose value is derived by comparing the outcomes resulting from creating and sustaining the relationship to the costs of maintaining or severing it. This is a transactional view of trust.	Lewicki and Bunker (1995)
Character-based trust	A focus on how the perceptions of a manager's character can affect employees in a hierarchical relationship	Cowart <i>et al.</i> (2014)
Characteristic-based trust	This trust consists of an actor offering a definition of herself, to an audience choosing either to interact with (trust) or not to interact with (distrust).	Williamson (1993)
Characteristic-based trust	Deals with trust due to characteristics of persons, such as ethnic group or religious affiliation. [based on Zucker, 1986].	Husted (1998)
Cognition-based trust	Trust that relies on rapid, cognitive cues or first impressions, as opposed to personal interactions.	McKnight <i>et al.</i> (1998)
Cognitive trust	Trust relationships in which there is a preponderance of cognitive content (compared to emotional content).	Lewicki and Bunker (1995)

Continued.

Table 1.2: Continued

Term	Definition	Source
Cognitive trust	Confidence or willingness to rely on a service provider's competence and reliability.	Johnson and Grayson (2005)
Competence trust	Trust built upon skills, expertise, and operational abilities.	Siau and Shen (2003)
Control trust	Trust built by institutionalized procedures.	Pavlou (2002)
Deterrence-based trust	Trust that exists when the potential costs of discontinuing the relationship or the likelihood of retributive action outweigh the short-term advantage of acting in a distrustful way.	Shapiro <i>et al.</i> (1992)
Emotional trust	Trust relationships wherein the emotional element is more dominant (than the cognitive element).	Lewicki and Bunker (1995)
Extended trust	This involves firms and individuals acting to trust one another beyond basic and guarded forms of trust. It develops within special relations which involve trusting other firms and individuals when contracts and monitoring devices are not in place or have been significantly reduced.	Brenkert (1998)
External trust	The extent to which organizational members have a collectively held trust orientation toward a partner firm.	Huff and Kelley (2003)
Fragile trust	A trusting intention level that is likely to undergo large changes during a given time frame. [Typically used to describe a sudden change of high trust to low trust, but not necessarily.]	McKnight <i>et al.</i> (1998)
Goodwill trust	Involves trust in a trustee's honesty and benevolence.	Siau and Shen (2003)
Guarded trust	Trust necessary when agents invoke various explicit contracts to protect their vulnerabilities and specify penalties for injury to those vulnerabilities and their interests. Trust is required here to maintain the relation in the face of unclarities in contracts. . . guarded trust makes contracts possible	Brenkert (1998)

Continued.

Table 1.2: Continued

Term	Definition	Source
Identification-based trust	The highest order of trust, it occurs when one party has fully internalized the other's preferences.	Shapiro <i>et al.</i> (1992)
Institution-based trust	Trust that reflects the security one feels about a situation because of guarantees, safety nets, or other structures.	McKnight <i>et al.</i> (1998)
Internal trust	The climate of trust within an organization, defined as positive expectations that individuals have about the intent and behaviors of multiple organizational members based on organizational roles, relationships, experiences, and interdependencies.	Huff and Kelley (2003)
Interorganizational trust	The extent of trust placed in the partner organization by the members of a focal organization.	Zaheer <i>et al.</i> (1998)
Interpersonal trust	The extent of a boundary-spanning agent's trust in her counterpart in the partner organization.	Zaheer <i>et al.</i> (1998)
Justice-based trust	Trust based on procedural justice. Procedural justice deals with the impact of decision-making processes on the perceptions of fairness of those affected by decisions-the trustor (Sheppard <i>et al.</i> , 1992).	Husted (1998)
Knowledge-based trust	Trust based on predictability, i.e., knowing enough about the other party that one can reliably predict the other party's behavior.	Shapiro <i>et al.</i> (1992)
Mutual trust	All parties must be both trusting of other parties and trustworthy in dealings with them.	Jones and Bowie (1998)
Personality-based trust	Trust that develops during childhood as an infant seeks and receives help from his or her benevolent caregiver, resulting in a tendency to trust others.	McKnight <i>et al.</i> (1998)
Predictability trust	Trust grounded in consistent behaviors.	Siau and Shen (2003)

Continued.

Table 1.2: Continued

Term	Definition	Source
Process-based trust	Trust tied to a long-term pattern of exchange between the parties. Such trust is produced, for example, in the form of a reputation based on a history of fair dealing. [based on Zucker, 1986].	Husted (1998)
Relationship-based trust	Focuses on the principles of social exchange and reciprocity between managers and employees.	Cowart <i>et al.</i> (2014)
Simple or Naïve trust	Unchallenged, unquestioned trust. It is unarticulated, not “spelled out.”	Flores and Solomon (1998)
Strong trust	Mutual trust between parties.	Bo <i>et al.</i> (2017)
Swift trust	Trust exemplified by the way team members need to carry out their tasks by trusting other members from the beginning of a project, not on the basis of past experiences, but rather on the basis of their background, professional credentials, and affiliations (Meyerson <i>et al.</i> , 1996).	Kanawattanachai and Yoo (2002)
Technology trust	Institution-based trust that arises among trading partners because of adherence to technical standards, security procedures, and protection mechanisms.	Pavlou (2002)
Weak trust	One-way trust between parties.	Bo <i>et al.</i> (2017)

Notably, virtually any indicator of trustworthiness can be manipulated and has been in experiments (Kramer, 2009). If anything, perceived trustworthiness is a belief of the trustor.

Trust is not a willingness to take a risk, although trust allows for risk taking (Li and Betts, 2011). However, when trust does not exist, risk taking does not occur (Meyerson *et al.*, 1996). Indeed, one may exhibit risk taking in the absence of trust. Thus, risk taking may be relevant to trust but trust itself is not willingness to take risk (Li and Betts, 2011). Nor is trust a calculated probability (Li and Betts, 2011). Once calculations begin, trust is replaced by a transactional consideration of the cost versus the benefit of taking a particular action.

As the variety and emphasis of definitions indicates, the concept of trust varies depending on the focus of a study (McKnight and Chervany, 1996). Trust is “*the outcome of observations leading to the belief that the actions of another may be relied upon*” (Jones, 2002). Trust can be conceptualized as composed of a “rule-belief” and a “conformity-belief.” Rule-belief is the belief that a rule requiring behavior, or a regular occurrence of behavior, exists. Conformity-belief is the belief that the rule will be followed (Jones, 2002).

1.2 Human Trust versus IT Trust

Tables 1.1 and 1.2 set the stage for the introduction of a definition of information technology trust. Although trust may be described or defined in many ways, “*most would agree that these forms of ‘trust’ are coherent only if they share important features of (i.e., can be modelled on) interpersonal trust*” (McLeod, 2021). When trust in an object is discussed, the focus quickly shifts to some human dimension or component of the object. Consider, for example, this excerpt (Leshner, 2021):

Surveys show that science still scores high [on trust] even when the general public is asked directly about its trustworthiness. For example, a 2017 survey by the non-profit group ScienceCounts reported that more than 70% of the public trusted scientists to ‘tell the truth’ and to ‘report their findings accurately.’

Note how the excerpt began with a focus on science but was operationalized by a focus on scientists. In discussions where the claim is made that a human perspective is not necessary, trust typically becomes redefined as another construct. In a discussion of medical AI systems, we find this: “*trust...denotes a reliance property that describes the willingness of the physician to rely on the medical AI...*” (Ferrario *et al.*, 2020). Here, trust is redefined as reliance. In fact, the National Institute of Standards and Technology conceptualizes the AI User Trust Scenario as comprised of two components: User Trust Potential and Perceived System Trustworthiness (Stanton and Jensen, 2020). As noted above,

trust is not trustworthiness. Thus, the conceptualization of trust centers on the human component.

The object need not be as advanced as artificial intelligence to see that in considering trust in an object, we ultimately focus on trust in another human. Note how the following quote puts the onus on the person (via the person's role): "*We trust engineers because we trust engineering and that engineers [as individuals] have been taught to apply valid principles of engineering*" (emphasis added) (Kramer, 2009). At the societal level, we rely on the safeguard of "professionalism" when we trust. An individual cannot know all that a doctor, lawyer, or engineer can know to draw up an effective contract. When we trust in medical technology, the legal system, or some engineering marvel, we are trusting in the professionalism of the individual licensed to practice in these areas (Darley, 1998). Because it is a relational construct, it only makes sense to be a construct involving entities capable of acknowledging the relationship.

Trust in an object has been defined as "*reliance upon the characteristics of an object*" (Jones, 2002). Trust is not reliance, however. One may rely on an object (or event) without trusting it. Though we may loosely use the words trust and rely interchangeably, the origins of the two words are different. Trust is an older word and is rooted in words most likely derived from the Old English word for "faithful." Rely, on the other hand, is rooted in Middle English words for "retie" or "gather," with a history in the context of the word "ligature."

A Turing Award winner demonstrated how malicious code can be hidden from detection and then stated the situation quite bluntly: "*You can't trust code that you did not totally create yourself*" (Thompson, 1984). This clearly places the onus for trust on the programmer, not the technology. By extension, we take the same position in this review. Following the Stanford Encyclopedia of Philosophy, our assumption going forward is that the dominant paradigm of trust is interpersonal (McLeod, 2021).

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