

# EDITOR'S COMMENTS

## Seeing the Forest for the Trees

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In a recent editorial, I talked about the need to safeguard against *Type III errors*—that is, formulating a research problem so that the answer to the question will matter (Rai 2017). I identified a researcher formulating the research with a sole focus on an immediate problem of interest to them while overlooking how the problem relates to a more generic, archetypal problem as one of the risks of a Type III error.

In this editorial, I share some thoughts on (1) the issues arising from not effectively abstracting the immediate problem of interest to an archetypal problem, and (2) the approaches that can assist in abstracting the immediate problem to an archetypal problem (Table 1).

### ***Issues from Not Abstracting to Archetypal Problems***

With the rapid pace of technological advances, IS researchers have a vast range of opportunities to study “interesting” and “novel” problems of immediate interest in a plethora of contexts. However, when a researcher does not consider how the immediate problem of interest relates to a more generic or archetypal problem, the problem is not made *intelligible* by relevant knowledge. The problem may or may not be as interesting or novel as the researcher may have perceived, and opportunities to make the work interesting, novel, and impactful at the level of the archetypal problem may not have been pursued. By not traversing the ladder of abstraction to engage with plausibly relevant knowledge, the researcher risks adopting a myopic frame of reference that can manifest as described below.

#### **Over-Problematizing the Immediate Problem of Interest**

By overlooking or underspecifying connections with knowledge about the archetypal problem, a researcher may over-problematize the problem. Some problems can be readily structured and solved by applying knowledge about the archetypal problem, or the research process to investigate the problems may be aided by the accreted knowledge at the level of the archetypal problem.

For example, a researcher may be interested in the problem of converting lurkers into contributors in a firm-sponsored open source community for innovation ideas. By overlooking or underspecifying connections to knowledge related to the broader problem of lurking in online communities, the researcher may over-problematize the immediate problem of interest to them. In doing so, they may formulate the problem to have limited intrigue to the broader base of scholars on open source communities and a limited scholarly contribution beyond what is already known.

#### **Under-Problematizing the Archetypal Problem**

By overlooking or underspecifying connections of the immediate problem of interest with knowledge about the archetypal problem, a researcher may under-problematize the archetypal problem. There may be aspects of the immediate problem that are in tension with the understanding at the level of the archetypal problem.

For example, we are now receiving a large number of submissions on the topical problem of risks of data breaches in organizations. Reviewers and editors have expressed that they would like to understand why data breaches create novel risks and require mitigation strategies that depart from the understanding at the level of IS service failures, and more broadly service failures, in organizations. While they readily acknowledge that data breaches are an important problem, they are curious to learn about the novel aspects of data breaches (or the type of data breach) that

<b>Table 1. Rationale and Process for Abstraction to Archetypal Problems</b>	
<b>Issues from Not Abstracting:</b>	
Over-problematizing the problem	<ul style="list-style-type: none"> <li>Applying knowledge about the archetypal problem can solve the immediate problems, or the investigation of the immediate problem may be aided by knowledge of the archetypal problem.</li> </ul>
Under-problematizing the archetypal problem	<ul style="list-style-type: none"> <li>There may be aspects of the immediate problem that are in tension with knowledge of the archetypal problem and reveal the need for significant revision to the accreted knowledge.</li> </ul>
The quicksand of interestingness of one-off problems	<ul style="list-style-type: none"> <li>Without searching for meaningful connections between the immediate problem and knowledge about a more generic problem, we risk a breakdown in coherence and stymie knowledge accretion.</li> </ul>
<b>How to Abstract to Archetypal Problems:</b>	
Transcend the empirically specific situation	<ul style="list-style-type: none"> <li>Connect with relevant knowledge about the archetypal problem—could the finding have an “aha” implication not only for those interested in the particular empirical situation but also for those that are interested in the archetypal problem and related empirical situations?</li> </ul>
Engage in an “emptying operation” to climb the ladder of abstraction	<ul style="list-style-type: none"> <li>Assess how situation-specific words can be emptied or abstracted to representations that generalize to a broader set of situations in reality.</li> </ul>
Use a variety of theories, models and literatures as inspirational resources for thoughts trials on abstractions	<ul style="list-style-type: none"> <li>Generate candidate abstractions by considering a variety of theories, models, and literatures.</li> <li>Spot breakdowns in viewpoints through the interaction of observations with a variety of theories, models and literatures.</li> <li>Generate a novel lens to the problem by bringing together complementary perspectives.</li> </ul>
Revise abstractions by searching for anomalies and advancing a coherent resolution	<ul style="list-style-type: none"> <li>Use techniques to search for anomalies relative to expectations from a theory or model.</li> <li>Revise the theory or model by including the reason for the anomaly in the theory or model and correct for the overgeneralization.</li> </ul>
Develop abstractions by applying problem-solving cycles	<ul style="list-style-type: none"> <li>Adopt an iterative process of problem formulation and solution to learn about the problem and solution spaces.</li> <li>Engage with stakeholders with diverse perspectives to interpret the problem-solving cycles and generate abstractions.</li> <li>Progressively refine the abstractions by extending the problem-solving cycles to other contexts.</li> </ul>
Connect with broader scholarly conversations	<ul style="list-style-type: none"> <li>Survey the literature to understand candidate scholarly conversations and key conversants.</li> <li>Use a process of trial-and-error to see how best to link the ideas and implications of the work to a scholarly conversation.</li> </ul>

challenge how we conceive, anticipate, and respond to IS service failures. By connecting a study on data breaches with knowledge regarding IS service failures and other service failures, the researcher may be able to show why the problem space, models and theories at the level of the archetypal problem require revision.

### The Quicksand of Interestingness of One-Off Problems

If we were to look at problems of immediate interest as novel and interesting without searching for meaningful connections to knowledge about more generic problems, we risk a breakdown in coherence—at an extreme, an incoherent sprawl akin to the Winchester Mystery House, where each structure, while sensational, lacks meaningful connections to other structures (Davis 2015). We would short-circuit a necessary condition of knowledge accretion—connecting the immediate problem of interest to the overarching problem so as to contribute to a deeper understanding at the level of the overarching problem.

As a community of scholars, we do not want to be in the business of one-off studies, springboarding to the next interesting problem that is studied in a disjointed manner. Rather, we want to work through important overarching problems by connecting with and galvanizing ideas to achieve coherent progress and knowledge accretion.

By abstracting immediate problems of interest to archetypal problems, we can think about the interestingness, novelty, and impact of work not only at the level of an immediate problem or a narrow manifestation of a phenomenon but also at a more fundamental level that enables scholarly knowledge accumulation.

## ***How to Abstract to Archetypal Problems***

Abstracting an immediate problem to an archetypal problem that is likely to be more enduring and of interest to a broader community can be quite challenging. The journey is likely to be effective when researchers adopt a frame of reference to go beyond the specific problem or empirical situation and approach abstraction to learn from, challenge, and enrich how we think about archetypal problems.

Below I discuss some ways that may be helpful in the process of abstracting. The discussion is meant to be illustrative and not exhaustive on how abstraction may be pursued.

### **Adopt a Frame of Reference to Transcend the Empirically Specific Situation**

Recently some colleagues requested that I provide feedback on a paper. The paper investigated the impact of IS use on decisions by public officials in an emergency response situation, where the officials have very limited time to make decisions with potential life-or-death consequences for citizens. While the specific problem is important and the empirical study was well done, the study did not connect with the broader base of knowledge regarding the archetypal problem of decision making under uncertainty and high risk. The feedback I offered to the authors was that their paper was likely to fare better in the review process—and importantly in the impact it was likely to have on future scholarship—if they could go beyond their empirical situation to connect with relevant knowledge about the archetypal problem. Could the findings have an “aha” implication not only for those interested in the particular empirical situation but also for those that are interested in the archetypal problem and related empirical situations? I also mentioned to the authors that their work was likely to be better cited if they are able to show the implications of their work at the level of the archetypal problem and, consequently, for a broader knowledge base.

### **Engage in an “Emptying Operation” to Climb the Ladder of Abstraction**

Problems observed in reality are situational and laden with idiosyncratic detail. The researcher can engage in an “emptying” operation by assessing how situation-specific information can be emptied or abstracted to representations that generalize to a broader set of situations in reality (Bruner 1973, 1996). A researcher’s ability to perform this process to generate abstractions that illuminate a broader set of situations in reality depends on the researcher’s repertoire of diverse experiences and knowledge of alternative perspectives of others working in the problem domain (Van de Ven 2007).

There is a tip that researchers can use to assess the extent to which they have abstracted idiosyncratic details that are tied to a situation. An article can be considered to have two types of words: (1) general concepts in the broader knowledge base, or *y-words*; and (2) situational issues related to the immediate problem of interest, or *x-words*. A high ratio of *y-words* to *x-words* indicates that an article has a high level of generic representation, whereas a low ratio indicates that the article has a high level of situational representation (Crovitz 1970; Weick 1989). Researchers can evaluate if the *x-words* can be deleted or reconceptualized as *y-words* to encompass a broader set of situations.

Consider a researcher who is investigating how the progression of design decisions related to a firm’s digital platform relates to the firm’s innovation processes and consequently to the innovations that it generates. The design decisions that the researcher observes are with respect to specific technology platforms. Similarly, the innovation processes and outputs that the researcher observes are in terms that are specific to a small set of firms. If the researcher were to represent the design decisions, innovation processes, and outputs as he/she observes them, the representation is likely to be jargon-laden. By having access to diverse experiences and alternative perspectives on design decisions, innovation processes, and innovation outputs, the researcher will have a repertoire of *y-words* to reconceptualize situation-specific *x-words* into abstractions that effectively represent a broader set of situations.

## **Use a Variety of Theories, Models, and Literatures as Inspirational Resources for Thoughts Trials on Abstractions**

Theory is intended to inspire the process of making sense of a problem by providing a conceptual organization of properties related to the problem (Van de Ven 2007).

The interaction of observations with a variety of theories, models, and literatures that provide alternative candidate abstractions can be used to spot breakdowns in viewpoints at the level of the archetypal problem and can be a basis to generate a novel lens to the problem by bringing together complementary perspectives.

Consider a researcher who is seeking to design and evaluate the effectiveness of intelligent wearable devices in persuading diabetes patients to modify their behaviors related to diet, medication, and exercise to be compliant with therapy. Three plausible abstractions, with increasing distance from the specific problem, inspired by different literatures are (1) design of information systems for the behavioral modification of diabetes patients (wearable devices abstracted to the class of information systems), (2) design of information systems for the behavioral modification of chronic disease patients to comply with therapy (diabetes is a chronic disease and the target behaviors to be modified have also been examined for other chronic diseases such as high blood pressure and heart disease), and (3) design of information systems for the behavioral modification of individuals to comply with behavioral norms for goal attainment (modifying behaviors of diabetes patients to comply with therapy to manage diabetes is a case of modifying behaviors of an individual to comply with behavioral norms for goal attainment).

By connecting with existing understanding regarding the immediate problem (design of wearable devices for the behavioral modification of diabetes patients) as well as the archetypal problem (design of information systems for the behavioral modification of chronic disease patients and more broadly the behavioral modification of individuals for goal attainment), the researcher inspires the work with, and connects the work to, broader and highly relevant knowledge bases.

Uncovering plausible abstractions to transcend the problem situation requires extensive iteration between observations and relevant theories, models, and literatures. Generating a variety of abstractions for the problem will enable the researcher to assess options on what to place in the foreground and background in studying the problem and on the broader knowledge base to which they can connect and influence with their work.

## **Revise Abstractions by Searching for Anomalies and Advancing a Coherent Resolution**

We should be driven in our search for abstractions by what important things we see about a problem or a manifestation of a phenomenon, not constrained by just what we readily see about it through the lens of existing theories, models, and perspectives in the literature. This search can be aided by techniques to spot anomalies relative to expectations from a theory or model. For example, advances in big data analytics can aid the researcher to uncover anomalies based on contextual aspects of the problem. The researcher can advance a coherent resolution of the anomalies by advancing revisions to the theory or model that corrects for the over-generalization.

Say a researcher is interested in detecting, amplifying, or preventing the propagation of information in social media, for example, actions for emergency response, fake news, or protest information related to government corruption. By detecting exponential differences in the diffusion-related activities of certain nodes, the researcher conjectures that bots may be part of the online social network. By recognizing the plausible role of bots in propagating information in social media, the researcher challenges the assumption that the diffusion of information in social networks is driven by the capabilities and actions of humans (Salge and Karahanna 2016). This consequently motivates a revision of how variety, speed, and consistency of actions as well as the nature of ties are conceptualized to represent the problem space. By puzzling through incompatibilities with theory when only human actors are involved, the researcher can revise the abstraction of the problem space when both humans and bots are involved. This revised abstraction can provide a more effective way to evaluate how to effectively intervene and address issues in such networks.

## **Develop Abstractions by Applying an Iterative Problem-Solving Cycle**

When faced with a murky problem, a researcher may adopt an iterative process of problem formulation and solution to learn about the problem and solution spaces.<sup>1</sup> The researcher can situate this learning in a context and engage with stakeholders with diverse perspectives to generate abstractions of the problem and solution spaces.

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<sup>1</sup>See, for instance Van de Ven's (2007) discussion of the engaged scholarship process, which involves iterative problem solving to learn about the problem and solution, and Hevner's discussion of intellectual control of complexity in design science research (in Rai 2017, pp. v-vii), which involves adaptive search.

Consider a researcher who conceives, inspired by conjecture, an initial design for an artifact to reduce information overload on service agents during consultation with customers facing an issue with their service. The researcher can engage in an iterative problem-solving process to learn about the problem space (i.e., information overload for the service agent) and the solution space (i.e., effective designs to represent the customer's profile, transaction history, and related information for the service agent). The researcher can generate abstractions of the problem and solution spaces to transcend the specific situation in which the problem-solving exercise was conducted. These abstractions can be progressively refined by extending the problem-solving cycles to other contexts.

### Connect with Broader Scholarly Conversations

If the work is formulated very narrowly or at an extreme to be an island onto itself, authors lose the opportunity to inform and be informed by relevant scholarly conversations. Effectively positioning a paper in a broader scholarly conversation requires surveying the literature to understand candidate scholarly conversations and key conversants (Huff 1999).

Linking the ideas and implications of the work to a conversation typically requires significant trial-and-error even for highly seasoned scholars. It requires understanding how scholarly conversations have progressed, the abstractions at and perspectives with which the problems have been examined, assumptions held, points of agreement and dissension, and viewpoints of key conversants. Such understanding enriches the researcher's repertoire of abstractions to look at the particular problem situation and assess how to meaningfully abstract to connect with discourse in the broader knowledge tradition.

### Concluding Thoughts

As we look at immediate problems that are interesting and novel, an important consideration is to ask how the immediate problem of interest relates to a more generic, overarching problem. The correspondence to a generic, overarching problem may not be readily apparent and may require significant trial-and-error and learning. The process to abstract from an immediate problem to an overarching problem is essential to develop a deep understanding about overarching problems and to accrete knowledge at a more fundamental level. By taking on the abstraction process systematically, the field can have a stronger impact and authors can broaden the audience and influence of their work.

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