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# Reconsidering the Role of Research Method Guidelines for Interpretive, Mixed Methods, and Design Science Research

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## Abstract

*Information systems (IS) scholars have proposed guidelines for interpretive, mixed methods, and design science research in IS. Because many of these guidelines are also suggested for evaluating what good or rigorous research is, they may be used as a checklist in the review process. In this paper, we raise the question to what extent do research guidelines for interpretive, mixed methods, and design science research offer such evidence that they can be used to evaluate the quality of research. We argue that scholars can use these guidelines to evaluate what good research is if there is compelling evidence that they lead to certain good research outcomes. We use three well-known guidelines as examples and contend that they seem not to offer evidence such that we can use them to evaluate the quality of research. Instead, the “evidence” is often an authority argument, popularity, or examples demonstrating the applicability of the guidelines. If many research method principles we regard as authoritative in IS are largely based on speculation and opinion, we should take these guidelines less seriously in evaluating the quality of research. Our proposal does not render the guidelines useless. If the guidelines cannot offer cause-and-effect evidence for the usefulness of their principles, we propose seeing the guidelines as idealizations for pedagogical purposes, which*

*means that reviewers cannot use these guidelines as checklists to evaluate what good research is. While our examples are from interpretive, mixed methods, and design science research, we urge the IS community to ponder to what extent other research method guidelines offer such evidence that they can be used to evaluate the quality of research.*

**Keywords:** research guidelines, interpretive research, design science, mixed methods, theory of scientific methodology

## **1 Introduction**

In the past, the mainstream methodology in Information Systems (IS) was statistical (Orlikowski & Baroudi, 1991). To increase the publication opportunities in the alternative research genres, such as interpretive, mixed methods, and design science, research method guidelines were introduced in these areas (Hevner, March, Park, & Ram, 2004; Klein & Myers, 1999; Venkatesh, Brown, & Bala, 2013). For example, guidelines for interpretive field studies were motivated by interpretive studies not being “widely accepted” (Klein & Myers, 1999, p. 67). To give another example, the most frequently cited mixed methods guideline was motivated because “there is a dearth of mixed methods research in information systems” (Venkatesh et al., 2013). These guidelines can be credited for increasing the visibility of interpretive, mixed methods, and design science research in IS.

However, sometimes good things come with a price. One possible side effect is that the guidelines can also prevent the publication of good research, if reviewers regard them as legislating what is acceptable (or rigorous or high quality) and what is not acceptable IS research from a methodological viewpoint. How real is this problem? Many authoritative sources, including the former editor-in-chief (EIC) of *MISQ* and the EIC of *EJIS*, imply that generally this is the case:

If editors do not signal their *a priori*s about a paper to the reviewers, then the natural inclination of the reviewers is to judge the paper against very high methodological standards first, which leads them to subsequently have a different, less favorable view of the overall contribution of the paper. (Straub, 2008, p. ix)

In our experience, methodological rigor is a prerequisite for publication in IS journals. Increasingly, we observe, editors are willing to jettison strong theory for papers that have good empirical contributions and potential theoretical implications [...]. But we have seen no similar looseness over method. (Rowe & Markus in Hovorka et al., 2019, p. 1362)

Moreover, Grover and Lyytinen (2015) note how IS authors “produce knowledge that seeks to get through reviewers looking to check boxes on theory and method” (p. 275). These reports imply that (1) reviewers in top IS journals often use method guidelines (standards) in the review process; and that (2) method guidelines can influence the review process (in top IS journals). In fact, “check boxes on method,” “judge the paper against very high methodological standards,” and “methodological rigor is a prerequisite for publication” imply that not meeting methodology guidelines alone may lead to rejection by top IS journals. Related concerns can be found in IS literature. Fitzgerald (2008) reports that during the doctoral consortium of the International Conference on Software Engineering, “research method was mentioned just once (and that was by a student) and the focus was much more on the actual content of the research.” He states that when he attended the doctoral consortium of the European Conference on Information Systems (ECIS), “more than 50% of the time involved discussions of research method issues. However, I do not necessarily think that this was time well-spent.”

The reasons for check-box compliance are complex. On one hand, readers (e.g., IS authors, reviewers, and editors) may require strict compliance with some method guideline, irrespective of what the guideline said. On the other, the research method guidelines may lay down

principles in a legislative or normative manner. Consider, for example, guidelines for interpretive (Klein & Myers, 1999), design science (Hevner et al., 2004), and mixed methods (Venkatesh et al., 2013). All caution against rote or mechanistic use of methodological principles. However, all three guidelines are introduced not only for conducting research but also for evaluating what good or rigorous research is. This implies for IS readers that research that does not meet the evaluation criteria is not good or not rigorous.

In this provocative paper, we debate to what extent research method guidelines offer such evidence that they can be used to evaluate good, high-quality, or rigorous research. We focus on the interpretive, mixed methods, and design science research genres (see Section 2.2). However, many of our claims—such as whether there is evidence that allows one to evaluate the quality of research—may be useful in scrutinizing the research method guidelines in other genres. Asking these questions is important. Despite all good intentions, reviewers' strict reading of these guidelines may unduly block some important research that does not meet them. For example, a highly cited mixed methods guideline recommends that "IS researchers should employ a mixed methods approach only when they intend to provide a holistic understanding of a phenomenon for which extant research is fragmented, inconclusive, and equivocal" (Venkatesh et al., 2013, p. 36). This suggests that, in other situations, scholars should not use mixed methods. Reviewers who follow the guideline to the letter should not then allow mixed methods research (per Venkatesh et al., 2013), if the extant research is not fragmented. But then, reviewers may block important mixed methods research in the area where existing research is not fragmented or inconclusive. Moreover, if a deviation from the guidelines increases the risk of rejection by the top IS journals (as implied by Straub, 2008; Rowe & Markus in Hovorka et al., 2019), then research settings that do not meet the guideline may be avoided as too risky. Furthermore, if IS scholars mainly "produce knowledge that seeks to get through reviewers looking to check boxes on [...] method" (Grover & Lyytinen, 2015, p.

275), then there is a risk that research education may be trivialized as a checklist approach so that the research meets the guidelines of good or rigorous research.

Finally, and importantly, even if statements about check-box compliance and methodological rigor as prerequisites for publication (Grover & Lyytinen, 2015; Rowe & Markus in Hovorka et al., 2019; Straub, 2008) do not apply widely among the top (e.g., Basket 6) IS journals, we must guard against the risk that IS research is not widely and unduly blocked in the future because the research does not meet some guidelines of “rigor,” which lack demonstration of cause and effect. Klein and Myers (1999) emphasize that “[u]ltimately the quality (and status) of interpretive research within IS will benefit from a lively debate about its standards” (p. 68). This point is important. Scientific ideas should not be accepted dogmatically simply because they are published in top journals, are written by famous scholars, or are highly cited, but because they can withstand serious scrutiny from the scientific community. Such scrutiny can also reveal the weaknesses of the scientific ideas (Laudan, 1977). Moreover, scientists should be allowed to suggest scientific ideas be rejected, in light of evidence, or because of a lack of evidence. Unfortunately, not only such a lively debate but also a critical review of these research method guidelines seem to be missing (in our top journals). The research method guidelines we review in this paper are widely used (as indicated by the citations), but researchers have not yet seriously scrutinized these guidelines. We start this lively debate in Section 2 by asking fundamental methodological questions about these guidelines. In Section 2.1, we introduce several concepts, and in Section 2.2, we point out that the guidelines (we review) follow a legitimization strategy, which typically outlines four types of evidence. We advance the interpretation that none of the types of evidence allows one to make normative claims for how to conduct or evaluate good, rigorous, or high-quality research. In Section 3, we discuss the theory of scientific methodology, and its implications for research method guidelines for interpretive, mixed methods, or design science research. We end by presenting a naturalistic approach to

research method guidelines in IS, which regards them as either scientific hypotheses with evidence or idealizations. The naturalistic approach requires evidence that each principle leads to a specific outcome. We are skeptical whether such evidence can be provided in settings such as interpretive, mixed methods, or design science research, which allows us to say that certain research principles promote good research outcomes better than others. Alternatively, we suggest that research method guidelines for interpretive and design science and in which situations to use mixed methods should be given the status of idealizations and may have various benefits for educational purposes. Having said that, it is debatable whether those research method guidelines, offering no causal evidence for how their principles “cause” good outcomes, can be used to evaluate the quality of research, for which purpose these guidelines are also proposed. The usefulness of such research guidelines may lie elsewhere, including pedagogical purposes.

## **2 Methodological Guidelines for Interpretive, Design Science, and Mixed Methods Research**

We first explain research method guidelines (RMGs) and research method principles (RMPs), and then we review three RMGs for research in IS, and why we selected them. We point out that these guidelines are also outlined as criteria for good or rigorous research. Finally, we review what evidence these RMGs provide to back up their claim that they can be used as guidelines for how to conduct and evaluate good research.

### **2.1 RMGs and RMPs**

In the philosophy of science, RMPs and RMGs belong to the “theory of scientific methodology” (Laudan, 1981a, p. 3). There is no common definition for RMPs and RMGs in the philosophy of science. Roughly speaking, RMPs are concerned with “how scientific theories in general are appraised and validated” (Laudan, 1981a, p. 3). What philosophers propose as RMPs in the

philosophy of science varies. We characterize RMPs as any principles that provide normative guidance for conducting or evaluating good research (or both). In IS, RMPs can vary from requiring some tests, such as  $p$  values, and sample sizes (in statistical research) to requiring certain steps to conceptualize a construct (Polites, Roberts, & Thatcher, 2012) or procedures to validate it (Mackenzie, Podsakoff, & Podsakoff, 2011). RMPs may also propose normative statements about when using a research method is, or is not, acceptable (Venkatesh et al., 2013). An RMG consists of one or more RMPs; thus, broadly speaking, an RMG is a collection of RMPs. For example, Klein and Myers (1999) suggest seven principles for interpretive research (see Table 1). Each principle can be called an RMP, according to our terminology, while the seven principles altogether form an RMG.

## **2.2 Guidelines for Conducting and Evaluating Good or Rigorous Research**

It is important to separate the descriptive and prescriptive functions of RMGs. Descriptive use is when articles or books, for example, characterize RMGs, or give examples of their use, without necessarily imposing certain practices as preferred or required for evaluating quality. Prescriptive function is when RMGs are proposed or imposed for conducting or evaluating research. When should RMPs be rationally imposed or required? Requiring or imposing RMGs is clearly rational, for example, when there is undisputed evidence that RMGs are necessary to achieve some specific good research outcomes. Further, linking the quality of research outcomes to RMPs typically assumes causality between them. If, for example, design science or interpretive RMPs are required to be followed (for good science), then there is an assumed causal relationship between RMPs and outcomes. The point is, why do we require an RMP if we do not have compelling evidence for its causal role in good research outcomes? Similarly, reviewers who impose the guidelines for evaluating what is acceptable science seem to implicitly assume cause and outcome (effect) relationships, where RMPs have some causal influence on good or acceptable research outcomes.



Our concern is that reviewers may impose research method guidelines for conducting and evaluating research, when these imposed guidelines lack evidence for the need for RMPs that “cause” good outcomes. Therefore, we want to draw the attention of the IS community to ask to what extent RMGs contain evidence that allows one to use the RMG to evaluate how good research is conducted and evaluated. At the same time, many RMGs contain other evidence, such as evidence of their use, which some may wrongly confuse as causal evidence of the research quality outcomes. Introducing these issues and concerns requires specific examples from actual RMGs. Accordingly, we selected guidelines in three different genres: interpretive studies, design science research, and mixed methods research. In these areas, we found several observations. First, we found influential and potentially authoritative RMPs, which can be inferred by IS readers as normative. Second, it is questionable whether these RMGs contain necessary evidence that closely ties each RMP to good outcomes. Third, these RMGs contain other evidence, which can be wrongly confused with demonstrating evidence of the effects of RMPs on good outcomes. Finally, IS scholars working in these alternative genres do not generally or discuss this evidence (the second and third points).

We selected three domains (interpretive studies, design science research, and mixed methods research) as examples to illustrate that these issues are relevant not only in one genre but also in different genres. For selecting one guideline in each genre, we chose influential RMGs. For influence, we looked for citations for lack of a better measure. Although citations do not demonstrate the quality of the study, they may demonstrate influence. Accordingly, we reviewed RMGs for interpretive field studies (Klein & Myers, 1999), design science research (Hevner et al., 2004), and mixed methods research (Venkatesh et al., 2013). These RMGs were published in *Management Information Systems Quarterly* (Hevner et al., 2004; Klein & Myers, 1999) or *Information Systems Research* (Venkatesh et al., 2013), and are highly cited. Although we selected these guidelines, most questions we ask go beyond them. For example, our discussion

challenges reviewers, editors, and authors to ask to what extent RMGs (in any genre) contain evidence that can be used to evaluate the quality of the research. Next, we highlight how readers can infer that these are guidelines for conducting and evaluating good or rigorous research. Table 1 provides a summary of the three selected RMGs and the list of RMPs each RMG includes.

**Table 1. Summary of Research Method Guidelines and Principles**

<b>(1) RMG for Interpretive Field Research (Klein &amp; Myers, 1999)</b>	
<p><b>Aim:</b> The article points out that “[a]s the interest in interpretive research has increased, however, researchers, reviewers, and editors have raised questions about how interpretive field research should be conducted and how its quality can be assessed. This article is our response to some of these questions and suggests a set of principles for the conduct and evaluation of interpretive field research in information systems” (p. 67). “This paper has two audiences. First of all, it should be of interest to all those who are directly involved with interpretive research, i.e., researchers, reviewers, and editors conducting, evaluating, or justifying interpretive research in information systems ... Second, many readers, while not doing interpretive research themselves, have become aware of its importance and wish to better understand its methodological foundations and potential” (p. 69).</p> <p><b>Evidence of Applicability:</b> Three articles are chosen to demonstrate the applicability of the guidelines.</p> <p><b>Citations<sup>1</sup>:</b> 6500+</p>	
<b>RMPs</b>	<b>Summary</b>
1. The Hermeneutic Circle	“This principle is foundational to all interpretive work of a hermeneutic nature” (p. 72). “This principle suggests that all human understanding is achieved by iterating between considering the interdependent meaning of parts and the whole that they form” (p. 73).
2. Contextualization	This principle “[r]equires critical reflection of the social and historical background of the research setting, so that the intended audience can see how the current situation under investigation emerged” (p. 72).
3. Interaction Between the Researchers and the Subjects	This principle “[r]equires critical reflection on how the research materials (or “data”) were socially constructed through the interaction between the researchers and participants” (p. 72). It “requires the researcher to place himself or herself and the subjects into a historical perspective” (p. 74).
4. Abstraction and Generalization	This principle “[r]equires relating the idiographic details revealed by the data interpretation through the application of principles one and two to theoretical, general concepts that describe the nature of human understanding and social action” (p. 72). “Interpretive researchers in information systems tend not to generalize to philosophically abstract categories but to social theories such as structuration theory or actor network theory” (p. 75).
5. Dialogical Reasoning	“This principle requires the researcher to confront his or her preconceptions (prejudices) that guided the original research design (i.e., the original lenses) with

<sup>1</sup> The number of citations was retrieved from Google Scholar when these lines were written.

	the data that emerge through the research process. The most fundamental point is that the researcher should make the historical intellectual basis of the research (i.e., its fundamental philosophical assumptions) as transparent as possible to the reader and himself or herself” (p. 76).
6. Multiple Interpretations	This principle “[r]equires sensitivity to possible differences in interpretations among the participants as are typically expressed in multiple narratives or stories of the same sequence of events under study. Similar to multiple witness accounts even if all tell it as they saw it” (p. 72). “The principle of multiple interpretations requires the researcher to examine the influences that the social context has upon the actions under study by seeking out and documenting multiple viewpoints along with the reasons for them” (p. 77).
7. Suspicion	This principle “[r]equires sensitivity to possible ‘biases’ and systematic ‘distortions’ in the narratives collected from the participants” (p. 72). “The application of the principle of suspicion appears to be one of the least developed in the IS research literature. However, since there is considerable disagreement..., we leave open the possibility that some interpretive researchers may choose not to follow this principle in their work” (p. 78).

## (2) RMG for Design Science Research (Hevner et al., 2004)

**Aim:** The article points out that the aim is “to inform the community of IS researchers and practitioners of how to conduct, evaluate, and present design-science research...by developing a set of guidelines for conducting and evaluating good design-science research” (p. 77).

**Evidence of Applicability:** Three articles are chosen to demonstrate the applicability of the guidelines.

**Citations:** 13400+

RMPs	Summary
1. Design as an Artifact	“Design-science research must produce a viable artifact in the form of a construct, a model, a method, or an instantiation” (p. 83). “The result of design-science research in IS is...a purposeful IT artifact created to address an important organizational problem. It must be described effectively, enabling its implementation and application in an appropriate domain” (p. 82).
2. Problem Relevance	“The objective of design-science research is to develop technology-based solutions to important and relevant business problems” (p. 83). “Design science approaches this goal through the construction of innovative artifacts aimed at changing the phenomena that occur” (p. 84).
3. Design Evaluation	“The utility, quality, and efficacy of a design artifact must be rigorously demonstrated via well-executed evaluation methods” (p. 83). The “evaluation includes the integration of the artifact within the technical infrastructure of the business environment” (p. 85).
4. Research Contributions	“Effective design-science research must provide clear and verifiable contributions in the areas of the design artifact, design foundations, and/or design methodologies” (p. 83). “Design-science research holds the potential for three types of research contributions based on the novelty, generality, and significance of the designed artifact. One or more of these contributions must be found in a given research project” (p. 87).
5. Research Rigor	“Design-science research relies upon the application of rigorous methods in both the construction and evaluation of the design artifact” (p. 83). “In both design-science and behavioral-science research, rigor is derived from the effective use of

	the knowledge base—theoretical foundations and research methodologies. Success is predicated on the researcher’s skilled selection of appropriate techniques to develop or construct a theory or artifact and the selection of appropriate means to justify the theory or evaluate the artifact” (p. 88).
6. Design as a Search Process	“The search for an effective artifact requires utilizing available means to reach desired ends while satisfying laws in the problem environment” (p. 83). “Abstraction and representation of appropriate means, ends, and laws are crucial components of design-science research” (p. 88). “Design-science research often simplifies a problem by explicitly representing only a subset of the relevant means, ends, and laws or by decomposing a problem into simpler subproblems...As means, ends, and laws are refined and made more realistic, the design artifact becomes more relevant and valuable” (pp. 88–89).
7. Communication of Research	“Design-science research must be presented effectively both to technology-oriented as well as management-oriented audiences” (p. 83). “Technology-oriented audiences need sufficient detail to enable the described artifact to be constructed (implemented) and used within an appropriate organizational context...Management-oriented audiences need sufficient detail to determine if the organizational resources should be committed to constructing (or purchasing) and using the artifact within their specific organizational context” (p. 90).

**(3) RMG for Mixed Methods Research (Venkatesh et al., 2013)**

**Aim:** The article points out the “primary goal in this paper is to facilitate discourse on mixed methods research in IS, with a particular focus on encouraging and assisting IS researchers to conduct high quality, rigorous mixed methods research to advance the IS discipline” (p. 48)

**Evidence of Applicability:** Two articles are chosen to demonstrate the applicability of the guidelines.

**Citations:** 2200+

RMPs	Summary
1. Consider the Appropriateness of the Mixed Methods Approach	“The general agreement is that the selection of a mixed methods approach should be driven by the research questions, objectives, and context...IS researchers should employ a mixed methods approach only when they intend to provide a holistic understanding of a phenomenon for which extant research is fragmented, inconclusive, and equivocal” (p. 36). Authors need to “[c]arefully think about the research questions, objectives, and contexts to decide on the appropriateness of a mixed methods approach for the research” (p. 41). Evaluators (e.g., reviewers and editors) should “[u]nderstand the core objective of a research inquiry to assess whether mixed methods research is appropriate for an inquiry. For example, if the theoretical/causal mechanisms/processes are not clear in a quantitative paper, after carefully considering the practicality, ask authors to collect qualitative data (e.g., interview, focus groups) to unearth these mechanisms and processes” (p. 41).
2. Develop a Strategy for Mixed Methods Design	“Two of the most widely used mixed methods research designs are: concurrent and sequential” (p. 37). Authors need to “[c]arefully select a mixed methods design strategy that is appropriate for the research questions, objectives, and contexts” (p. 41). Evaluators (e.g., reviewers and editors) should “[e]valuate the appropriateness of a mixed methods research design from two perspectives: research objective and theoretical contributions. For example, if the objective of a research inquiry is to identify and test theoretical constructs and mechanisms in a new context, a qualitative study followed by a quantitative study is appropriate (i.e., sequential

	design)" (p. 41).
3. Develop a Strategy for Mixed Methods Data Analysis	"Data analysis in mixed methods research should be done rigorously following the standards that are generally acceptable in quantitative and qualitative research" (p. 38). Authors need to "[d]evelop a strategy for rigorously analyzing mixed methods data. A cursory analysis of qualitative data followed by a rigorous analysis of quantitative data or vice versa is not desirable" (p. 41). Evaluators (e.g., reviewers and editors) should "apply the same standards for rigor as would typically be applied in evaluating the analysis quality of other quantitative and qualitative studies" (p. 41).
4. Develop Meta-Inferences	Meta-inferences are "theoretical statements, narratives, or a story inferred from an integration of findings from quantitative and qualitative strands of mixed methods research" (p. 38). Authors need to "[i]ntegrate inferences from the qualitative and quantitative studies in order to draw meta-inferences" (p. 41). Evaluators should "[e]nsure that authors draw meta-inferences from mixed methods research. Evaluation of meta-inferences should be done from the perspective of the research objective and theoretical contributions to make sure the authors draw and report appropriate meta-inferences" (p. 41).
5. Discuss Validation Within Quantitative and Qualitative Research	Authors "should discuss validation in quantitative research and qualitative research independently before discussing validation for the mixed methods meta-inferences...[A]fter discussing validation in both qualitative and quantitative strands, IS researchers need to explicitly discuss validation for the mixed methods part of their research" (p. 40). Evaluators should "[e]nsure that authors follow and report validity types that are typically expected in a quantitative study. For the qualitative study, ensure that the authors provide either explicit or implicit (e.g., rich and detailed description of the data collection and analyses) discussion of validation" (p. 41).
6. Use Mixed Methods Research Nomenclature when Discussing Validation	"[W]hen IS researchers discuss validation in quantitative and qualitative research, they should use the well-accepted nomenclature within quantitative or qualitative research paradigms in IS. However, when discussing validation in mixed methods research, the nomenclature developed by Teddlie and Tashakkori (2003, 2009) can help differentiate mixed methods validation from quantitative or qualitative validation" (p. 40). Evaluators should "[e]nsure that the authors use consistent nomenclature for reporting mixed methods research validation" (p. 41).
7. Discuss Validation of Mixed Methods Findings and/or Meta-Inference(s).	"Validation in mixed methods research is essentially assessing the quality of findings and/or inference from all of the data (both quantitative and qualitative)...[W]hile IS researchers need to establish validity of qualitative and quantitative strands of mixed method research, they also need to provide an explicit discussion and assessment of how they have integrated findings (i.e., meta-inferences) from both qualitative and quantitative studies and the quality of this integration (i.e., inference quality)" (pp. 40–41). Evaluators should "[a]ssess the quality of integration of qualitative and quantitative results. The quality should be assessed in light of the theoretical contributions" (p. 41).
8. Discuss Validation from a Research Design Point of View	Authors need to "discuss validation from the standpoint of the overall mixed methods design chosen for a research inquiry...[T]he discussion of validation should be different for concurrent designs as opposed to sequential designs because researchers may employ different approaches to develop meta-inferences in these designs" (p. 42). Reviewers and editors should "[a]ssess the quality of meta-inferences from the standpoint of the overall mixed methods design chosen by IS

	researchers (e.g., concurrent or sequential)” (p. 41).
9. Discuss Potential Threats and Remedies	Authors need to “[d]iscuss the potential threats to validity that may arise during data collection and analysis. This discussion should be provided for both qualitative and quantitative strands of mixed methods research. IS researchers should also discuss what actions they took to overcome or minimize these threats” (p. 42). Reviewers and editors should “[e]valuate the discussion of potential threats using the same standard that is typically used in rigorously conducted qualitative and quantitative studies” (p. 41).

The design science RMG aims “to inform the community of IS researchers and practitioners of how to conduct, evaluate, and present design-science research...by developing a set of guidelines for conducting and evaluating *good* design-science research” (Hevner et al., 2004, p. 77). Similarly, the interpretive RMG (Klein & Myers, 1999) notes that “[a]s the interest in interpretive research has increased...researchers, reviewers, and editors have raised questions about how interpretive field research should be conducted and how its quality can be assessed” (p. 67). Mixed methods guidelines have similar goals. For instance, Venkatesh et al. (2013) offer “a set of guidelines for conducting and evaluating mixed methods research in IS...to initiate and facilitate discourse on mixed methods research in IS and encourage and assist IS researchers to conduct *rigorous* mixed methods research” (p. 2).

As can be seen, these RMGs are proposed for conducting and evaluating design science, interpretive, and mixed methods research. Moreover, they are not RMGs for conducting and evaluating any design science, interpretive, and mixed methods research. They are RMGs for conducting and evaluating good (Hevner et al., 2004, p. 77) or rigorous (Venkatesh et al., 2013, p. 2) research. This implies that when the RMGs are not met, the research is not good or rigorous. The mixed methods RMG also “offer[s] a set of guidelines for IS researchers to consider in making decisions regarding whether to employ a mixed methods approach in their research” (Venkatesh et al., 2013, p. 15). Some readers may interpret this RMG as implying that

situations not meeting the recommendations are deemed unacceptable ways of using mixed methods.

Provided that these RMGs are proposed for conducting and evaluating good or rigorous design science, interpretive, or mixed methods research, it is easy to understand that in the hands of reviewers, when IS research does not meet these guidelines, the reviewers blame the research (rather than the RMGs) as being low quality or lacking methodological rigor (see Rowe & Markus in Hovorka et al., 2019; Straub, 2008). Because the RMGs we reviewed advocate their use for evaluating and conducting good or rigorous research, we need to ask, what evidence are they based on? We discuss this point in the next subsection.

### **2.3 Evidence Supporting the Use of Guidelines**

Typically, articles on RMGs seem to use a legitimization strategy, usually arguing that the RMG has one or more of four characteristics:

- 1) The RMG is consistent with some previous views.
- 2) The RMG, or some of its principles, is popular among a group of researchers.
- 3) The RMG is used by one or more published paper(s).
- 4) The RMG can be used by future IS researchers.

At first reading, all four characteristics seem relevant as evidence for evaluating what is good or rigorous research. However, none of these characteristics counts as evidence for evaluating whether some principles lead to certain good outcomes. We maintain that the RMG articles we reviewed do not provide evidence of better outcomes or performance compared with approaches that do not follow the guidelines. Below, we discuss these issues in more detail.

#### **2.3.1 Consistency Is Not Evidence of Outcomes**

The RMGs we reviewed use the rhetoric of being consistent with some articles or researchers. For example, the justification for the interpretive RMG centers on the following claim: “Our claim

is simply that we believe our proposed principles are consistent with a considerable part of the philosophical base of literature on interpretivism and hence an improvement over the status quo” (Klein & Myers, 1999, p. 68). Two observations are necessary. First, even if we accept that an RMG can be justified or acceptable when it is consistent with “*a considerable part of*” something, the interpretive RMG does not (try to) show that its principles “are consistent with a considerable part of the philosophical base of literature on interpretivism.” To clarify, making this claim requires supporting evidence, for example, based on a review of all philosophical literature on interpretivism, and then illustrating that the proposed guidelines are consistent with said philosophy. However, they “decided to concentrate on the hermeneutic philosophers, especially Gadamer and Ricoeur” (Klein & Myers 1999 p. 70). They admit that “the complete literature of interpretive philosophy comprises so many varied philosophical positions that it is unlikely to yield one consistent set of principles for doing interpretive research” (ibid., p. 70).

One may also question to what extent the interpretive RMG (Klein & Myers, 1999) is consistent with the philosophical literature on interpretivism. For example, “the most fundamental principle” is the hermeneutical circle (ibid., p. 71). Stegmüller (1977 p. 8) provides several examples of how the understanding process does not follow a circle but a “hermeneutic spiral” or a dilemma. To give another example, one can ask to what extent the philosophy underlying interpretive research supports the idea of presenting a priori prefixed quality evaluation principles. For example, according to Salmon (2003, p. 722), famous interpretivists such as Dilthey, Collingwood, Winch, and Geertz either reject or at least limit causal explanations in social sciences. At the same time, using RMGs as evaluation criteria or evaluation criteria for good research seems to require assuming some causality (see Section 3.3.2).

Second, the justification for guidelines is consistency with one or a set of writers. Scientific writings often report that the findings are consistent with those of other studies. In some circumstances, this is reasonable. Having said that, readers must understand that using the



consistency argument is problematic for scientific justification. Consider the following well-known thesis: The Earth is flat. Then, consider the following argument: The Earth is flat because this view is consistent with Carpenter's (1885) flat Earth theory. It is true that this argument is consistent with Carpenter's (1885) view. However, who would accept this as evidence that the Earth is flat?

In scientific research, it is not a good justification practice for researchers to base their arguments on saying that their opinion is consistent with some other opinions. Justifying claims by stating consistency with a previous study does not require the presentation of evidence for or against the claim. Proposing a principle for conducting and evaluating high-quality research, be it interpretive, mixed methods, or design science, should require the presentation of available evidence for and against each principle. This evidence should not be replaced with someone's opinion (without evidence) and references that are consistent with these opinions.

### **2.3.2 Evidence of Applicability**

The RMGs we reviewed select two or three articles they call exemplars. The interpretive RMG uses "three published examples of interpretive field research from the IS research literature...in order to demonstrate how authors, reviewers, and editors can apply the principles" (Klein & Myers, 1999, p. 79). Similarly, the design science guideline states:

Following Klein and Myers (1999) treatise on the conduct and evaluation of interpretive research in IS, we use the proposed guidelines to assess recent exemplar papers published in the IS literature in order to illustrate how authors, reviewers, and editors can apply them consistently. (Hevner et al., 2004, p. 78)

In turn, the mixed methods RMG "illustrate[s] the applicability of our guidelines using two exemplars of mixed methods research from the IS literature" (Venkatesh et al., 2013, p. 23). They note that their goal for these exemplars is to "demonstrate how our guidelines can be used

to understand and apply the process of conducting and validating mixed methods research in IS” (ibid., p. 45).

We interpret these examples as examples of how reviewers, editors, and authors can apply the RMPs. These RMGs are proposed for conducting and evaluating good or rigorous research. Let us presume for the sake of the argument that the guidelines possess the capability of pointing out what good or rigorous research is. For reviewers and editors to judge whether the research is good or rigorous, based on the guideline, should the RMG also point out cases that do not meet the guidelines? Similarly, if we want authors to “understand and apply the process of conducting and validating” (Venkatesh et al., 2013) high-quality or rigorous methods research in IS, then should we also explain and justify why certain practices are not rigorous and not high quality? One could use these deviations to show, for example, what important complications result. However, the RMGs we reviewed do not present such deviations, which do not meet the principles of high quality or rigor. The RMGs we reviewed purposefully avoid criticizing any paper. For example, the mixed methods RMG notes that “the purpose of this discussion is not to critique the application of the mixed methods approach in these papers” (Venkatesh et al., 2013). Similarly, the design science RMG notes: “Our goal is not to perform a critical evaluation of the quality of the research contributions, but rather to illuminate the design-science guidelines” (Hevner et al., 2004, p. 90).

Importantly, these RMGs do not explicitly say that these exemplars are used to validate, justify, or test the guidelines. For example, for the mixed methods RMG, the two cases illustrate “[t]he applicability of these guidelines” (Venkatesh et al., 2013). For the design science RMG, the exemplars “demonstrate the application of these guidelines” (Hevner et al., 2004, pp. 75–76). The applicability evidence presented should not be confused with the quality of the research or a demonstration of cause and effect. We illustrate this point with a simple provocative example. Let us presume that one is diagnosed with cancer, and the treatment advice is to walk one mile

every day. If one can do that, we may agree that it demonstrates that the advice was doable (for this person at least). However, that a person is able to walk for one mile is not evidence that this is a good cancer treatment.

Moreover, a high number of citations may indicate the influence or impact of the article. Having said that, a high number of citations is not evidence that the guidelines can be used to evaluate what good research is. Generally speaking, how many times a paper is cited should not be conflated with evidence of the outcome. The number of citations is not evidence that the claim is true or justified. We may agree that the theory the Earth is flat is widely known. However, despite being widely known, it is hardly true. Moreover, the popularity of a claim or wide acceptance is not evidence per se that the claim is true<sup>2</sup>.

To summarize, the RMGs we reviewed (Hevner et al., 2004; Klein & Myers, 1999; Venkatesh et al., 2013) demonstrate the applicability or application of the guidelines. These RMGs provide some evidence that an RMP has been used or demonstrates how an RMP can be used. (Whether the examples demonstrate the usability of the RMGs is not the focus in this paper because we are not evaluating, for instance, the pedagogical usefulness of these examples.) We want to emphasize that these applicability examples do not constitute evidence of cause and effect or good outcomes. Scholars cannot use these examples to claim that these guidelines are appropriate for evaluating what good (interpretive, mixed methods, or design science) research is.

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<sup>2</sup> In addition, it is not clear to what extent a high number of citations demonstrates, for instance, popularity in the cases of these reviewed guidelines. For example, if there are few guidelines for interpretive research or mixed methods research in the top IS journals, and the reviewers expect adherence to the guidelines, then is the authors' best bet to cite these guidelines whether they like the guidelines or not?

### **2.3.3 Potential Sources of Confusion in RMG Writings**

In this section, we emphasize some potential inconsistencies in RMG writings. Most notably, although these guidelines propose lists of RMPs and evaluation criteria, the authors of the RMGs also warn readers against 1) using the principles automatically, or 2) using the principles as bureaucratic rules, or 3) treating the guidelines as legislative. If reviewers are using these guidelines as normative checklists, do the reviewers simply misunderstand the RMGs? The issue is more complex. In many cases, the RMGs can be read normatively, and there are potential inconsistencies. For example, some recommendations should be revised if they are not intended to be legislative.

To start, the design science RMG aims “to inform the community of IS researchers and practitioners of how to conduct, evaluate, and present design-science research...by developing a set of guidelines for conducting and evaluating good design-science research” (Hevner et al., 2004, p. 77). Scholars repeat this message elsewhere: “it is vital that we as a research community provide clear and consistent...guidelines...for the design and execution of high quality design science research projects...to establish the credibility of IS design science research” (Hevner, 2007, p. 87). At the same time, the guideline emphasizes that “guidelines should be addressed in some manner for design science research to be complete” (Hevner et al. 2004 p. 82). If it is vital to have “clear and consistent...guidelines,” then how can we say that they can be “addressed in some manner”? Allowing “some manner” seems to risk having clear and consistent guidelines. These are not the only unclarified issues. The design science RMG also “advised against mandatory or rote use of the guidelines” (ibid, p. 82) and maintains that “[r]esearchers, reviewers, and editors must use their creative skills and judgment to determine when, where, and how to apply each of the guidelines in a specific research project” (Hevner et al., 2004, p. 82). However, this recommendation seems to conflict with the call for “clear and consistent...guidelines.” Finally, how can the guidelines be used “for conducting and evaluating

good design-science research (ibid., p. 77) if in every project, scholars have to use their creative skills and judgment regarding when and how to apply each guideline?

Readers of the interpretive RMG face similar riddles. Klein and Myers (1999) caution that:

Principles are not like bureaucratic rules of conduct, because the application of one or more of them still requires considerable creative thought...[I]t is incumbent upon authors, reviewers, and editors to exercise their judgment and discretion in deciding whether, how, and which of the principles should be applied and appropriated in any given research project. (p. 71)

This indicates flexibility in the application of the RMG. However, the interpretive RMG also notes that “while we believe that none of our principles should be left out arbitrarily, researchers need to work out themselves how (and which of) the principles apply in any particular situation” (Klein & Myers, 1999, p. 78). The dilemma is that if “researchers need to work out themselves how (and which of) the principles apply in any particular situation,” then how do we know that they are not “left out arbitrarily,” which was banned? There seems to be one more fundamental conflict. Recall that the set of interpretive principles is a response to how “interpretive field research should be conducted and how its quality can be assessed” (Klein & Myers, 1999, p. 67). How can the RMG constitute an adequate response to how research “should be conducted and how its quality can be assessed” (p. 67) if applying the RMG “require[s] considerable creative thought” (p. 78), and “researchers need to work out themselves how (and which of) the principles apply in any particular situation” (p. 78)?

Mixed methods guidelines note that “these guidelines could be seen as legislative,” but this is not their intention (Venkatesh et al., 2013, p. 48). This indicates flexibility in the application of the RMG. However, many RMPs in the mixed methods RMGs are not presented as non-legislative. For instance, each RMP is accompanied by a message for authors dictating what to

do during research, as well as another message for reviewers and editors dictating what to do during evaluation (Table 1). Furthermore, many of these principles cannot be presented as non-legislative without changing the meaning of the original message. As an example, let's consider the first guideline of the mixed methods research (Venkatesh et al., 2013):

“IS researchers should employ a mixed-methods approach only when they intend to provide a holistic understanding of a phenomenon for which extant research is fragmented, inconclusive, and equivocal” (p. 36).

This principle rewritten in a non-legislative tone would sound something like this: “IS research can employ mixed method research whenever they find it offering new or useful information. Therefore those situations where mixed methods may be used cannot and should not be predicted a priori.”

If the aim of the RMG is not to be legislative, then many RMPs in the mixed methods guidelines (Venkatesh et al., 2013) should be rewritten to reflect their non-binding nature.

### **3 RMPs between Classical and Contemporary Thought**

In this section, we review some of the philosophy of science underlying RMPs. Due to space limitations, this review is incomplete and omits numerous other ideas of the philosophers we discuss. Nonetheless, the views we present are helpful to further reflect the challenges facing the RMPs in interpretive, mixed methods, and design science research in IS.

In the first part, we present a brief overview of several classic attempts to establish infallible research methods, and how this task turned out to be difficult. Then, we introduce several contemporary perspectives that view research methods as hypothetical and revisable; a philosophical position known as normative naturalism (Laudan, 1990). We conclude this section

by pointing to some of the key challenges of applying this naturalist view to interpretive, design science, and mixed methods IS research.

### **3.1 A Classical View: Strict Adherence to the Scientific Method**

#### **3.1.1 The Scientific Method Gives Us Infallible Knowledge**

A key historical figure advocating for the infallible scientific method was Aristotle. He believed that *critical thinking* can separate with absolute certainty scientific knowledge from opinion and superstition (Laudan, 1983). For Aristotle, scientific knowledge was infallible (Oddie, 2016). Later, scientific research cast serious doubts on this view. Often, at any point in time, when we look at the research, older theories often appear naïve or wrong (Laudan, 1981a, 1981b; Niiniluoto, 1999). In other words, the scientific knowledge (the best science at the time) in the past was often fallible and was replaced or corrected by later research (Laudan, 1981a, 1981b; Niiniluoto, 1999). As a result, a historical review of the sciences does not support the conclusion that scientific knowledge has been infallible (Laudan, 1981a, 1981b; Niiniluoto, 1999). Quite the contrary, reviewing the sciences suggests that scientific knowledge has been fallible. Then, scientific knowledge cannot be separated from opinion and superstition with absolute certainty.

Philosophers realized that scientific knowledge is not certain and infallible. At the same time, many natural sciences were seemingly highly progressive (Laudan, 1983). This raised the question, why were they successful? Given that Aristotelian infallible critical thinking was not the scientific method that explained the success of science, philosophers such as Comte, Jevons, Helmholtz, and Mach suggested other candidates for the scientific method (Laudan, 1983). However, these philosophers could not agree on what this scientific method was (Laudan, 1983). Even more problematic was that Duhem (1906) showed that successful scientists either did not use or violated the proposed RMPs. As researchers in science continued to make breakthroughs in physics and medicine, interest in understanding this success was high (Laudan, 1983). Vienna Circle logical positivists (e.g., Schlick, Neurath, and Carnap) suggested

that the scientific method not only explains the success of science but also can differentiate science from pseudo-science (Siponen & Tsohou, 2018). For example, Schlick (1932) put forward the verification method. Vienna Circle Logical positivists' ambition to establish an objective or infallible method for separating science from nonsense attracted a lot of criticism, which ultimately clarified that perhaps no method is truly objective or can give infallible knowledge. We discuss some of the major criticism below.

### **3.1.2 Challenges Facing the Absolute Method**

The Vienna Circle logical positivism's infallible method project experienced attacks not only from its opponents but also from the Vienna Circle. That is, criticism of the Vienna Circle logical positivists' absolute RMPs first emerged as a self-critique by the Vienna Circle members themselves. Neurath, and later Carnap, objected to absolute RMPs (Hempel, 1935). For example, Carnap (1932) notes that no methodological norm provided "objective validity," because norms cannot "be empirically verified or deduced from empirical propositions; indeed (norms) cannot be affirmed at all" (p. 237). In other words, Carnap deems the acceptance of any RMP a matter of taste (Laudan, 1996). This does not mean that Carnap lacks RMP preferences. Instead, Carnap regards justifying that one RMP is ultimately better than another as impossible (Carnap, 1935). Therefore, for Carnap, RMPs are "proposals, which no one was obligated to accept" (Laudan, 1996, p. 15).

Similarly, a father of logical empiricism, Reichenbach (1938) regards the aims of science as "volitional bifurcations." Laudan's (1996) interpretation is that for Reichenbach these bifurcations include the choice of fundamental methodological norms, and (per Laudan's interpretation) Reichenbach admits that they ultimately are "a matter of personal taste and preference" (p. 15).

In addition to the self-critique by Vienna Circle logical positivists, louder attacks came from philosophers outside the circle. We briefly discuss these criticisms next.



(1) *Quine and the argument against verification.* Quine's (1951) second dogma points out that verification (e.g., verification by observation) cannot test a single statement or hypothesis isolated from its underlying assumptions. That is, any test or observation, no matter how simple and obvious it may sound, is always associated with numerous underlying presuppositions that are not empirically testable and must be assumed. Quine (1951) maintains that when a claim is tested, a complex web of assumptions and presuppositions is also tested; thus, he concludes that any hypothesis can be accepted by revising the underlying assumptions. Generally, Quine's critique applies to any test or RMP.

(2) *Kuhn and the argument that fundamental method decisions are irrational.* One major task for logical empiricists and Popper, around 1930 to 1950, was to articulate the logic of theory acceptance, including generic methodological rules under which scientific theories are or should be rationally accepted, rejected, falsified, confirmed, or disconfirmed (Laudan, 1996). For example, Popper (1934/1959), who called himself a critical rationalist, and not a positivist, proposed the idea that scientific theories are rejected (falsified) if the observation does not match the prediction<sup>3</sup>. The Popperian and logical empiricist program endeavors not only to outline the rationality under which theories are evaluated but also how the theories can be compared rationally (Laudan, 1996).

Soon, philosophers of science reported that physicists did not follow the Popperian rationality of rejecting the theory in the case of negative observation (Lakatos, 1970; Laudan, 1978). Furthermore, Kuhn, who regarded himself as "an ex-physicist" (Kuhn, 1959, p. 225), famously shocked the philosophy of science (Hoyningen-Huene, 1992, p. 491) with a number of issues. For instance, he argued that different paradigms in one scientific discipline tend to have radically different methodological norms for assessing theories (Kuhn, 1962). In addition, according to Kuhn (1962), the worldview and languages of each paradigm are so different that

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<sup>3</sup> "A theory which is not refutable by any conceivable event is nonscientific" (Popper, 1934/1959, p. 347).

the members of one paradigm fail to communicate methodological rules outside it. However, according to Kuhn (1962), the methodological rules are not decided by a rational discussion. Moreover, a change in methodological thinking, Kuhn (1962) claims, does not occur through rational discussions. Instead, methodological changes for assessing theories are irrational, which Kuhn (1962) characterizes as a “leap of faith,” or comparable to a religious “conversion experience.” Moreover, especially in Kuhnian normal science, methodological norms tend to be dogmatically accepted.

For Kuhn, methodological norms are influenced by the cognitive values of the particular research community (Hoyningen-Huene, 1992). For example, one value is accuracy (Hoyningen-Huene, 1992), and Kuhn (1977) characterizes such values as “ambiguous” and “imprecise” (p. 322). Kuhn (1977) maintains that although two scientists agree on a certain value, say accuracy, they disagree what it means<sup>4</sup>. RMPs “repeatedly prove to conflict with one another” (Kuhn, 1977, p. 322). According to Kuhn, because the RMPs are “ambiguous” and “imprecise,” they allow such conflict (Laudan, 1996, p. 90). For Kuhn, these conflicts can be complex and are not settled rationally (Laudan, 1996; Siponen & Klaavuniemi, 2019). Finally, Kuhn notes that such methodological disagreements are required for “the emergence of new scientific ideas” (Laudan, 1984, p. 14). Kuhn’s (1977) point is that methodological agreements generally prevent new scientific ideas. Raising new scientific ideas

requires a decision process which permit rational men to disagree, and such disagreement would generally be barred by the shared algorithm which philosophers have generally sought. If it were at hand, all confirming scientists would make the decision at the same time. (Kuhn, 1977, p. 332)

For Kuhn, an algorithm means “rule-governed activity” (Hoyningen-Huene, 1992, pp. 489, 492).

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<sup>4</sup> “individuals may legitimately differ from about their application to concrete cases” (Kuhn, 1977, p. 322).

(3) *Hanson and the argument of theory-laden observations.* The Vienna Circle positivists based their verification method on observation (Siponen & Tsohou, 2018). Hanson (1958) argues that all observations are theory laden. For example, when microscopic images from a biochemistry journal are viewed, those who have doctorates in biochemistry see different things in the picture than those who lack such education (Siponen & Tsohou, 2018). Hanson (1958) presents examples of how, even within one scientific discipline, different scientists may see different things based on the same observational evidence available. The methodological implications of the idea include that when the underlying assumptions change even the same method (e.g., simple observation) can provide different results. Quine's (1951) second dogma maintains that any test necessarily involves such underlying assumptions.

(4) *Feyerabend and the argument that universal RMPs are worse than useless.* Feyerabend (1962) argues that there are no universal, predefined, or common methodological rules in science. He contends that if he has to give one such rule, it would be "anything goes." This became his famous slogan, and this concept is commonly misinterpreted (Diesing, 1991; Feyerabend, 1978)<sup>5</sup>. See also Treiblmaier (2018). Feyerabend (1975) presents evidence that many elite scientists (e.g., Galileo, Newton, and Einstein) broke common rules and made up their own RMPs as they proceeded with their research. Importantly, Feyerabend (1975) notes that breaking the rules for appraising research is not limited to exceptional cases. Instead, he emphasizes that the scientific elite not only break all the common and predefined RMPs but also do so frequently (Feyerabend, 1975, p. 23). However, many elite scientists, according to Feyerabend (1975), purposefully omit or ignore evidence, or they accept the theory that does not enjoy the best scientific evidence available. Feyerabend's (1978) conclusion is not only that

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<sup>5</sup> Feyerabend (1978) notes: "anything goes does not express any conviction of mine, it is jocular summary of the predicament of the rationalist: if you want universal standards, I say, if you cannot live without principles that hold independently of situation, shape of world, exigencies of research, temperamental peculiarities, ties, then I can give you such a principle. It will be empty, useless, and pretty ridiculous-but it will be a 'principle'. It will be the 'principle' 'anything goes'" (p. 188).

many top scientists violate general RMPs, but also such deviations are required for scientific progress. Feyerabend (1975) explains: “Science needs people who are adaptable and inventive, not rigid imitators of established behavioral patterns” (p. 163). For him, theory development is an invention that “depends on our talents and other fortuitous circumstances” (Feyerabend, 1975, p. 155), and rules just limit talented people (Feyerabend, 1975, p. 156). Moreover, Feyerabend (1975) notes that any test or instrument for observation comprises (speculative) beliefs that are inculcated in us through education and background.

(5) *Polanyi and Hesse, and the argument that scientific expertise is uncodifiable.* IS readers may be familiar with the idea of tacit knowledge, originally introduced by Polanyi. What we have not seen reported in IS is that Polanyi regards scientific activities as intuitive insights and tacit knowledge, which cannot be written as rules. He claims that “[n]o rules can account for the way a good idea is found for starting an inquiry, and there are no firm rules either for the verification or the refutation of the proposed solution of a problem” (Polanyi, 1968, p. 27). As far as we understand, Polanyi rejects *firm RMPs* for conducting and evaluating science. Somewhat similarly, Hesse (1980) notes the impossibility of setting rules for science. He maintains that whenever such rules exist, they reflect individuals’ scientific education.

### **3.2 A Contemporary View**

Much of the theory of scientific methodology in the philosophy of science around 1930–1960 is referred to as a priori philosophizing, including logical positivism, logical empiricism, and critical rationalism (Giere, 1996). After the 1970s, influenced by Kuhn, the philosophy of science became less concerned with explicating the logic of science, “and more concerned with actual scientific reasoning” (van Benthem, 2006, p. 264). A priori philosophizing in the philosophy of science is typically contrasted with philosophy aimed at understanding actual science as it is practiced (Giere, 1996; Thagard, 2009; van Benthem, 2006). In the 1970–1980 period, philosophy of science aimed at understanding and philosophizing from actual scientific practices

was referred to as “historical school” or “theorists of scientific change.” By late 1980, this approach—“we must look to science for the justification of science's own methods”—was often referred as naturalism (Rosenberg, 1996, p. 10), or practice-based philosophy. For example, Bechtel (2009) describes naturalism as follows: “Philosophers of science adopting a naturalistic perspective often present themselves as investigating the domain of science in the manner in which scientists investigate phenomena in their own domains of inquiry” (p. 2). Naturalism can be regarded as the mainstream approach in the modern philosophy of science (Macarthur, 2009; Rosenberg, 1996)<sup>6</sup>. Next, we describe a naturalist approach to RMPs, which illustrates the idea that RMPs should be evidence based and evaluated as scientific hypotheses. Considering the application of this idea in IS is helpful to see the potential difficulties of connecting causes and outcomes.

### **3.2.1 RMPs as Hypothetical and Revisable (Normative Naturalism)**

Laudan (1996) claims that many philosophers went from one extreme of infallible methods to another, deeming the acceptance of RMPs a matter of opinion or irrational. Instead, Laudan (1986) suggests that RMPs are like any other empirical and conceptual problems in science. According to his view, RMPs and RMGs should be as open to testing as any other scientific theory, hypothesis, or proposition. In addition, scientific theories, hypotheses, and propositions are not “fixed once and for all” (p. 353), but instead, may be revisable in light of the evidence. Similarly, RMPs and RMGs should also be tentative and revisable. Research methods are theory laden (Hanson, 1958) and subject to Quine’s (1951) problem of reductionism. This explains why two scholars can disagree about a certain RMP even if they are considering the same evidence and share the same scientific aims.

If RMPs are hypothetical, and revisable in light of evidence regarding how effectively they promote the goals of science, then the key issue for each RMP is its evidence (Laudan, 1996).

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<sup>6</sup> “Naturalism is the current orthodoxy within Anglo-American philosophy” (Macarthur, 2009).

Different methodological principles can be effective for promoting different aims; therefore, each RMP is linked to and promotes a specific goal. For Laudan (1987), selecting an RMP rationally requires choosing a method that best promotes a specific goal in science. Moreover, for Laudan, an RMP is not chosen in a comparative vacuum. Instead, scientists select RMPs based on various criteria for acceptance, testing, and use, by using available evidence (Laudan, 1978). Laudan (1986) suggests that a decision is rational when an individual perceives that certain RMPs are more likely to realize the goals of an inquiry than the alternatives are. In the next section, we discuss the challenges of applying Laudan's program in IS RMGs for interpretive, design science, and mixed methods research.

### **3.2.2 Challenges Facing Normative Naturalism (in IS)**

Laudan (1977) suggests that the principles of research methods are hypothetical imperatives formulated as follows:

If actions of a particular sort, *m*, have consistently promoted certain cognitive ends, *e*, in the past, and rival actions, *n*, (have) failed to do so, then assume that future actions follow the rule. If you(r) aim is *e*, you ought to do *m* (,which is) more likely to promote those ends than those actions based on the rule: if you(r) aim is *e*, you ought to do *n*.  
(Laudan, 1996)

Doppelt (1990) criticizes Laudan by stating that not all principles of RMGs are hypothetical imperatives. Resnik (1992) maintains that due to Quine's under-determination (following Quine's second dogma), there are basic methodological standards that are justified, even if they lack conclusive empirical evidence for being the most effective means of achieving the research aims. If this suggestion is accepted, then not all principles of RMGs are hypothetical imperatives, and some are basic methodological standards.

Laudan (1990) and Resnik (1992) found this reasoning wanting, as do we. Principles of RMGs can be under-determined based on evidence. The implication of under-determination, if accepted, is that researchers can challenge that a certain principle, X, is better than Y for achieving an outcome; however, this does not challenge the idea that RMGs are hypothetical imperatives (Laudan, 1990; Resnik, 1992). A practical concern of normative naturalism is that scholars cannot survey all the available methods to select the one that is best suited to a specific study. Moreover, we simply lack the requisite training for all methods, and if we do, we still lack the cognitive competence for this task (Schmaus, 1996). We see two other concerns in applying Laudan's (1990) normative naturalism in IS.

*(1) The specific aim of science in IS is unclear.* To be able to apply Laudan's approach, we must recognize the specific aims of science. In the sciences, there can be various goals, which can be in conflict with some other goals, as Kuhn (1962) points out. For example, explanation accuracy can be in conflict with generalizability. Many method choices in sciences may be based on specific goals and omit others. For example, Nobelist Friedman's (1953) methodology of a positive economy trades off realism to achieve other goals (Siponen & Klaavuniemi, 2019). To give another example, cancer biologists may value explanation accuracy and realism (in terms of accurate representation), while theories in physics may trade off accuracy and realism by having a wider scope (Siponen & Klaavuniemi, 2019).

The point is that there can be various aims in science, which can be even in conflict (they might not be served at the same time). The specific yet various aims in (say) physics, cancer research, or economic modeling (per Friedman's methodology) may be well understood in these fields. It is not clear that such goals, and how they can be in conflict, are well understood in IS. The guidelines reviewed do not talk about specific goals and possible conflicts. For example, the guidelines do not state how things would be done differently if the aim is, say, explanatory accuracy versus something else.

(2) *Concerns about establishing cause-and-effect relationships.* The second issue concerns normative naturalism (Laudan, 1987), and its implications for cause and effect. This issue is also important for any IS guideline, which suggests that certain RMPs can be used to evaluate good research. For Laudan, “[i]f one’s goal is y, then one ought to do x” (p. 24), and “all methodological rules...can be re-cast as (a) contingent statement of...[the] connections between means and ends” (p. 25). We argue the following: If RMPs are normative, for example, then they claim to say what is good design science or when mixed methods research can be used. Generally speaking, this claim implicitly assumes cause and outcome (effect) relationships. Are there such causal relationships? Is this even possible? To clarify this point, let us consider the three commonly recognized causal capacities (or types of causation): 1) deterministic, 2) random, and 3) probabilistic (Dupré & Cartwright, 1988).

A deterministic causation “is one which, under specifiable circumstances, always produces its effect” (Dupré & Cartwright, 1988). Basically, deterministic causality requires the existence of true, 100% exception-less laws. In psychological and social phenomena, deterministic laws have been difficult to find (Dupré & Cartwright, 1988). It would be highly questionable to claim that the RMPs we reviewed are deterministic, that is, that they cause the effect, namely, the outcome of good research, with no exceptions in every case. This leaves us with two options: The causation is probabilistic or random. Dupré and Cartwright (1988) state:

Probabilistic capacity also operates only sometimes, but the strength of the tendency to produce the effect is nomologically fixed...[i]f there are genuinely random capacities, it is obvious that there are capacities that cannot be reduced to quantitative probabilities. (p. 522)

None of these guidelines show probabilistic evidence, that, for example, with an 85% likelihood, employing a certain RMP leads to better results than following some other principle. This is not



a criticism of these guidelines: We doubt to what extent producing such evidence is possible. Finally, random causality suggests that an action “sometimes produces its effect and sometimes does not, but nature does not determine how often or how regularly it does so” (Dupré & Cartwright, 1988, p. 522). Thus, if there are no deterministic or probabilistic causes between the RMPs and the outcomes because the phenomenon is indeterministic, then no philosophizing or tests can establish it. This does not imply that the interpretive, mixed methods, or design science research is “unscientific.” Instead, it means that we should doubt the idea that certain RMPs produce or guarantee (i.e., cause) good research outcomes.

## **4 Discussion**

Nothing that we say in this paper suggests that interpretive, design science, or mixed methods research is not scientific in principle. Furthermore, although we outline many fundamental concerns with the three RMGs, it does not mean that we regard them as useless. However, the RMGs we reviewed are not proposed as “useful sources” for mixed methods, interpretive, or design science research. Their ambition is much higher. They are proposed as normative guidelines for how good or rigorous research should be conducted and evaluated. One of our arguments is that the RMGs we reviewed cannot—and therefore, should not—be used for this specific purpose, which they are advanced, namely, to evaluate the quality of research. Next, we discuss a number of key issues highlighted by our analysis of the three RMGs.

### **4.1 Requiring Clear and Consistent Guidelines May Hinder New Ideas**

Hevner (2007) notes that “it is vital that we as a research community provide clear and consistent...guidelines...for the design and execution of high quality design science research projects...to establish the credibility of IS design science research” (p. 87). Having said that, the design science RMG seems to conflict with this idea as this RMG requires subjective case-by-case applications (Hevner et al., 2004, p. 82). The potential problem with the requirement for

clear consistent guidelines is that it may force design science research into a uniform format that does not allow for variety. Klein and Myers (1999) note that “the complete literature of interpretive philosophy comprises so many varied philosophical positions that it is unlikely to yield one consistent set of principles for doing interpretive research” (p. 70). A concern is whether clear consistent guidelines prohibit creativity and out-of-the-box thinking, which can hinder scientific innovation. As we note, Kuhn (1977) claims that the emergence of new scientific ideas requires methodological disagreements. Feyerabend (1975) claims that new scientific ideas require breaking established methodological rules. Although not every major scientific discovery may require breaking existing method principles, some or many may require it.

#### **4.2 Inappropriate Judgments and Check-Box Compliance**

Klein and Myers (1999) note, “it is better to have some principles than none at all, since the absence of any criteria increases the risk that interpretive work will continue to be judged inappropriately” (p. 68). We call this the absence argument. Let us clarify that the title of the Klein and Myers (1999) guideline is for interpretive research, and in the abstract, they hint at providing guidelines for evaluating interpretive research. Then, the guidelines are an improvement of the status quo of interpretive research in IS (p. 68). Later, they note that their principles apply mostly to the hermeneutical type of interpretive research (p. 68). However, if IS reviewers or IS authors then apply Klein and Myers’ (1999) “guideline for interpretive research” to a non-hermeneutical type of interpretive research, not following “hermeneutic philosophers, especially Gadamer and Ricoeur” (p. 70), then, in such cases, “interpretive work will continue to be judged inappropriately.” If IS authors and reviewers apply Klein and Myers’ (1999) RMG for evaluating non-hermeneutical research, then this is not a problem of Klein and Myers’ (1999) RMG. Nevertheless, it is relevant to note the possibility that even the introduction of a perfect RMG for one type of interpretive research can lead to judging other types of interpretive

research inappropriately. This is the case if the guideline is only for one type of interpretive research, and/or it is applied to other types of interpretive research.

More generally, there is also a possible risk that the RMGs we reviewed pave the way for several inappropriate judgments (using Klein and Myers' [1999] term). The idea that by reading an article about a set of principles researchers and reviewers can conduct and evaluate (good) research in the area can be misleading, and can lead to check-box compliance. First, these RMGs may create a situation in which reviewers or editors, without any hands-on expertise in interpretive, design science, or mixed methods research, take on the role of gatekeepers by simply using these guidelines as a checklist. Second, if paper acceptance in leading IS journals requires compliance with these principles to meet "methodological rigor" (see Rowe & Markus in Hovorka, 2019, p. 1362; Straub, 2008), then what is required for publication is not expertise in interpretive or design science research, but instead, how to demonstrate compliance with the RMGs. If this is true, then it may lead to a situation in which the required methodological principle is complying with the guidelines and not the mastery of, say, interpretive research. Consequently, we may have IS scholars whose primary "training" for interpretive research, mixed methods research, or design science research is reading the RMGs, with a focus on strict compliance to maximize paper acceptance. We are afraid that this may already be the case to some extent, which Rowe and Markus in Hovorka (2019, p. 1362), Straub (2008, p. ix), and Grover and Lyytinen (2015, p. 275) actually imply.

Finally, what happens to creative and unexpected research and any settings or circumstances that do not fit the guidelines? For instance, the mixed methods guideline outlines "seven purposes for mixed methods research that [the authors] adapted from prior research" (Venkatesh et al., 2013, p. 5), indicating that only these seven purposes are possible. Moreover, "if researchers fail to provide and explain meta-inferences, the very objective of conducting a mixed methods research study is not achieved" (p. 19). Or consider, "IS researchers should

employ a mixed-methods approach only when they intend to provide a holistic understanding of a phenomenon for which extant research is fragmented, inconclusive, and equivocal” (p. 36). These are examples of legislative claims that may limit the use of mixed methods research.

Moreover, there could be a risk that noncompliance with the guidelines is viewed as a “lack of methodological rigor” or a “flaw,” thus leading to rejection. If the reviewers’ “challenge is to find the fatal flaws” (Saunders, 2005, p. iii), then we are afraid that a good source is to find a setting or circumstances where one cannot have perfect compliance with a guideline (as mentioned, many sources suggest that this is the case in IS; Grover & Lyytinen, 2015, p. 275; Rowe & Markus in Hovorka, 2019, p. 1362; Straub, 2008, p. ix). It could be that many important cases and settings are those complex and dynamic cases that do not match the established guidelines.

### **4.3 Do the RMGs meet the standards they impose?**

The RMGs reviewed propose “validation” or “evaluation” guidelines and ask authors to validate their research with different “rigorous” tests. At the same time, readers can hardly find such “rigorous” evidence supporting the RMPs in these articles. This lack of rigorous evidence makes readers wonder whether the RMG articles meet the standards they set for empirical research. The short answer is no. For example, the design science RMG suggests comparisons with rival approaches, but the authors do not consider doing this for their guidelines (Hevner et al., 2004). To give another example, the mixed methods RMG asks for a rigorous test for mixed methods research. However, they do not provide evidence that, for instance, the following normative recommendation meets any rigorous test: “IS researchers should employ a mixed methods approach only when they intend to provide a holistic understanding of a phenomenon for which extant research is fragmented, inconclusive, and equivocal” (Venkatesh et al., 2013, p. 36). The interpretive guideline reports that their RMPs do not meet their own interpretive guidelines, because their study is conceptual (Klein & Myers, 1999, p. 70). We disagree that evaluating

good research outcomes is purely a conceptual problem. The key reason is the following. A conceptual problem is primarily a logical or mathematical riddle. We argue that if an RMP claims it should be used to evaluate what good research is, then this is a claim for cause and outcome. This question is also “empirical” and not only a matter of logic: Can a certain RMP promote good research outcomes better than some other RMPs?

#### **4.4 The “Authority” and “Consistent with” Arguments**

The RMGs we reviewed justify the individual principles or the whole RMG with an authority argument (such as “in our opinion” or “based on our insights”) or “consistency with” arguments. An authority argument is, for example, when one declares an opinion without presenting the available evidence to justify it. Readers may wonder whether the RMPs, especially when they are used to regulate research, are too important to be a matter of authority or opinion. If RMGs contain rules or principles regulating what a “rigorous” or “good” practice is, and reviewers may require authors to follow them, then should such principles not only be testable claims of how the RMPs are empirically successful in achieving the specific goals? Should they also present evidence for (and against) each RMP? The “consistent with” argument is a questionable approach to justification when the underlying evidence is not presented.

#### **4.5 Should we regard the RMGs and RMPs as mere idealizations?**

As noted, all the RMGs analyzed were introduced to increase publication opportunities in alternative genres. However, by doing this important task, all the RMGs ended up doing much more, as they were also introduced to evaluate the quality of research. It is not clear why increasing publication opportunities requires an evaluation guideline. One reason might be scientific legitimacy of a young discipline such as IS. For example, in the first ICIS, Keen (1980) worries that the legitimacy of IS, and one reason bleak was “that we have no clear criteria for evaluating our research” (ibid, p. 10). Later, Straub, Nanyang, and Evaristo (1994) argue that a lack of explicit evaluation criteria is responsible for the nearly 90% manuscript rejection rate in

top IS journals. The philosophy of science, however, suggests that the issue of evaluation criteria is not that straightforward.

Kuhn claims that the decisions about which RMPs are used by a research community are irrational, so that a shift in such norms is comparable to a religious “conversion experience” (Kuhn, 1962). Polanyi (1946) denies the whole business of proposing a set of principles and claims that research method competence is tacit. Laudan’s (1986, 1996) approach subjects RMPs to scientific study. According to this view (Laudan, 1986), research on “methodology is the study of how to conduct inquiry effectively” (p. 349). According to Laudan (1987), the key question for scholars examining research methodologies is understanding that “methodology rules are...statements about instrumentalities, about effective means for realizing cherished ends” (p. 24). Given that RMGs are similar to other theories or sets of propositions in science, RMPs are testable to the same extent as any other theories, hypotheses, and propositions in science (Laudan, 1986). We do not find such tests reported in the RMGs we reviewed. Ultimately, if we cannot show any evidence that these principles lead to better outcomes than their competitors, then why should we require them? We suggest that if RMPs or RMGs cannot offer evidence for their claims, then they should have a less normative effect on our journal review process. We propose the RMGs should be regarded as idealizations. This does not mean that RMGs are useless; instead, they can have a pedagogical function, for example, in PhD training. However, if RMGs are idealizations, and they, for example, simplify how research methods are really used, or sometimes require things that are irrelevant, unnecessary, or harmful in some specific situations, they cannot be used to assess how good, rigorous, or high-quality research is conducted or evaluated.

#### **4.6 Future Work**

We focused on only three different guidelines. As mentioned, Klein and Myers (1999) call for “a lively debate” (p. 68). To facilitate this debate, and to further increase our understanding, future

research is needed to examine other RMGs. We do not want to restrict the debate or future research, but we offer some possible directions. Future work could focus on finding to what extent the other guidelines in different interpretive, mixed methods, and design science guidelines use the reported legitimations strategy (see Section 2.3). Such studies should also examine to what extent other RMGs also claim to offer evaluation criteria for good, rigorous, or high-quality studies. Finally, such studies could examine on what evidence the guidelines for good research are based.

Future critical studies on methods can also focus on guidelines for quantitative (statistical) research from the philosophical viewpoint. Let us use statistical significance as a concrete example. Winter (2008) argues that for “behavioural IS research, statistical significance is established as a clear and common measure of its results’ rigour” (p. 470). This claim is questionable. For example, the American Statistical Association (ASA) announced this warning for authors who employ statistical significance tests uncritically: “Statistical significance is not equivalent to scientific, human, or economic significance” (Wasserstein & Lazar, 2016). In medicine, “[t]he non-equivalence of statistical significance and clinical importance has long been recognised” (Altman & Bland, 1995, p. 311), and “statistical significance at any level does not prove medical, scientific, or commercial importance” (Ziliak, 2010, p. 325).

Moreover, future work could also include a conversation on how we can assess research quality without normative RMGs. Finally, future work could examine how we can empirically identify RMPs that are based on compelling evidence for the RMP and outcomes.

## **5 Conclusions**

IS scholars have put forward RMGs for conducting and evaluating interpretive, design science, and mixed methods research. Although these RMGs require rigorous testing and validation, they do not seem to meet these requirements. The evidence for the guidelines consists of the

authors' opinions and claims that the principles are consistent with some previously published research or views. The guidelines give examples of the applicability of the principles, showing how scholars can apply the principles or how a study has applied them. Neither focus counts as evidence for conducting and evaluating good or high-quality research.

If scholars use the method guidelines for evaluation (as intended by their authors), then such RMGs should not be based on the authority argument, usability, or a demonstration that the principle is consistent with some papers. We contend that the RMGs we reviewed do not contain evidence for assessing good research outcomes. If this argument is accepted, then the guidelines should be rejected for the purpose of evaluating the research quality. Moreover, there could be a risk that the RMGs may contribute to check-box compliance, where research not meeting them is regarded as lacking methodological rigor. RMGs that mandate in which circumstance to use the method may also limit research and new idea development. For example, why we should limit a priori in which circumstances mixed methods can and cannot be used?

It is also important to ask why IS journals need to present method guidelines when there are many research method journals<sup>7</sup>. What value do the IS guidelines add? There is also a risk that they are trivializing the complexity of research and downplay tacit knowledge. Finally, the philosophy of science regarding the scientific method offers important lessons for IS. One option is regarding each RMP as a tentative and revisable principle that enjoys evidence for or against. This view means that RMGs are similar to hypotheses in science and have limited generalizability. This option, however, seems to be difficult to achieve in the IS context of mixed, design science, and interpretive methods. Alternatively, the Kuhnian "normal science" regards

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<sup>7</sup> For example, *Ethnography*, *Organizational Research Methods*, *Psychological Methods*, *Qualitative Research*, *Qualitative Research journal*, *Action Research*, *International Journal of Action Research*, *International Journal of Qualitative Methods*, *Journal of Organizational Ethnography*, *Journal of Phenomenological Psychology*, and *Qualitative and Multi-Method Research*.



RMGs as dogmatic and irrational conventions. We propose deeming RMGs idealizations, which can be useful for pedagogical purposes for novices. If our proposal to regard RMGs as idealizations is accepted, then we should reject the guidelines for the specific research quality evaluation purpose for which they are proposed. The RMGs we reviewed are introduced to assess how good, rigorous, or high-quality research is conducted or evaluated. Idealized guidelines cannot be used to assess these outcomes. This does not mean that interpretive, design science, or mixed methods research is nonscientific or the IS guidelines are useless, but instead, that RMGs should have less weight in evaluating what is an acceptable use of a method.

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