The Next Generation of Research on IS Use: A Theoretical Framework of Delegation to and from Agentic IS Artifacts

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ABSTRACT

Information systems (IS) use, the dominant theoretical paradigm for explaining how users apply IS artifacts toward goal attainment, gives primacy to human agency in the user-IS artifact relationship. Models and theorizing in the IS use research stream tend to treat the IS artifact as a passive tool; lacking in the ability to initiate action and accept rights and responsibilities for achieving optimal outcomes under uncertainty. We argue that a new generation of “agentic” IS artifacts requires revisiting the human agency primacy assumption. Agentic IS artifacts are no longer passive tools waiting to be used, are no longer always subordinate to the human agent, and can now assume responsibility for tasks with ambiguous requirements and for seeking optimal outcomes under uncertainty. To move our theorizing forward, we introduce delegation, based on agent interaction theories, as a foundational and powerful lens through which to understand and explain the human-agentic IS artifact relationship. While delegation has always been central to human-IS artifact interactions, it has yet to be explicitly recognized in IS use theorizing. We explicitly theorize IS delegation by developing an IS delegation theoretical framework. This framework provides a scaffolding which can guide future IS delegation theorizing and focuses on the human-agentic IS artifact dyad as the elemental unit of analysis. The framework specifically reveals the importance of agent attributes relevant to delegation (endowments, preferences, and roles) as well as foundational mechanisms of delegation (appraisal, distribution, and coordination). Guidelines are proposed to demonstrate how this theoretical framework can be applied toward generation of testable models. We conclude by outlining a roadmap for mobilizing future research.

Keywords: IS Delegation, Delegation, Theoretical Framework, IS Use, IS Artifacts, Agency, Agentic IS Artifacts
INTRODUCTION

“Civilization advances by extending the number of important operations which we can perform without thinking of them.” – Alfred North Whitehead, 1911

Information systems (IS) use is the dominant theoretical lens for conducting research on how humans work with IS toward goal attainment (Burton-Jones et al. 2020). For decades, IS scholars have applied this lens to understand how humans use IS artifacts to achieve goals across a wide variety of organizational contexts (e.g., Ahuja and Thatcher 2005; Wang et al. 2013), consumer contexts (e.g., Goh et al. 2013; Kwon et al. 2016) and societal contexts (e.g., Venkatesh et al. 2016a; Venkatesh et al. 2016b). In fact, an MIS Quarterly research curation identified 107 articles published on the topic of IS use in this journal alone (Burton-Jones et al. 2020). The vast majority of IS use research, however, assumes that IS artifacts are tools that serve as a means to achieving a user’s ends (Orlikowski and Iacono 2001). IS use literature to date has placed an emphasis on human agency rather than IS agency—i.e., the ability to accept rights and responsibilities for ambiguous tasks and outcomes under uncertainty and to decide and act autonomously. For reasons articulated next, we argue that only recognizing human agency is insufficient.

A new generation of foundational technologies—including cloud computing, big data infrastructure, artificial intelligence, mobile technology, and the Internet of things—have together given rise to IS artifacts that are agentic in nature. Agentic IS artifacts are unique in many ways, but especially in how they enable transfer of rights and responsibilities from, or even to, human agents. This new generation of agentic IS artifacts is imbued with the capacity to learn, adapt, act autonomously, and be aware of the need to act without being prompted by users (e.g., Floreano and Wood 2015; Russell 2019). Agentic IS artifacts can now assume tasks that involve a higher degree of uncertainty in unstructured and dynamic situations where interactions
with the environment and other agents involve significant dependencies (Leigh 2007; Russell and Norvig 2016; Schuetz and Venkatesh 2020). Chatbots are now replacing customer service and support representatives (Hill et al. 2015); e-mail applications now make writing suggestions (Seabrook 2019); the malignancy of tumors may eventually be determined by smart surgical tools (Max 2019); legal decisions, such as parole decisions, increasingly rely on predictive models (Ashley 2017); navigation agents now route and instruct drivers (Samson and Sumi 2019); and autonomous vehicles are no longer science fiction (Anderson et al. 2014).

This paradigm shift highlights the need to envision new forms of relationships between humans and agentic IS artifacts where agentic primacy is ambiguous or fluid (Baskerville et al. 2019; Demetis and Lee 2018; Rahwan et al. 2019; Rai et al. 2019; Russell 2019; Schuetz and Venkatesh 2020). For three reasons, though, current IS use theorizing is not well-suited for making sense of relationships where agentic primacy is not only reserved for the human agent.

First, IS use is termed “IS use” as a user is using a system to accomplish a goal. This inherently assumes, even in the terminology, that the human agent is responsible for effectively applying a technological tool to a problem or process. While there will always be some level of use present in human agent and IS artifact relationships, even when the IS artifact has agentic capabilities, this perspective is human agent centric and does not explicitly consider the transfer of rights and responsibilities from one agent to another. While some rights and responsibilities are nearly always transferred in any form of IS use, the fact that less defined responsibilities and rights (i.e., instruct me how to optimally reach a destination based on current and changing conditions) typically thought to be reserved for humans (e.g., navigation decisions under uncertainty) can now be transferred to agentic IS artifacts, requires a new theoretical lens.
Second, the overemphasis of IS use theories on users’ perceptions provides, at best, an incomplete view of how agentic IS artifacts can be applied toward goal attainment. Consider the unified theory of acceptance and use of technology (UTAUT) (Venkatesh et al. 2003). This theory is among the most cited and oft-invoked theoretical lenses in research on IS use. It gives primacy to user perceptions, paying little heed to the capabilities and actions of the IS artifact. For instance, such a theoretical lens is not suitable for studying IS artifacts that can initiate their own actions to engage users. It also overlooks the complicity of IS artifacts in goal achievement (or failure). Even research that explicitly encompasses the role of the IS artifact in facilitating goal achievement tends to give primacy to the user, such as the theory of effective use (Burton-Jones and Grange 2013). Not sufficiently reflected are properties of IS artifacts.

Third, the level of analysis in IS use theorizing has predominantly focused on the individual level (e.g., Burton-Jones and Straub 2006; Hsieh et al. 2011) or collective level (e.g., Burton-Jones and Gallivan 2007; Negoita et al. 2018). A key challenge is that the users involved define the unit of analysis—i.e., the individual level is chosen for studying individuals using the IS artifact and the collective level is chosen when studying collectives (e.g., teams, departments, organizations) using the IS artifact. Yet, the IS artifact can also use the individual for goal attainment. This creates limitations in theorizing about IS artifacts with agentic properties. Important interdependencies between agents are missed when relying on these views.

In sum, we explicitly acknowledge the increasingly agentic nature of IS artifacts, focus on the dyadic unit of analysis, and introduce delegation—transferring rights and responsibilities for task execution and outcomes to another—as a foundational and powerful lens through which to explain human-agentic IS artifact relationships. Delegation has always been implicit in IS use research but has been so inherent it is taken for granted. After all, whenever an individual or
collective leverages IS artifacts to perform tasks they would otherwise have to do themselves, this could be viewed as a type of delegation. However, the complexities and possibilities of this delegation process have never been sufficiently unpacked and brought to the fore. Given the growing agency displayed by contemporary IS artifacts, explicit delegation theorizing is now overdue. By foregrounding delegation, new opportunities will likely emerge for evaluating rights and responsibility transfers within dyads and even beyond this unit of analysis to triadic, platform, and multi-agent perspectives of IS delegation, as will be discussed in more detail later. As exploration of agentic IS artifacts within the IS use domain is nascent, we propose an IS delegation theoretical framework that provides the scaffolding needed to further meaningful, theory-informed study of human-agentic IS artifact relationships. The hope is that this framework will motivate future work on delegation, especially toward preventing stagnation around high-level constructs, such as ease-of-use, usefulness, representational fidelity, and transparent interaction, and stimulate development of more nuanced and impactful insights specific to delegation interaction patterns.

Agentic IS Artifacts and the Need for a New Lens

The relationship between agents—human and IS—is essential to understand, particularly when considering how rights and responsibilities are transferred. We now consider: 1) agency, 2) the increasingly agentic nature of IS artifacts, and 3) prior work related to delegation as well as motivation for considering delegation as focal to human-agentic IS relationships.

Agency and Agentic IS Artifacts

Theoretically, the notion of agency is an abstraction conceived of by theorists to understand not only the nature of individual choice and accountability (Bandura 2001; Bandura 2006), but also to understand abdication of control to another while retaining monitoring rights (Eisenhardt 1989; Grossman and Hart 1983; Ross 1973; Shapiro 2005). Agency is fundamentally, and
somewhat paradoxically, a relational and relative concept (e.g., Descombes 2010; Emirbayer and Mische 1998; Latour 2005; Robichaud 2006). When applying agency via a proxy or surrogate, an agent trades some control in exchange for efficiency, reduction in responsibilities, stressors, or individual economies of scale (Bandura 2001; Bandura 2006). This is particularly relevant to delegation. For instance, agency-based theorizing is used not only to explain how individuals exert free will, but also to explain the nature of cooperation and conflict between agentic entities as they work to complete goals (Burton-Jones and Volkoff 2017; Emirbayer and Mische 1998; Enfield and Kockelman 2017; Hong et al. 2013; Robichaud 2006; Russell 2019; Schlosser 2015).

When considering agency with respect to IS artifacts, the agent-based computing literature generally considers an agent to be “something that perceives and acts in an environment” (Russell and Norvig 2016, p. 59). For a technology to be considered an agent, it must “possess a degree of intelligence that permits it to perform parts of its tasks autonomously and to interact with its environment in a useful manner” (Brenner et al. 2012, p. 21). Following from this, our term agentic IS artifact refers to rational software-based agents that have the ability to perceive and act, such as take on specific rights for task execution and responsibilities for preferred outcomes (Russell 2019). Such artifacts are also assumed to be designed “to achieve the best outcome or, when there is uncertainty, the best expected outcome” (Russell and Norvig 2016, p. 4). Thus, we consider any software-based artifact designed to make rational, autonomous decisions as agentic. To elaborate, a rational software-based agent is “a computer system, situated in some environment, that is capable of flexible autonomous action in order to meet its design objectives” (Jennings et al. 1998, p. 276). Situated means that “the agent receives sensor input from its environment and that it can perform actions which change the environment in some way” (p. 276). Autonomous means “the system should be able to act without the direct
intervention of humans (or other agents) and that it should have control over its own actions and internal state” (p. 276). Autonomy also suggests that the agent can leverage its own prior history (i.e., experience via relevant information gathering) rather than just the rules built into it by the designer (Russell and Norvig 2016). Flexible means that the system is responsive (“perceive their environment and respond in a timely fashion to changes”), proactive (“able to exhibit opportunistic, goal-directed behavior and take the initiative where appropriate”) and social (“should be able to interact, where appropriate, with other artifact agents and humans to complete their own problem solving and to help others with their activities”) (p. 276-277).

Not all agentic IS artifacts are created equal, however. To address this variation, in Table 1, four agentic IS artifact archetypes are proposed along a continuum of agency. This approach follows in the tradition of prior work that has proposed archetypes of IS artifacts (e.g., Piccoli and Pigni 2013). It also follows recommendations for considering artifact autonomy on a continuum from very simple tasks to full task completion autonomy and responsibility for an outcome (Castelfranchi and Falcone 1998). At the lower end of the proposed continuum, agentic IS artifacts act as assistant-like agents with limited agentic abilities (Wooldridge and Jennings 1995). At the higher end, agentic IS artifacts act more freely as autonomous agents which can make complex decisions and be trusted to act on their own (Castelfranchi and Falcone 1998; Maes 1990; Russell and Norvig 2016). The reflexive archetype refers to agentic IS artifacts that restrict their decision-making to immediate or proximal stimuli. The supervisory archetype refers to agentic IS artifacts that seek to monitor progress toward, or deviation from, a defined goal or optimal point, and make or suggest corrections or adjustments over time. The anticipatory archetype refers to agentic IS artifacts which proactively anticipate human agent needs, often
autonomously and without specific instructions from a human agent. Finally, the prescriptive archetype refers to agentic IS artifacts that also have the ability to prescribe or take action.

### Table 1: Agentic IS Artifact Archetypes

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<th>Agentic Archetypes</th>
<th>Examples</th>
<th>What’s Different?</th>
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| Reflexive (i.e., reactive) | • Sensing and acting (or alerting) agents, e.g., rebalance a financial portfolio when specified allocations are out of balance  
• Virtual assistants that react to queries (e.g., voice-based assistants) | These agents act reflexively, in direct response to relevant stimuli. Decisions are limited to models that define how to respond to expected stimuli. |
| Supervisory (i.e., control system) | • Behavior modification systems (e.g., decision support, ambient intelligence, health behavior nudges, or financial trade suggestions)  
• Guidance systems such as those that observe human behaviors and remind them of process steps (e.g., visual cues, such as from smart lights, that guide how to put together furniture) | Supervisory agents evaluate deviations from the norm (or the status of goal progression) and seek to guide decision making or take actions that will help return to the norm or enhance probability of progression toward a specified goal. |
| Anticipatory (i.e., proactive) | • Social media content searching, filtering, and presentation  
• Digital content compilation (e.g., automatic video or album creation)  
• Wearable augmented reality agents that anticipate needs (e.g., provide names for people in the field of view) | Anticipatory agents proactively apply model-based “reasoning” to anticipate needs or wants (e.g., the artifact automatically generates media compilations). |
| Prescriptive (i.e., autonomous decision-making) | • Bots (e.g., chatbots, search bots, resume filtering bots, etc.)  
• Autonomous vehicles  
• Automated financial portfolio management  
• Legal agents (e.g., arbitration or even judicial decision prescription)  
• Medical agents (e.g., that make decisions during procedures) | Prescriptive agents act as substitutes for either behavior-based decision-making or outcome-based decision making by prescribing or taking actions. |

### Toward IS Delegation

Given this range of agency in IS artifacts and the increasingly agentic nature of IS artifacts, we claim that the delegation lens will yield more relevant and nuanced insights regarding human agent and agentic IS artifact relationships, and this lens will be increasingly needed as the
We start with the IS literature. A key turning point in how IS scholars understand the agency of IS artifacts can be traced to Giddens’s view of the association between structure and agency in the creation of social systems. Foundational IS research in the structuration tradition (e.g., DeSanctis and Poole 1994; Orlikowski 1992) shifted the discipline’s discourse about IS artifacts from that of passive objects being acted upon to that of something that itself has agency, realized through structure that is continually produced and reproduced in practice (Orlikowski 2000). Structuration theory has been the subject of much research focus within the IS discipline (Jones and Karsten 2008; Poole 2009). It has fundamentally shaped our view of IS artifacts as having agency. What remains is to understand and explain transfers of rights and responsibilities to and from agentic IS artifacts.

In recent times, literatures as diverse as actor network theory (Braa et al. 2004; Chiasson and Davidson 2005; Hanseth et al. 2006; Latour 2005), sociomateriality (Suchman 2002; Suchman 2007), and agent-based computing (Brenner et al. 2012; Miller and Parasuraman 2007; Parasuraman et al. 2000; Russell 2019) explicitly recognize that agency, and therefore delegation, is not just reserved for human-to-human interactions. There are several notable observations from this literature. One is that abdication of control to non-human artifacts results in changes to the role that the human plays, such as being more of a monitor rather than an doer (e.g., Miller and Parasuraman 2007; Parasuraman et al. 2005). Another is that interfaces explicitly designed for flexibility in control transfers can result in better overall performance (Parasuraman et al. 2005). IS research has shown that even IS artifacts with limited agentic
capabilities, such as the ability to recommend (e.g., Xiao and Benbasat 2007) or persuade (e.g., Oinas-Kukkonen and Harjumaa 2009; Schuetz and Venkatesh 2020), can influence human behaviors and that social power dynamics are significant when delegating (Tong et al. 2017).

What is different now, however, is that no longer is effectiveness dependent on systems being applied to tasks that are “simple, flexible, familiar, and independent” (Burton-Jones and Grange 2013, p. 650); nor are humans the only or focal agents in the human-IS artifact relationship (Baskerville et al. 2019; Demetis and Lee 2018; Rahwan et al. 2019; Rai et al. 2019). In particular, the bidirectional nature of the relationship between humans and IS artifacts is now understood to be an important consideration in theorizing (Baskerville et al. 2019; Markus and Rowe 2018; Schuetz and Venkatesh 2020). Research in this area has significant implications for theorizing about delegation; particularly that transfers of rights and responsibilities can move in a direction previously not thought possible. For instance, in the design of semi-autonomous systems, there may be a need to keep the “human-in-the-loop” in case a transfer of control needs to occur (e.g., Feng et al. 2016). Humans might also need to be “in the loop” of machine learning and classification. While agentic IS artifacts focused on classification (e.g., algorithms) may have a high accuracy rate, for certain classification problems, the algorithm may need to request help from human agents. Agentic IS artifacts can even initiate actions that elicit a response from humans.

As an example of the above, in the domain of open source software development, Hukal et al. (2019) observe the varied roles that bots play in coordinating distributed technical work. Hukal et al. (2019) observe that manager bots, for example, review source code changes by developers and decide whether to assign the changes to human reviewers. Here the agentic IS artifact delegates specific aspects of the task to humans: in this case, which code changes they
should review and which tasks they should prioritize in their workflow.\textsuperscript{1} Extant theorizing has mostly been in reference to a cause-and-effect loop that requires updating of how the human perceives or applies the IS artifact or how the IS artifact itself updates in response to observed effects. There is not yet strong theorizing around delegation from the agentic IS artifact.

**Summary**

The main claim in this section is that agentic IS artifacts are different, which fundamentally changes how we should theorize around such artifacts. Table 2 illustrates these differences.

<table>
<thead>
<tr>
<th>Prior Vocabulary</th>
<th>IS Use</th>
<th>IS Delegation</th>
<th>New Vocabulary</th>
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<tr>
<td><strong>Users</strong></td>
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<td></td>
<td>● <em>Responsible</em> for usage knowledge and effective application, sometimes requiring significant user efforts dedicated to attention and reflection.</td>
<td>● Human occupation of the supervisory role is <em>no longer a given</em>. The roles of supervisor and subordinate are now fluid and can shift back-and-forth, even during a single interaction.</td>
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<td></td>
<td>● Emphasis on <em>self</em> (e.g., self-efficacy, etc.) with respect to systems and tasks.</td>
<td>● Humans cannot always be assumed to have <em>superiority in decision-making abilities</em> and have <em>situational preferences</em>.</td>
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<td><strong>Systems</strong></td>
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<td></td>
<td>● <em>More dependent</em> on the user (e.g., initiation, instructions, or information)</td>
<td>● <em>More autonomous</em>:</td>
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<td></td>
<td>● <em>Functional</em> (e.g., automates, informs)</td>
<td>● <em>Situated</em> (via awareness capabilities)</td>
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<td></td>
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<td>● <em>Flexible</em> (via computational capabilities)</td>
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<td>● <em>Social</em> (via interfacing capabilities)</td>
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<td><strong>Tasks</strong></td>
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<td></td>
<td>The types of tasks often considered in user-IS artifact theorizing are relatively <em>well-defined or bounded</em> tasks.</td>
<td>Agentic IS artifacts can now accept much more <em>open-ended, ambiguous, and uncertain</em> sensing, cognition (even combining thinking across artifacts), and acting tasks.</td>
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Human agents can now delegate more complex tasks and even outcome preferences to these increasingly autonomous artifacts. Agentic IS artifacts can even delegate to human agents. While

\textsuperscript{1} Please see [https://www.theverge.com/2020/2/27/21155254/automation-robots-unemployment-jobs-vs-human-google-amazon](https://www.theverge.com/2020/2/27/21155254/automation-robots-unemployment-jobs-vs-human-google-amazon) for more details and additional examples.
IS use literature provides an essential foundation, especially in that it identifies key relationships between goal-oriented users, systems, and tasks, it has yet to explicitly address delegation. Further, while we have distinct views of delegation to and from IS artifacts from various literature streams, including HCI (e.g., Dix 2009; Helander 2014; Jacko 2012) and agent-based computing literature (e.g., Russell 2019; Russell and Norvig 2016), we do not yet have an integrated framework. To move forward, a sharper, integrated view, which articulates and generates fundamental attributes and mechanisms relative to delegation, is vital.

**IS Delegation theoretical framework**

In this section, an IS delegation theoretical framework is proposed. It draws upon agent interaction theories. We first explain why we focused our efforts on a framework. We then explain the process for evaluating the literature and synthesizing into a framework. Finally, we provide details about the framework itself, including the constructs, attributes, and mechanisms.

**Why Develop a Framework?**

A theoretical framework provides “the underlying structure, the scaffolding or frame” (Merriam and Tisdell 2016, pg. 85). A theoretical framework is high on the ladder of abstraction (Merton 1968; Ostrom 2005; Van de Ven 2007), in that it offers high-level constructs and relationships. It does not necessarily define a single research design or leverage a single theory. While this approach may be perceived as imprecise, a distinct advantage of a framework is that it offers new ways of thinking, without constraining application. Further, when research has yet to reach a consensus, a framework can help to guide systematic expansion of the stream, preventing excessive fragmentation (Hou et al. 2007; Kuhn 1962). For instance, notable prior research which helped research into emerging phenomena grow systematically include: the theory of effective use (Burton-Jones and Grange 2013), the social cognitive theory framework (Bandura
2001), the diffusion of innovations theoretical framework (Rogers 2003), and the dynamic capabilities theoretical framework (Teece et al. 1997). We follow in this tradition.

What was the Process for Developing the Framework?

In developing the proposed framework, the overall goal was to extract relevant concepts, attributes, and mechanisms from the literature (Shepherd and Suddaby 2017; Whetten 1989), synthesize these perspectives, and apply them, while also providing a degree of imagination (Weick 1989). We follow an integrative consensus approach, similar to theorizing such as the relational view of the firm (Dyer and Singh 1998) and relational coordination (Claggett and Karahanna 2018), as well as the frameworks mentioned prior. Our primary guiding principles were: 1) incorporate key components from IS use and related agent interaction streams of research, 2) explicitly identify the relationship between a human agent and an agentic IS artifact with a delegation lens, 3) remain high on the ladder of abstraction, and 4) remain bounded to the human–agentic IS artifact dyad. Consideration of additional agents is discussed later.

To develop the basis for the framework, we first drew from multiple literatures of agent-based interactions including (Table 3): IS use research (Burton-Jones et al. 2020), IS scholarship on ANT (Braa et al. 2004; Chiasson and Davidson 2005; Hanseth et al. 2006; Lamb and Kling 2003; Scott and Wagner 2003), IS scholarship on sociomateriaity (Cecez-Kecmanovic et al. 2014; Orlikowski 2010; Orlikowski and Scott 2008; Orlikowski and Scott 2015), agent-based computing (Brenner et al. 2012; Miller and Parasuraman 2007; Parasuraman et al. 2000; Russell 2019), and cognitive and task-technology fit (Goodhue and Thompson 1995; Serrano and Karahanna 2016; Vessey 2006). We leveraged these literatures to identify the high-level constructs and to characterize the relational nature of the agents involved.
We then reviewed multiple literatures that seemed relevant to delegation in the IS context, beyond IS use, including automation and control (e.g., Miller and Parasuraman 2007; Parasuraman et al. 2000), algorithm aversion (e.g., Burton et al. 2019; Dietvorst et al. 2016), agent-based and multi-agent systems (e.g., Castelfranchi and Falcone 1998; Stout et al. 2014; Wooldridge 2009), economic and game-theoretic perspectives on delegation (e.g., Alonso and Matouschek 2007; Alonso and Matouschek 2008), psychological and behavioral findings on delegation (e.g., Aggarwal and Mazumdar 2008; Akinola et al. 2018), and delegation in the workplace (e.g., Klein et al. 2006; Leana 1986). The challenge, as the reader may already be thinking, is that many literatures assume that some level of delegation occurs or consider delegation tangentially (e.g., recommendation agents: Al-Natour et al. 2006; Xiao and Benbasat 2007), but an explicit focus on delegation is lacking. Further, a risk in drawing from disparate literatures is that each has its own focus and underlying assumptions. While drawing from only one theory or literature would have simplified matters, a major drawback is that it would have constrained the framework to one perspective. Indeed, we were unable to find a single theory that comprehensively explained the delegation process. Therefore, the aim was not to apply or extend any one of these theory bases, but to compose a complete and relevant set of ideas to illuminate the phenomenon. In this sense, the risk associated with drawing upon multiple literature bases is outweighed by the benefit of a multifaceted view of the delegation phenomenon. It also provides opportunities for future researchers to spawn multiple new models, rather than only incrementally refine, or even ignore, one idiosyncratic model.

We ultimately synthesized the literature seen as most relevant to IS delegation and, to reduce complexity and embrace parsimony, categorized into three streams: 1) the advice literature, 2) the algorithms perceptions literature, and 3) the delegation decision-making literature. These
streams are now briefly summarized and are the streams from which we derived the attributes of agents and the mechanisms most relevant to IS delegation.

**Advice Literature:** In this literature, a “judge” or decision-maker receives advice from an “advisor” (Bonaccio and Dalal 2006). The decision-maker must then choose whether or not to accept and apply the advice. The primary contribution of this literature stream is that judges (i.e., the individuals receiving the advice) typically weigh the benefits of the advice against potential costs (Bonaccio and Dalal 2006). If judge confidence is low, perhaps due to prior experiences (i.e., pre-advice disposition) or concerns about advice accuracy (i.e., advisor or process-based concerns), advice is less likely to be positively received (Bonaccio and Dalal 2006). This literature is highly similar to the literature on recommendation agents in e-commerce (Al-Natour et al. 2011; Xiao and Benbasat 2007) in that evaluations of trust and costs versus benefits (e.g., ease-of-use and usefulness of a recommendation) are central variables. Interestingly, advice literature has also shown judges to be adaptive, in that they adjust to situational and task differences as well as in relation to their own abilities, such as by evaluating advice in their own area of expertise differently than advice that is outside of their area of expertise (Bonaccio and Dalal 2006). This literature is highly relevant to delegation in that the delegation process requires appraisal of the costs and benefits of transferring control to a proxy.

**Algorithm Perception Literatures:** The algorithm aversion (Burton et al. 2019) and algorithm appreciation (Logg et al. 2019) literatures seek to understand why human agents are or are not interested in interacting with algorithms, particularly as they seek assistance in making decisions. Similar to the advice literature, appraisals (i.e., perceptions and evaluations) play a large role in this literature. Expectations of the accuracy and value of the algorithm’s capabilities (Burton et al. 2019) are particularly important as well as the level of control retained or
transferred by the human agent, conditional on the human agent’s capabilities (e.g., expert vs. novice) (Logg et al. 2019). Further, the level of involvement of the human agent in engaging with the algorithm may increase favorable perceptions, but impacts on performance are unclear (Jussupow et al. 2020). What is clear is that increased levels of involvement will require more attention to agent appraisals of each other as well as distributions of rights and responsibilities.

**Delegation Decision-Making Literature:** Relevant delegation decision-making studies and perspectives come from management and leadership (Akinola et al. 2018; Klein et al. 2006; Leana 1986; Ribes et al. 2013; Schriesheim et al. 1998; Xiong Chen and Aryee 2007), economics (Alonso and Matouschek 2007; Alonso and Matouschek 2008; Holmstrom 1980; Schanze 1987; Vickers 1985), political science (Bendor et al. 2001; Huber and Shipan 2006), and psychology (Aggarwal and Mazumdar 2008; Bandura 2001; Wickens et al. 2015). While the findings and contexts of delegation from these literatures are quite broad, a consistent theme is how rights and responsibilities are distributed between agents as well as how coordination, including monitoring and updating, occurs after the initial delegation decision. For instance, in political science, legislative and regulatory decision making involves delegation from constituents to representatives and, in many cases, re-delegation from representatives to committees or regulatory agencies (Bendor et al. 2001; Huber and Shipan 2006). Central to these political delegation processes is which rights and responsibilities are retained versus transferred, the outcome of transference, and the feedback loop from outcomes back to those engaging in delegation and task progression. Further, in job settings, not only do monitoring, contracting, and structure matter, as suggested by economic, organization and sociology scholars (Davis et al. 1997; Eisenhardt 1989; Giddens 1981; Giddens 1984; Jensen and Meckling 1976; Wiseman and Gomez-Mejia 1998) as well as IS scholars (Jones and Karsten 2008; Jones and Karsten 2009;
Walsham 2002), but also the dynamics of delegation in that teams, tasks, and goals can frequently change or need to be adapted (Akinola et al. 2018; Klein et al. 2006; Leana 1986; Ribes et al. 2013; Schriesheim et al. 1998; Xiong Chen and Aryee 2007). Thus, while many options are available for characterizing and labeling delegation mechanisms, we have chosen parsimony. We focus on the root causes for engaging in delegation: distribution of rights and responsibilities and coordination of activities between agents, in addition to appraisals.

<table>
<thead>
<tr>
<th>IS Delegation Theory Framework</th>
<th>Literature Streams that Motivated Construct Inclusion</th>
<th>Literature Streams that Motivated Attribute and Mechanism Inclusion</th>
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<td>Human Agent</td>
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<td>Incentives (Extrinsic)</td>
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<td>Complexity</td>
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<td>Decomposability</td>
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<td>Delegation Mechanisms</td>
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From our literature review and synthesis, and through many iterations, we developed the IS Delegation Theoretical Framework shown in Figure 1. This framework is built upon three concepts. First, delegation involves the presence of at least two agents (Alonso and Matouschek 2007; Arrow 1985). Second, the focal occasion that brings the two parties together is a task that needs to be completed or an outcome that is desired (Serrano and Karahanna 2016; Vessey 2006). Third, rights and responsibilities for tasks and outcomes are transferred (Eisenhardt 1989; Enfield and Kockelman 2017). We bound our theorizing to relationships between human agents and agentic IS artifacts when the IS artifact possesses at least some degree of autonomy relevant to task completion and goal attainment (Bendor et al. 2001; Castelfranchi and Falcone 1998; Wooldridge 2009). The primary unit of analysis is the human-agentic IS artifact dyad (Rahwan et al. 2019). The underlying assumptions are: 1) at least one of the agents plays a role in task execution, 2) an agent can choose to delegate rights for task execution and responsibilities or responsibilities for one or more outcomes, and 3) delegation is relative to similarities and differences between the human agent and an agentic IS artifact, the goal being considered, and the situational context.
In the sub-sections that follow, we further describe the proposed attributes and mechanisms. We then present a more detailed IS delegation theoretical framework, including examples of how the attributes and mechanisms may be instantiated in Figure 2, and then in further detail later in the paper when we discuss ways in which this framework could be applied by researchers.

**IS Delegation Framework: Construct Attributes**

In this section, we propose that the agents—the human agent and agentic IS artifact—are endowed with resources (assets and capabilities), have and develop preferences (decision models and goals), and occupy one or more roles (delegator or proxy, at a minimum). We recognize asymmetries in the agents’ attributes and that each can occupy delegator or proxy roles. We propose that tasks, situations, and outcomes are focal to the delegation relationship. Tasks can be described and defined via action requirements (cognitive, digital or physical), the degree of complexity associated with the task (uncertainty, interdependence, and dynamics), as well as the
potential for decomposability (i.e., ability to subdivide). Further, delegation is situated.

Situational incentives (economic or social) as well as complexity (situational stability, observability, and controllability) are likely to have a significant impact on delegation processes and outcomes. Finally, we propose that the primary outcome of interest is goal-centric, with possibilities including attainment, progress, or failure.

**Human Agent and Agentic IS Artifact Attributes Relevant to Delegation**

Three fundamental attributes of agents proposed to be especially relevant to delegation and most pervasively viewed as important in agent interaction literature are: *endowments*, *preferences*, and *roles*. These proposed attributes are meant to be a foundation, not an exhaustive and exclusive list. The selection of these attributes was based on a review of literatures on agency, delegation, and agent-based interactions where at least one agent is software-based (e.g., AI and HCI literatures). While we could have chosen different names for these attributes or perhaps even different types of attributes, our goal was to be inclusive of the consensus reached in prior work, but also to provide a new and different framework for moving forward. For instance, rather than simply restate and re-categorize existing constructs (e.g., ease-of use, social norms, etc.), we assume that these constructs would likely impact human agent preferences (in the cases of these constructs), which is fundamental to considerations of delegation and agency, and therefore provide “preferences” as one of our framework characteristics. Yet, preferences are only one aspect of a complex set of attributes that impact delegation. Endowments, which are intrinsic to the agent, were also similarly considered as comprehensive of much prior work in examining intrinsic properties of users and agents, but also provides an opportunity to explicate unique sub-attributes specific to delegation. Finally, roles are specific to delegation, especially when at least two agents are included and were included to acknowledge roles occupied as well as role shifts.
We start with a more in-depth discussion of endowments. Human agents and agentic IS artifacts are endowed with resource-based assets (e.g., knowledge) and capabilities (e.g., ability to think abstractly). Endowments are particularly important to this framework as delegation typically occurs when an agent wants to free up resources for other pursuits or engage in activities that one cannot do on one’s own. In the case of the human agent, this could include sensing and analysis of data beyond the scope and scale of what the human brain can, or desires to, analyze. In the case of the agentic IS artifact, endowments can include assets such as knowledge and access to information, as well as the capability to sense, analyze, and act. For either agent, there must be enough shared knowledge and capabilities to facilitate the formulation of a relationship (i.e., symmetries), but also enough differences to justify the costs of delegating and oversight (i.e., asymmetries) (e.g., Dyer and Singh 1998; Lane and Lubatkin 1998). Thus, the relative endowment of the delegator with respect to the proxy, or vice versa, as well as the perception of the endowment by the other agent, becomes particularly salient in trying to understand why delegation would occur.

As has been argued extensively in the IS use literature (e.g., Venkatesh et al. 2003; Venkatesh et al. 2012), human agents will not engage in IS-related activity unless motivated to do so. Agency theorists specifically consider such motivations as preferences (Bandura 2006; Enfield 2017; Schanze 1987; Schlosser 2015; Shapiro 2005; Vickers 1985). We further disaggregate preferences into goals and decision models. A goal is a “cognitive representation of a desired end point” (Fishbach and Ferguson 2007, p. 491). When an agentic IS artifact is perceived as helping to attain a goal, the goal, along with perceptions of the agentic IS artifact, form the overarching motivations for a human agent to initially enter into a delegation relationship with an agentic IS artifact (Burton-Jones and Grange 2013). Decision models are
internalized representations of how choices will be ranked in choice sets (Green and Fox 2007; Simon 1956; Tversky and Kahneman 1991) and are typically considered via utility functions (Enfield 2017; Schlosser 2015). Preferences are constructed, revised, or reinforced via such models (Lichtenstein and Slovic 2006). For instance, the degree to which an agent is willing to delegate or accept decision making authority is partially contingent on risk preferences and available information for assessing risk (Ross Jr et al. 1997). Trust associated with the delegation process may also drive preference construction (Hancock et al. 2011) as well as confidence in the process (Lee and Moray 1994) and expectations of costs that might be incurred (Castelfranchi and Falcone 1998; Miller and Parasuraman 2007; Steffel and Williams 2017; Steffel et al. 2016).

Agentic IS artifacts also have preferences constructed via goals and decision models. Goals are initially embedded in agentic IS artifacts by designers and provide opportunities as well as boundaries for action. Interestingly, whether or not the preferences of the agentic IS artifact are revealed or kept private has significant implications for the agentic relationship. To achieve goals, agentic IS artifacts leverage decision models to help guide decision making processes, especially when faced with uncertainty. Such models are abstractions used to understand causality and processes (Iwasaki and Simon 1994) and are representations of how variables are expected or predicted to interact (Russell and Norvig 2016), but may be opaque (Burrell 2016).

Finally, the role of the agent is contingent on the rights and responsibilities possessed or transferred. In coarse terms, the role can primarily be that of either a delegator or a proxy (Castelfranchi and Falcone 1998). When decision making authority is abdicated to another, the agent occupies the delegator role (Miller and Parasuraman 2007; Wickens et al. 2015). When

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2 The designer (producer) is also an agent worthy of consideration, but to keep our model parsimonious, we do not explicitly include consideration of the agentic IS artifact designer. We suggest later, though, that this, along with consideration of other agents (such as other agentic IS artifacts being interfaced with and their designers), would be an excellent addition to this framework and an excellent avenue for future research.
decision making authority is accepted, the agent occupies the proxy role, which requires attention not only to the cost of task execution, but also to potentially coordinating with the delegator (Castelfranchi and Falcone 1998). In more granular terms, we propose that roles should be considered with regard to retention versus transfer of rights and responsibilities. For instance, a human agent can delegate the right to make financial decisions to a robo-advisor as well as the responsibility to act ethically, but may retain certain responsibilities, such as for accurately reporting income or losses to tax authorities. Further, either agent can fluidly occupy the role of delegator or proxy depending on situational needs during task execution. For instance, an agentic IS artifact can be a delegator when it either needs information or assistance from a human agent, which is sometimes referred to as a “role reversal” (Demetis and Lee 2018). Thus, the nature of the role will be dependent on the situation and nature of what has been transferred.

Although our characterization of human and agentic IS artifact encompasses common attributes, it is important to note that we do not assume symmetry between the two agents. Indeed, a core element that makes delegation an ideal lens is that agents are assumed to bring different strengths relative to the task. We therefore assume that the instantiation of agentic attributes will be distinct to the agents and idiosyncratic to the specific agentic dyad. While there are numerous dimensions along which human agents and agentic IS artifacts differ, we highlight noteworthy differences. These are by no means exhaustive and are intended to be illustrative.

In terms of endowments, agentic IS artifacts possess a robust digital infrastructure that facilitates their contribution to task execution. Digital infrastructure such as cloud storage, processors, and networks enable agentic IS artifacts to handle vast amounts of data at high speed and to have a long, detailed memory of past, codified events. While human agents are similarly capable of handling and remembering data, research broadly recognizes the limits of human
memory (Newell and Simon 1972; Simon 1974). In combination with complex algorithms, agentic IS artifacts are able to draw upon robust digital infrastructure to engage in computationally intensive processing in task execution with high speed. However, in comparison to human agents, agentic IS artifacts demonstrate less robust cross-context awareness and ability to engage in abstraction in ways meaningful to task execution (e.g., Véras et al. 2015).

Human and agentic IS artifacts also differ with regard to preferences in task execution. Decision making models of agentic IS artifacts range in complexity from relatively simple decision trees to deep learning algorithms, such as recurrent neural networks. The processes by which these models make specific decisions reveal preferences shaped by task objectives. A key distinction is that, owing to computational power, agentic IS artifacts are able to identify hidden patterns that strongly relate to task goal achievement. For instance, deep learning models engage in feature extraction to identify patterns (e.g., Chen et al. 2016) and reinforcement learning models engage in numerous trials within specified rewards, punishments, and constraints to identify the most efficient means of executing tasks (e.g., Mnih et al. 2015). Agentic IS artifacts have been shown to ‘think’ differently from humans (Burrell 2016). However, relative to human agents, agentic IS artifacts have been observed to be limited in their ability to communicate the rationale underlying the decisions made; particularly when complex models are involved (Burrell 2016; Ribeiro et al. 2016).

Finally, although a feature of the theoretical framework is the explicit recognition of fluidity in each agent’s occupation of the role of delegator or proxy, we also recognize asymmetries between the two in occupying these roles. Human agents are innately endowed with certain rights that may be exercised. In contrast, agentic IS artifacts have rights conferred and these are instantiated in designs and documented in contracts, terms and conditions, and regulations. For
instance, within reasonable bounds, human agents have the discretion to determine whether and when to execute a delegated task, while agentic IS artifacts have much less discretion. Similarly, human agents are afforded flexibility in determining whether they exercise their rights in either role, whereas agentic IS artifacts tend to be rigid and rule-based in exercising their rights.

**Task Attributes**

To our knowledge, the literature has yet to identify what task attributes are most relevant to delegation. We therefore propose three fundamental task attributes: *action requirements* (Brenner et al. 2012; Miller and Parasuraman 2007; Parasuraman et al. 2000; Russell 2019), *complexity* (Campbell 1988; Dorf and Bishop 1998; Lee and Markus 1967; Leigh 2007; Russell and Norvig 2016), and *decomposability* (Helander 2014; Lee and Siemsen 2017).

We draw upon agent-based computing literature (Brenner et al. 2012; Miller and Parasuraman 2007; Parasuraman et al. 2000; Russell 2019) to identify three types of *action requirements*: cognitive, digital, and physical. Cognitive actions are actions involving thought, such as model building and revising as well as knowledge retention and expansion. Digital actions are actions that take place in the digital realm, such as electronic financial trades or digital reminders to take a certain action. Physical actions are actions requiring actuating, such as an autonomous vehicle making a turn or a robot on a factory line completing a weld.

Drawing primarily from thoughts on intelligent software agent design by Russell and Norvig (2016) and control systems (Dorf and Bishop 1998; Lee and Markus 1967; Leigh 2007) as well as prior literature on tasks (Campbell 1988), task *complexity* is associated with the degree of uncertainty when making decisions (i.e., will inputs produce expected outputs), the interdependence between decisions as well as between various agents and the dynamics of a system. Overall, the more uncertain, dynamic, and interdependent the task, the more effort an agent must expend to complete the task.
Finally, decomposability is the potential for subdividing a task into smaller subtasks (Helander 2014; Lee and Siemsen 2017). This is especially important to consider in this context as more granular subdivision of tasks requires further delegation which has implications for how agentic relationships unfold over time.

Outcomes

There is little doubt that individual agents enter into relationships with other agents, including non-human agents (Braa et al. 2004; Chiasson and Davidson 2005; Hanseth et al. 2006; Latour 2005), to at least attempt to attain goals. For instance, a subordinate has the potential to generate value for the supervisor and the supervisor can potentially capture value from the efforts of the subordinate (Bendor et al. 2001). Therefore, in the proposed framework, the outcome is focused on goal attainment, progress, or failure which includes task completion. Indirect outcomes could also include the value generated and captured, as value captured may be asymmetric between the two agents, and implicitly, the impacts on the agents’ states as tasks are undertaken, completed, shirked or further delegated. We briefly note that the recipients of decisions made, who are also agents, are likely to have a vested interest in the outcome, such as the patient in a surgical setting or the individual subject to a legal decision. We return to this point later in our section where we consider future research opportunities.

Situational Attributes

The situation in which agentic dyads are enacted has substantial influence on the relationship between the agents as well as on outcome expectancies (Rahwan et al. 2019). In particular, the relationship between inputs and outputs is not always a given. As an example, say that in the future a “virtual nutrition assistant” is available that can make meal selections. A human agent motivated by health concerns may be highly likely to delegate meal selection and ordering to such an agentic IS artifact, particularly for automatically ordering ready-to-prepare dinners for
home cooking based on his or her schedule, diet preferences, and health status. Or, perhaps, one wants to grab a quick lunch between meetings and the virtual assistant is asked to order a diet-friendly meal at a local restaurant, thus saving effort both in time spent and cognitive evaluation of choices with respect to diet and health preferences. The same human agent using the same virtual nutrition assistant, however, may not want to delegate meal selection when out to eat with friends or family for a special occasion. In both situations, the virtual nutrition assistant offers similar services, but the willingness to delegate is situationally driven and is relative to the other agent as well as the task being considered.

Drawing on consensus in the agency literature, the framework emphasizes situational incentives and complexity.

In agent interaction theories, incentives entice an agent to perform some action (Jensen and Meckling 1976). They may be either economic (e.g., monetary) or social (e.g., social norms) (Burton et al. 2019). While not explicitly identified in the existing delegation literature to our knowledge, extrinsic incentives can impact delegation decision-making processes. For instance, monetary rewards, such as for higher productivity in a job setting, may motivate employees to engage in delegation. Similarly, social norms or situational expectations may place pressure on individuals to delegate or accept delegated tasks, such as for using or following mapping and navigation software to get to a location rather than relying on memory.

Agency-based control systems (Dorf and Bishop 1998; Lee and Markus 1967; Leigh 2007) and agent-based computing literature (Russell and Norvig 2016) highlight the importance of situational complexity. Three primary characteristics are identified with respect to the complexity of a situation: stability, observability, and controllability. Stability refers to the consistency of outputs given known inputs within the situation (or known similar situations). Observability
refers to the transparency (or opacity) of the situation, with respect to being able to understand
the states of system, given what is measured and known. Controllability refers to how much
regulatory power agents have over the situation, particularly in regard to manipulating inputs so
that expected outputs are attained.

**IS Delegation Framework: Delegation Mechanisms**

Mechanisms are used in the social sciences both to “refer to a causal process that produces
the effect of interest and sometimes to a representation of the crucial elements of such a process”
(Hedström and Ylikoski 2010, pg. 52). This excellent review article on mechanisms goes on to
state, “The primary epistemic… of science is to understand phenomena, and this is precisely
what mechanisms provide” (Hedström and Ylikoski 2010, pg. 54). Drawing on these
understandings of mechanisms, we consider delegation mechanisms to represent elements of the
delegation process. Secondarily, we believe that understanding the elements of a process also
aids in understanding what types of effects may occur, such as whether delegation itself occurs,
is potentially discontinued at some point, and whether or not feedback loops from observed
outcomes impact delegation processes in subsequent time periods. Granted, explicit models will
need to be built for in-depth understanding of delegation causes-and-effects, and this is precisely
why we have chosen the framework approach to theorizing. We offer the scaffolding from which
multiple future models can be built, perhaps with a more explicit focus on individual
mechanisms. Further, we follow the recommendations provided in the aforementioned review
article on causal mechanisms in the social sciences in that we include: the agents, properties of
agents, their possible actions, and relations (Hedström and Ylikoski 2010, pg. 64).

Drawing broadly on the three literature streams related to delegation and interactions
discussed earlier (Table 3)—advice taking and giving literature (Bonaccio and Dalal 2006),
algorithm perception literature (Burton et al. 2019; Logg et al. 2019), and delegation
decision-making literature (e.g., Akinola et al. 2018; Alonso and Matouschek 2007; Alonso and
Matouschek 2008; Bendor et al. 2001; Huber and Shipan 2006; Klein et al. 2006; Leana 1986;
Ribes et al. 2013; Wickens et al. 2015)—we propose three delegation mechanisms: appraisal
(e.g., confidence, compatibility), distribution (e.g., transfer of rights and responsibilities), and
coordination (e.g., monitoring, updating, accountability, predictability, common understanding).

**Appraisal**

Appraisal occurs when an agent “assesses what is at stake with respect to the [other agent]
and what can be done in response to it” (Fadel and Brown 2010, pg. 108). In the advice literature
(Bonaccio and Dalal 2006), algorithm perceptions literature (Burton et al. 2019) and agent
interaction literature focused on delegation (e.g., Stout et al. 2014), appraisals of various forms,
including expectations and sentiments, play a central role in whether or not advice is accepted,
whether or not algorithms are ultimately leveraged, and whether or not tasks are delegated to
agent-based software. Such appraisals can include both emotional and cognitive aspects, as the
focal artifact being appraised may invoke or recall emotions and may also be logically evaluated
(Scherer et al. 2001). For instance, confidence in the agentic IS artifact is likely based on how the
human-agent feels about delegation to agentic IS artifacts in general, how the human agent feels
about the artifact itself, and cognitive evaluation of costs and benefits of delegation.

Part of this appraisal process may also include consideration of the compatibility of the
decision-making process applied by the agentic IS artifact, to the extent that it is known,
discoverable, or observable, with the human agent’s preferred decision-making process. In other
words, the appraisal mechanism may be applied by the human agent to emotionally or
cognitively evaluate agentic IS artifact endowments and preferences in relation to his or her own
preferences and endowments. This mechanism is one of finding beneficial complementarities.
It is also likely that such appraisals will shift and be tempered or enhanced as the delegation relationship continues over time. This could occur as information asymmetries are lessened, such as the human agent learning more about the actual capabilities of the agentic IS artifact. This could also occur as the agentic IS artifact is updated or adapts in ways that impact appraisals.

Using cognitive appraisal, the agentic IS artifact may also evaluate attributes of the human agent. The agentic IS artifact, when acting as a proxy, may only accept delegation if the delegator can intervene if needed, such as being capable of taking over in a semi-autonomous vehicle or when monitoring an industrial control system. The agentic IS artifact may appraise accuracy or reliability of the human agent when delegating or sub-delegating tasks. A simple example is that of capacity. Maybe the human agent is more than capable of completing a task, such as providing details about the menu at the restaurant he or she is currently at, but lacks the capacity to, or interest in, completing the task at the current time.

While there is much to be said about appraisals, the main point is that they are an essential mechanism for understanding why, when, and how delegation to and from agentic IS artifacts may occur, may or may not continue, and may or may not be revised.

**Distribution**

Distribution is, according to the Merriam-Webster dictionary, something that is divided or shared. The proposed framework considers the distribution of rights and responsibilities between agents. Figure 2 depicts examples including transfers of decision rights and responsibilities as well as intervention rights and responsibilities, which would include when the other agent could or should intervene. Here, we provide more depth and specifically consider distribution of rights and responsibilities via transfer, negotiation, and regulation.

We start with transfer. A rational decision-maker would not delegate if full rights and responsibilities were preferred to be retained. Transfer refers to moving rights or responsibilities
from one agent to another (Alonso and Matouschek 2007; Castelfranchi and Falcone 1998; Holmstrom 1980; Leana 1986). For instance, as is represented in classic agency theory, one agent (i.e., a principal) may have the right and responsibility to complete a task, but decides instead to delegate that task to another agent (Bendor et al. 2001; Eisenhardt 1989). This transfer can be complete or partial (Castelfranchi and Falcone 1998) and has implications for how the arrangement between the agents will then be executed.

Given that a transfer of at least some rights and responsibilities is necessary for delegation, how might this transfer occur? One way is via a negotiation process. Negotiation is a process of seeking a mutual agreement, including consideration of levels of commitment and incentive distribution associated with accomplishing a specified goal or working toward a desired outcome. Negotiation includes establishing or accepting the rules that will guide how the delegator and the proxy work with or against each other when trying to achieve an outcome. Typically negotiation works toward some sort of contract, which is traditionally either behavior-focused (i.e., specific to how the process must be enacted) or outcome-based (i.e., based on results) (Eisenhardt 1989). Such contracts might be implicit, such as when decision making authority is delegated without an explicit agreement and includes either assumed or norm-based expectations (Castelfranchi and Falcone 1998). Alternatively, contracts might be explicit, including formal agreements, transactions, and potentially even behavior-focused or outcome-based limitations (Castelfranchi and Falcone 1998). Negotiation is particularly relevant to delegation as typically some sort of “trade” occurs, such as travel to a destination in an autonomous vehicle in exchange for money (and maybe even rights to some personal data). Thus, negotiation within delegation would be the process of the two agents determining which rights and responsibilities are transferred, and for what in exchange. We also note that some
items of value, such as personal information, may be traded without explicit or fully understood permissions and that not all rights and responsibilities are negotiable.

Finally, negotiation may include the setting of constraints, boundaries or mutually agreed upon regulations. Such regulations are typically established in order to prevent adverse outcomes or undesired actions, are both a proactive control and boundary-setting mechanism, and may be part of the negotiation process or a regulatory process after the fact. This is salient as the delegator may wish to set expectations and boundaries to prevent conflict, rather than by micro-managing or addressing conflict. In particular, the degree of discretion in choice selection is established, to the extent possible, *ex ante*.

**Coordination**

Coordination is the managing of dependencies between actions and tasks (Malone and Crowston 1994) and alignment of actions to achieve goals (Gulati et al. 2012). The implication of this mechanism is that delegators must approach delegation not only from the perspective of appraisals and distribution, but also from the perspective of a supervisor or monitor, which is what is depicted in Figure 2. From a coordination perspective, the desired outcome now involves dependencies and alignments that must be determined or accepted (Wickens et al. 2015). Thus, the delegator delegates decision-making rights (Gurbaxani and Whang 1991), but also incurs costs in the form of managing coordination. At the same time, the agentic IS artifact, when in the role of a proxy, must be flexible enough to assume delegated rights and responsibilities while also working to update the delegator via representations as needed or requested. This means that additional costs will be incurred to handle such flexibility and effectively report back to the delegator.

While not explicitly included in Figures 1 and 2, we also note that Okhuysen and Bechky (2009) posited integrative conditions for coordination especially relevant to this framework:
accountability, predictability, and common understanding. Accountability focuses on which agent is responsible for task completion. Predictability addresses whether or not the agents understand the sequence of tasks and events and can apply this knowledge as a framework to future tasks. Common understanding is the shared knowledge between the agents. We note that these integrative conditions are highly relevant to delegation processes where responsibility for tasks and outcomes can be fluid, where dynamic situations impact predictability, and common understanding can be subject to considerable variation. These integrative mechanisms are certainly relevant to considering the delegation relationship between human agents and agentic IS artifacts.
Figure 2: Examples of IS Delegation Framework Attribute and Mechanism Instantiation
A Roadmap for IS Delegation Theorizing

In this section, we offer guidelines for making this framework actionable as well as ideas for future research opportunities. While IS delegation theorizing could be left to grow organically, a risk with unsystematic growth is the future difficulty of synthesizing fragmented contributions. A benefit, however, is that new and interesting findings are more likely to be found when inquiry is not constrained. To attempt to strike a balance between the risk of fragmentation and the risk of stifling innovation, we propose five guidelines we hope will provide sufficient structure, while also leaving ample room for innovation. We want to be clear that application of all five guidelines is not required to derive benefits from the framework. The first three guidelines are critical for researchers to achieve an appreciation for delegation. The fourth and fifth guidelines are optional and should only be considered given the aims of the research inquiry. In essence, we are suggesting primary ways in which researchers may wish to approach building IS delegation models and, just as imagination was required in developing the IS delegation framework, imagination may also need to be applied when determining how to best develop IS delegation models. In this spirit, these guidelines are meant to assist; not to constrain or suggest that research that fails to follow all of the guidelines should be rejected in review processes.

Guidelines for Theorizing with the IS Delegation Framework

Robust theory enables researchers to generate numerous research models (Ostrom 2005). In this section, we outline guidelines to aid researchers on how to develop delegation research models when studying specific phenomena. We provide two illustrative examples of this application: one addressing the study of whether delegation is likely to occur (i.e., willingness-to-delegate) and the other addressing whether delegation will yield successful goal attainment or progress (i.e., effective delegation).
Guidelines for Applying the Framework

The guidelines presented in Table 4 offer a pathway for moving from a general set of considerations—e.g., attributes and mechanisms—to theoretically salient elements.

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<th>#</th>
<th>Description</th>
<th>Focus</th>
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<td>Baseline Guidelines</td>
<td>#1 Identify and explicate the salient attributes of the task or desired outcome under study</td>
<td>Task or outcome</td>
</tr>
<tr>
<td></td>
<td>#2 Identify and analyze salient delegation mechanisms relative to the task under study</td>
<td>Task or outcome, delegation mechanisms</td>
</tr>
<tr>
<td></td>
<td>#3 Identify and analyze salient attributes of agents relative to the task and delegation mechanisms</td>
<td>Task or outcome, delegation mechanisms, human agent, agentic IS artifact</td>
</tr>
<tr>
<td>Optional or Situational Guidelines</td>
<td>#4 Identify and analyze salient situational attributes relative to the task and delegation mechanisms</td>
<td>Task or outcome, delegation mechanisms, situation</td>
</tr>
<tr>
<td></td>
<td>#5 Identify and analyze any feedback loops resulting from outcome of delegation</td>
<td>Task, delegation mechanisms, human agent, agentic IS artifact, situation, outcomes</td>
</tr>
</tbody>
</table>

**Guideline 1: Attributes of the Task or Desired Outcome.** The task or desired outcome serves as the main occasion for bringing together the human agent and the agentic IS artifact, as argued extensively in the cognitive fit (e.g., Vessey 2006), task technology fit (e.g., Goodhue and Thompson 1995), IS use (e.g., Burton-Jones and Grange 2013; Burton-Jones and Straub 2006; Lauterbach et al. 2020), and even consumer behavior (e.g., Castelo et al. 2019) literatures.

Therefore, the first guideline when studying IS delegation is to use the task or desired outcome as the starting point. Beginning this way is important for a few reasons. First, it is the foundational element that serves as the basis for the human-agentic IS artifact dyad. Second, as the occasion that brings together human agent and agentic IS artifact, it helps bound the elements most relevant to delegation mechanisms and to attributes of the agents. Third, it sensitizes
researchers to the delegation mechanisms that are likely to be salient and the attributes of the
agents that ought to be considered. For instance, the physical nature of a task (an action
requirement) or outcome (requiring decision making under uncertainty) may underscore
coordination and distribution as delegation mechanisms likely to be most salient. Similarly, the
physical nature of the task or the nature of obtaining an optimal outcome may highlight the
salience of endowments and roles as key attributes. This focus then sets the stage for application
of subsequent guidelines. For instance, the scope at which the task or outcome is examined can
determine whether delegation should be theorized as unidirectional (e.g., when studying a
specific sub-task) or as a dynamic engagement, with transfer going back and forth (e.g., when
studying a complex, whole task or desired outcome).

**Guideline 2: Delegation Mechanisms.** Once the main elements of the task or outcome
preferences have been conceptualized, researchers should *identify delegation mechanisms likely
to be most salient* within the situation of the phenomenon under study. Such consideration will
sensitize researchers to the important aspects of transferring task execution from one agent to the
other. Continuing with the example of a physical task, the nature of the task might point to
coordination as a salient delegation mechanism, as monitoring of task execution and task status
updates may be important considerations in a physical space; if only for safety (You and Robert
2018). In other words, this approach serves as a means for researchers to theorize about specific
factors underlying the transfer of task execution from one agent to the other. This is important
considering that delegation mechanisms may differ depending on the direction of delegation and
the asymmetry between human agent and agentic IS artifact. Additionally, identification of
salient delegation mechanisms can provide insight into the attributes of the agents most likely to
be important for delegation in a particular situation.
**Guideline 3: Attributes of Agents.** The next step is to consider the relevant attributes of the agents, conditional on the tasks, outcomes, and mechanisms identified as most salient. Naturally, there are asymmetries in the specific attributes of human agents and agentic IS artifacts with regard to the elements of the task or outcome. Hence, researchers should leverage the nature of the task or outcome to identify the relevant attributes and symmetries or asymmetries between agents. With a physical task, researchers might consider the repetitiveness of the task or the level of precision needed. Both agents may be equally capable of performing the task, however, over prolonged periods, the agentic IS artifact may provide greater consistency given that it is less prone to distraction and is less likely to tire in the same way as human agents. Conversely, a complex physical task may involve elements—e.g., fine motor skills—beyond the abilities of the agentic IS artifact and for which the human agent is better suited. For a physical task, coordination mechanisms such as monitoring may require robust sensory capacity within a physical space (You et al. 2018). Consequently, researchers might theorize the specific attributes of agents relevant to monitoring considerations in delegation of the physical task.

**Guideline 4 (Optional or Situational to the Research Context): Attributes of the Delegation Situation.** The prior three guidelines should together provide researchers the necessary grounding for developing delegation models. We note that the researcher may decide to combine the task and situation (“situated task”) rather than consider the two distinctly. For some models and research contexts, however, the nature of the task or outcome may vary by situation. For instance, with a physical task such as diffusing an explosive device, safety is paramount and can yield a very different delegation experience compared to a low-risk situation. Therefore, when applicable, this fourth guideline suggests that researchers give thought to identifying salient situational attributes relevant to the nature of the task and to the delegation mechanisms.
identified per the preceding guidelines. Such considerations will aid researchers in their theorizing about the why behind delegation as well its outcome.

**Guideline 5 (Optional or Situational to the Research Context): Delegation Feedback Loops.** Finally, to the extent that researchers are examining IS delegation as a static versus dynamic phenomenon, the framework highlights possible feedback loops that may shape future delegation in meaningful ways. In not all situations will feedback loops be relevant to researchers’ inquiry. However, there are occasions where consideration of feedback loops can be informative. Dynamic or temporal examinations of delegation are such occasions. Simulations or multi-agent perspectives are also such occasions. For instance, the outcome of a delegation episode may shape the human agent’s judgment about whether to delegate in their role as delegator or how to execute tasks in their role as proxy. Similarly, an agentic IS artifact endowed with a learning model can improve its performance through observation of the human agent or other agentic IS artifacts to update its decision-making model. In such instances, the state of the agents evolves following the delegation outcome. Consequently, researchers should consider whether feedback loops are relevant to the delegation phenomenon under study.

**Application of the IS Delegation Framework**

Following similar approaches used by Ostrom (2005) and Burton-Jones and Grange (2013) to translate frameworks into actionable models, we now provide examples of ways in which the guidelines proposed here can be applied to delegation phenomena. We offer two illustrations: one that applies the guidelines to examine when delegation might occur and the other that applies the framework to examine the outcome of delegation. We select examples of domains that represent new frontiers for IS use research and useful for the application of IS delegation theory.
In each illustration, we demonstrate how the guidelines can sensitize researchers to salient attributes and mechanisms.

**Theorizing Willingness-to-Delegate**

Consider a case of a surgical team delegating decision-making to a surgical support agentic IS artifact (Figure 3). Imagine a surgeon who wears augmented reality glasses that helps with organ, vessel, and tissue identification during surgery. Or, imagine a lighting system which lights up specific parts of the patient’s body with identifying information or process instructions during surgery. Is there a way to develop an IS delegation model that will explain or predict the willingness-to-delegate in this situation?

While considerable prior work has been conducted in the health IT domain (Baird et al. 2018; Davidson et al. 2018), explicit consideration of delegation to and from health care specialists is lacking. Further, traditional IS use constructs could be applied, but we argue that such an approach would be insufficient as: 1) the unique properties of the agentic IS artifact would not be foregrounded, 2) the relationship between agents would be evaluated primarily from the human agent’s point of view, and 3) rights and responsibility transfers would be assumed rather than explicitly considered.

To develop a willingness-to-delegate model for this case, *the first step would be to consider the nature of the task or preferred outcome* (Guideline #1). In the case illustrated here, the cognitive portion of the decision-making could be delegated to the agentic IS artifact, while the human agent (i.e., the surgeon or a member of the surgical team) completes the physical actions. Of course, the agentic IS artifact could also assume some or all of the physical tasks, such as is the case with surgical robots. In either case, the nature of the task is two-fold: 1) determination of the optimal sequence of steps, such as directions, route, or surgical procedures, and 2) physical
actions that carry out these steps. The first step for the researcher is to determine whether the model will only focus on delegation of the first step (cognitive + digital) or both steps (cognitive + digital + physical). For purposes of brevity in this example, we will stick to optimization of a sequence (step 1) with an emphasis on guidance that reduces the potential for defects (i.e., mistakes). Thus, the nature of the delegated task is primarily cognitive, with the cognition and instructions for action represented digitally, and the outcome is focused on minimizing errors.

Given this focus, the most appropriate delegation mechanism, at least at first, is likely to be appraisal (Guideline #2). The human agent in particular is likely to appraise which rights and responsibilities must be retained versus delegated as well as how much effort will need to be expended in coordinating with the agentic IS artifact. Further, appraisal is likely to be a process rather than a discrete event. Confidence in the agentic IS artifact is likely to be established over repeated interactions, gradually increasing in rights and responsibility transfers as well as potential reduction in monitoring. For instance, a surgeon might compare his or her preferred approach to the approach being recommended (or required) by the surgical support agentic IS artifact before eventually simply fully relying on the artifact for instructions. This may be the case with augmented reality that might be used to verify assumptions (i.e., yes, that is the blood vessel I think it is) or be relied upon to give specific visual instructions that are followed.

Given the primacy of appraisal in these cases, the most salient agent attribute is likely preferences, relative to immediate goals, the role desired, and perceptions of endowments of the other agent (Guideline #3). For instance, the decision-model of the delegating human-agent, at least at first, is likely to work through appraisal to make a determination of the endowment of the agentic IS artifact. Put simply, can the agentic IS artifact actually make the decision I need it to make, without making excessive mistakes?
As already implied, appraisal of these types of delegation is *highly situation specific* (Guideline #4). Reliance on an agentic IS artifact to deliver packages using the optimal route, for instance, has much different stakes than making surgical decisions. Thus, appraisal-based effects include consideration of the probability and magnitude (i.e., risk) of potential outcomes.

We also briefly note that we intentionally did not specify a variance or process model (Burton-Jones et al. 2015), as we envision a variety of models are possible for further explaining delegation. The presentation in Figure 3 is meant as a basis for either type of model. For instance, a variance model in the form of UTAUT (Venkatesh et al. 2003), but tailored toward delegation and also including attributes of the agentic IS artifact, could be developed to explain the willingness of a human agent to initially delegate to an agentic IS artifact. A process model, such as the integrative post-adoptive model proposed by Jasperson et al. (2005), could also be developed, especially as integrative efforts are undertaken to model delegation both to and from agentic IS artifacts. In regard to a process model, a series of interactions with an agentic IS artifact, likely gradually increasing in more and more transfer of rights and responsibilities, is likely to gradually increase confidence. In other words, *feedback loops* (Guideline #5), over time, will be of significant importance to the explanatory power of a willingness-to-delegate model.
Figure 3: Conceptual Model for Willingness-to-Delegate to a Surgical Support Agentic IS
Following these guidelines and using the IS delegation theoretical framework helps move theorizing forward in ways that IS use likely could not. For instance, while an artifact such as a surgical assistant may be easy to use and useful in many ways, or may offer representational fidelity and transparent interaction, these high-level constructs do not provide the nuance necessary to understand how and why delegation occurs. For instance, perhaps the surgeon is only willing to delegate a subset of tasks, for which the surgical assistant it better suited, or perhaps even the surgical assistant defers to the surgeon’s judgement when uncertainty is high or predicted accuracy is low. In particular, considerations of attributes and mechanisms specific to delegation provide opportunities for more specific and nuanced insights that may help move our domain forward and prevent stagnation around high-level, coarse constructs.

**Theorizing Effective Delegation**

In this illustration, we consider the case of assigning code review work to developers in open source software communities (Hukal et al. 2019). The model is shown in Figure 4. Open source software development is characterized by code contributions from developers from around the world who communicate and collaborate through digital technology (Fitzgerald 2006; Von Krogh et al. 2012; Von Krogh and Von Hippel 2006). Developers identify particular needs within the community and devote their time and effort to contributing. Given the scale and complexity of managing this work, there have been efforts to deploy bots—agentic IS artifacts that execute specified actions—to assist when needed (Hukal et al. 2019). Research is needed to develop models regarding what outcomes will be yielded from delegation of tasks between human agents (developers) and agentic IS artifacts (bots). In the Kubernetes project, as described by Hukal et al. (2019), when a source code change has been submitted by a developer, it needs to be evaluated to determine if it should undergo a code review before being committed to base code. If the code was developed by a whitelisted (i.e., approved) developer, then no review is
needed (Hukal et al. 2019). Otherwise, the code needs to undergo review and must be assigned to whitelisted reviewers. Following review, the code is then entered into the testing workflow. Viewed through the lens of IS delegation, either a human agent (a developer) or an agentic IS artifact (a bot) can perform this task.

Beginning with the nature of the task (Guideline #1), we observe that the action requirement is digital. That is, assignment of code review to an approved reviewer and all necessary inputs and outputs occur on the GitHub platform. We also observe that the task is decomposable into multiple subtasks. Specifically, assignment of code for review involves determining who submitted the code change, determining if they are whitelisted, on this basis deciding whether to assign the code for review, identifying possible whitelisted reviewers, deciding which reviewer to assign, assigning the code review and notifying the reviewer and awaiting their output.

Identification of these aspects of the task sensitizes us to the delegation mechanisms that are likely to be salient in examining the delegation phenomenon (Guideline #2). We suggest the digital nature of the task points to distribution as an important delegation mechanism. The decomposability of the task suggests that coordination may also be an important delegation mechanism. Finally, the transfer decision requires appraisal of the reviewer’s likelihood of conducting the code review. Taking this assessment a level deeper, we might theorize that distribution takes the form of transfer of rights and responsibilities; that coordination requires monitoring and updating regarding delegated work and that appraisal requires examining prior review performance data. For instance, following norms reflected in the open source ideology (Stewart and Gosain 2006), transfer of rights and responsibilities from the bot to the code reviewer is likely to be implicit rather than being explicitly negotiated (Castelfranchi and Falcone 1998). Norm-based expectations in the open source ideology are that developers will
contribute their time and effort when needed. Similarly, regarding execution of the review task, once code review is assigned to a particular reviewer, it is necessary to monitor whether the reviewer has accepted the assignment and if so, whether they have completed the review. Appraisal of a reviewer may emphasize the timeliness and quality of their prior code reviews.

We then turn attention to the attributes of the agents (Guideline #3). In light of the salient task attributes and delegation mechanisms, we consider the human agent’s endowments in the form of coding self-efficacy—i.e., their confidence in their ability to write and understand software code—and temporal resources—i.e., having the time to devote to the code review. We also consider the human agent’s role as a proxy and the flexibility they enjoy in deciding whether or not to accept delegation. In the case of the agentic IS artifact, we consider the bot’s endowments in terms of information storage infrastructure and its preferences in the form of a decision model. Information storage and processing infrastructure is viewed as a salient endowment because of the need to evaluate the whitelist of reviewers, their prior work, and their currently observable task demands. A robust information storage and processing infrastructure provides such history and facilitates its use in evaluation of a potential reviewer. The decision model refers to the outcome the bot aims to optimize. The decision model could focus on minimizing the time it takes to assign code for review, in which case it optimizes for who is most likely to agree to a request in a timely manner. Alternatively, the decision model could focus on maximizing the quality of the code review. In either case, the focus is on the ability of the bot to identify reviewers who are likely to accept delegation and will do a good job. Robust decision models are likely to facilitate effective reviewer selection and assignment.

The digital nature of the task and the codification of digital traces of activities on the GitHub platform represent an important situational consideration (Guideline #4). Specifically, reputation
is the main currency for developers within the open source community (Roberts et al. 2006). The salience of reputation as a coveted asset can affect the human agent’s willingness to occupy the proxy role and the effort they put into completing assigned code review work.

Finally, we consider whether feedback loops may be salient in shaping future delegation (Guideline #5). If the bot possesses a learning model, the decision model can codify and store the outcome of the code review assignment for future evaluation. Successful delegation outcomes with a reviewer may increase the odds of future review assignments. Poor delegation outcomes (e.g., refusing to accept delegation, failing to complete a code review, doing a poor job of the code review) will reduce the likelihood of the bot assigning the reviewer in future. Similarly, successful delegation outcomes may increase a reviewer’s willingness to accept code review assignments from the bot. The reviewer may be more receptive to the bot’s decisions about what code review assignments he or she can handle. Conversely, with poor delegation outcomes, a reviewer may turn down future review assignments from the bot if he or she feels that the bot is assigning code reviews that are beyond the reviewer’s abilities. Hence, the model considers the possibility of feedback loops in shaping future delegation.

Extant IS use theories such as UTAUT and representation theory provide insight on developers’ technology beliefs regarding delegation or how well the bot represents elements of the code review allocation task. However, these theories would overlook insights regarding the agentic aspect of the deliberative process through which the bot makes its assessment regarding effective delegation. These theories would also overlook the relational aspects that characterize transfer of rights and responsibilities between the bot and code reviewers. The IS delegation framework’s emphasis on the dyad as an elemental foundation and the agentic nature of IS artifacts directs attention to these considerations in ways that traditional IS use theories do not.
Figure 4: Conceptual Model for Effective Delegation in the OSS Code Review Context
Extending IS Delegation Theory with Multi-Agent Perspectives

With the considerable opportunity to interface with many agents, particularly as agentic IS artifacts can re-delegate to other agents and human agents can delegate different tasks to mixes of agents, there will be a need to further elaborate relationships between the concepts, attributes, and mechanisms as the quantity of agents involved increases. We discuss three primary areas with significant promise: 1) a *triadic perspective*, 2) a *collective agency agentic IS platform perspective*, and 3) a *collective agency recipient (and ethical) perspective*.

A Triadic Perspective

The designer of the agentic IS artifact has received little attention thus far. Of particular interest is how the agency of the agentic IS artifact designer impacts the foundational decision models and agency of the agentic IS artifact. In many ways, the agentic IS artifact may serve as an agentic mediator between the designer and human agents. For instance, if the human agent views the primary obligation of the IS artifact as being to the IS artifact designer (or even to advertisers or other participants), will delegation be impeded or viewed with suspicion? If so, would suspicion lead to unwillingness to divulge complete information, which may impact the ability of the agentic IS artifact to optimize it decision model? However, if the obligation of the agentic IS artifact is perceived to be to the human agent, will the propensity for delegation be enhanced as well as the willingness to divulge information? Further, will delegation mechanisms manifest similarly or differently between the designer and the agentic IS artifact?

Collective Agency Perspective: Agentic IS Platforms

*Collective agency* occurs between agents when there is a “shared belief in their collective power to produce desired results” (Bandura 2001, p. 14). This is particularly relevant to human agents and agentic IS artifacts as they rarely function in isolation and often coordinate with and rely upon on other human agents and IS artifacts (i.e., the "ensemble" view Orlikowski and
Iacono 2001). What is not fully understood is the interaction between human agents, agentic IS artifacts, and collectives. For instance, as the Internet of Things (IoT) becomes more pervasive, it is highly likely that collective affordances will be dynamically determined between human agents, individual agentic IS artifacts (e.g., a smartphone), and collectives (e.g., IoT in a room). Especially important is that the capabilities of the “things” in one room, building, or region may be different than the capabilities of the things in another location. Advanced networking capabilities are already permitting ad-hoc peer-to-peer relationships where affordances may be contingent on, or even constrained by, the situational presence of other devices, such as is the case when dynamically and perhaps automatically sharing meeting notes between in-person meeting participants. An interesting implication of such dynamics is that assumptions held by the agents, such as the assumptions developed when initially evaluating delegation, may not hold as either the agents themselves change or perhaps the original agreement changes in opaque ways.

Extending this line of thinking and inquiry, collective agency and alignment can be operationalized when agentic IS artifacts are designed as platforms. For instance, an autonomous vehicle is an agent, but also includes interfaces to many other agentic IS artifacts, such as navigation systems, and may also represent third-party agent interests within its platform. The designer of the autonomous vehicle may want to monetize trip data by selling it to advertisers or by suggesting destinations or experiences that are not too far out of the way (e.g., a local restaurant that matches the human agent’s food preferences only a few minutes out of the way). While many aspects of the delegator-proxy relationship are cooperative (e.g., get me to my destination for a set price), conflicts may occur (e.g., overuse of data or monetization strategies) and power dynamics (Tong et al. 2017) will be especially important to consider. This is particularly true as the number of interacting agents grows and the dependencies between agents
increase (e.g., Guessoum et al. 2005). Essential questions include: What is the nature of cooperation and competition within and between agentic platforms and how will additional agents, such as designers, impact agentic platform participation and performance? What are the implications of third-party agents that also delegate, especially for systems in which reliability may be affected by dependencies? Can methods traditionally not applied in IS use literature, such as simulations and multi-agent perspectives, help to model and explain more complex delegation interaction patterns?

**Collective Agency Perspective: Recipients and Ethical Considerations**

Another type of agent not fully considered in the framework proposed here is the potential recipient of delegation task execution and outcomes. For instance, although delegation may occur between a surgeon and an agentic IS artifact, as a recipient, the patient who is being operated on has a significant personal stake in the outcome. In addition to the core elements illuminated by the IS delegation framework, several other considerations come to the forefront in such situations. It may be important to consider whose interests are being prioritized. As agentic IS artifacts possess a specific logic that guides decision making—whether based on a learning model or on preprogrammed decision rules, transparency is needed regarding such logic, especially in cases where decisions are being made without explanation or when unintended outcomes occur or ethically dubious actions occur (Pasquale 2015). Burrell (2016) points out that that opacity, as represented in corporate secrecy, can be used to intentionally evade scrutiny of actions that defy existing regulations, such as discrimination in recommended courses of treatment for patients or abdication of fiduciary responsibilities when recommending financial products. In these cases, appraisal, distribution, and coordination processes are likely to operate differently when the recipient of the task outcome is considered.
Similarly, although the IS delegation framework highlights negotiation between the two focal agents in delegation, negotiation with the recipient may also need to be considered. Zuboff (2019) notes that, in the hopes of extracting longer-term value, certain organizations have a penchant for using IS artifacts to collect more data than is needed to deliver necessary services. In IS delegation, will images taken by a surgical support agentic IS artifact be used in unintended or unapproved ways? Maybe such images will help improve future surgical outcomes, but at what impact to the focal patient? Will trip data from autonomous vehicles be used in ethically dubious ways, such as by tracking social connections via passenger lists or trip destination data? What implications does this have for delegation mechanisms in the framework? While this area could be written about at length, two primary points are likely to be important for future research: What impact will the agency of recipients or third parties have on delegation processes and outcomes; and how will ethics play a role in delegation appraisal processes and delegation outcomes? Further, how will balance be achieved between individual and collective needs, especially as the number of interacting agents grows?

Conclusion

This research has revisited traditional IS use assumptions and proposed a new framework, based on delegation. We have sought to offer a new perspective on how agent attributes, delegation mechanisms, and outcomes can be used as building blocks to further theorizing in this important area. If civilization can only advance as we have less things to think about, as quoted at the beginning of this article, the implications of delegation to and from agentic IS artifacts will be enormous. The opportunity to be at the forefront of this remarkable research opportunity is now in the hands of IS researchers.
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