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Accumulating Project Management Knowledge Using Process Theory

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ABSTRACT

Process theory has become an important mechanism for the accumulation of knowledge in a number of disciplines. In contrast with variance theory, which focuses on co-variation of dependent and independent variables, process theory focuses on sequences of activities, their duration and the intervals between them, as they lead to particular outcomes. For example, rather than focusing on what *properties* successful projects have in common, process theory focuses on what *sequences of activities* lead to successful projects. Thus process theory is a powerful companion to variance theory, particularly relevant to project management knowledge accumulation. However, process theory itself and methods of developing process theories are still in a nascent stage. We present a 5-level model that specifies different formulations of process theory, explaining how it can be applied and leveraged to accumulate knowledge, specifically within project management research. We conclude by considering future possibilities and challenges for process theory in project management research.

Keywords

Process theory, process sequences, knowledge accumulation.

"…you simply don't go out and do a piece of work. No, the first thing you do is determine the lengthy sequence of activities necessary even to begin the job. Then you realize that the sequence of preparatory activities is so long you will never get to the intended task. So you go fishing instead."

Patrick F. McManus (1989)
"Sequences" in The Night the Bear Ate Goombaw

INTRODUCTION

Managing projects is a complicated and challenging endeavor. Humorist Patrick McManus has hit a raw nerve in the field: although project management has long been the subject of research, we have yet to develop an underlying understanding of its nature, i.e., a theoretical underpinning (Reich, et al. 2103). We contend that the conceptualizations from process theory hold significant promise for formalizing knowledge accumulation in the field.

In a field of practice, such as project management, the central goal of research is to accumulate knowledge that is both conceptually rigorous and helpful in application (Benbasat, 2001; Benbasat and Zmud, 2003; Keen, 1980; van de Ven, 1989). Project management has a significant impact on business and society, but a less than stellar track record of success (see, e.g., Johnston, 2014), particularly in the area of information systems (IS) project management (e.g., Cerpa and Verner, 2009; Shaw, 2012; Widman, 2008). Against this challenge, the accumulation and dissemination of project management knowledge offers multiple promising advantages: (1) increased predictability that application of particular interventions will generate successful outcomes, (2) increase certainty that the selection of particular interventions will better suit the circumstances being faced, and (3) ensuring that lessons will be learned from experience, with the application of such lessons leading to an upward spiral of increasingly positive outcomes (Crawford, 2006; Diesing, 1992; Keil and Robey, 1999). This is often well-known for practitioners within a particular setting, as, for example, when specific organizations develop and apply specific project management practices. It also applies, however, across fields of endeavor where the collection of best practices builds an increasingly stable and extensive base for individual settings.

While these benefits can be substantial and may be sufficient for many in practice, a deeper understanding of the mechanisms by which particular actions lead to actual outcomes, alternative ways to implement them, and variations of actions taken, based on situational contingencies, can lead to additional benefits. This is the role of theory in any discipline. It is well illustrated in the notion of “double-loop” learning, where not only are individual lessons learned, but the process of cultivating lessons accelerates their invention and discovery (Argyris, 1976). Additionally, we have learned in the IS discipline that such knowledge accumulation and representation is important for establishing the identity and success of an academic discipline (Benbasat, 2001; Benbasat and Zmud, 2003; Keen, 1980).

We contend that restricting research to a variance theory perspective and requiring researchers to base their studies on existing theories has driven behavioral research away from innovation and discovery and into "yet another variation on..." some existing theory, often from a discipline outside IS or PM and often without any real understanding of the validity of that theory in its own discipline, let alone its validity in IS or PM. A process theory approach addresses this problem by effectively "letting the process speak for itself." Such studies represent valuable steps toward understanding the nature of project management and is worthy of consideration as a contribution to knowledge.

PROCESS THEORY AS CURRENTLY CONCEIVED

While theory can be conceptualized along a wide range of characteristics and dimensions (see, e.g., Burton-Jones et al. 2015; Gregor 2006; Mueller and Urbach 2013 for a detailed discussion), two types of theories (or meta-theories) are of fundamental interest: *variance* and *process*. A number of scholars have described key distinctions between them (Burton-Jones et al. 2015; Markus and Robey 1988; Mohr 1982). At their core, variance theories consist of carefully defined constructs (properties of objects in Weber’s (2012) terminology), with carefully defined relationships among these constructs, and a statement regarding the boundary within which evidence justifying the theory may be observable (Bacharach 1989; Diesing 1992; Weber 2012).

A stricter and widely held view is that “in variance theory the precursor [i.e., any construct preceding another] is a necessary and sufficient condition for the outcome” (Mohr 1982, p. 37). In other words, changes in the level of the precursor, as characterized by antecedent variables, are invariably associated with corresponding changes in outcome variables. Should testing in the designated environment show this strong a relationship between constructs, confidence in the theory should be very high. We argue that invariability may be a worthy goal, and possibly achievable in the physical sciences; however, even for well-tested social science theories such invariability is rarely attained. Constructs of job satisfaction and organizational commitment, for example, are theorized to be associated with job retention. While such theories are often useful, they are not invariable. Many such theories are “perishable,” (March and Smith, 1995), subject to variations with changes in, for example, technology advances or human expectations. In contrast, we argue that theory can be viewed as being supported along a range or continuum of confidence levels from providing mild predictive ability (which might still be helpful in practice) to being fully invariant. The key is that the statements remain theory even as the level of support varies with the results of each new test.

Variance theory is the most common type of theory used in the behavioral literature (Burton-Jones et al. 2015; Paré et al. 2008) and, as such, has had a heavy bearing on information systems and project management research. We argue, however, that process theory holds significant promise for facilitating the accumulation and codification of knowledge in the information systems and project management disciplines. Further, while the current conceptualization of process theory has much to offer, specific extensions that we present below will greatly increase its value.

Generally speaking, variance theories focus on extant properties (variables) and the static relationships among their values. In contrast, process theories focus on understanding how outcomes emerge from a sequence of preceding events (e.g., activities or choices by one or more actors). The emphasis shifts from "measuring the state of one or more conditions prior to an intervention and then evaluating outcomes," to opening the black box regarding the intervention[1] to appreciate both the nature of the intervention itself as well as its conceptual links with preceding and succeeding events. As a result, we see process theory as making (at least) two contributions when included as part of a cumulative knowledge tradition: (1) it addresses dynamic phenomena given the time sensitivity of sequences of activities; and (2) it provides direct applicability for practitioners by studying interventions that they, in principle, can themselves apply. Practitioners can extrapolate such processes to their own circumstances and further refine the "theory" to their exact conditions.

Process theories are particularly useful for investigating how and why a final outcome emerges. They typically do so by analyzing critical incidents preceding the final outcome or through a sort of reverse engineering, that is, analyzing which event preceded the final outcome and then working backwards gradually until an initial trigger (or a set of triggers) (Poole et al. 2000). In doing so, process theories develop an in-depth understanding of both the events themselves and the conceptual links between them. Thus the intermediary outcomes of preceding events become the inputs or triggers for subsequent events, even though such transitions may not be automatic or instantaneous. At the same time, it is important to note that consequences may not be manifest in nature (e.g., a work order issued or a document created), but can also refer to latent concepts (e.g., a state of consensus achieved among a group of principal actors). Indeed, such latent states could be much more important in explaining the progressive pattern of a process than any of the manifest outcomes of any one event in it (see Figure 1).

IMPLICATIONS OF PROCESS THEORY FOR PROJECT MANAGEMENT

The idea of processes as the nucleus for the integration and synthesis of knowledge is already evident in the Process Management Body of Knowledge (PMBoK), which recognizes 47 major processes, organized into 5 sequential clusters or phases (Project Management Institute, 2013). These document general practices that are seen as contributing to project management success. For example, the PMBoK describes stakeholder management as a fundamental process and explains in detail how this process is embedded into an overall project management approach. We argue that such a description provides an opportunity to probe further. The most basic formulation of stakeholder management activities can be represented as a "level 1" theory (see below) holding that the use of such a formulation should result in observed positive results. By testing and integrating the results of such tests, this essential theory may evolve into greater understanding of the various results produced by such a process, including the effects of variations in the actions, their intervals and their sequence. Ultimately such a process may include understanding of the range of actions from which to choose, the states that are likely to reside in the intervals between them, and a chain of likely causes and effects that can guide selection of actions and anticipation of results by project managers regarding stakeholder management. Such a process aims to supplement appreciation for processes and likely outcomes with understanding of their variations and *why* such outcomes are achieved.

One approach to such an analysis might, as illustrated in Figure 1, use reverse engineering of a successful project, for example, to show, hypothetically: (1) agreement that the project outcomes are satisfactory (result), (2) preceded by a process that examined the master set of requirements as specified by each stakeholder, (3) preceded by a careful description of execution steps relating to particular requirements submitted by the stakeholders; (4) preceded by implementation decisions accounting for tradeoffs among assembled requirement lists, and (5) preceded by individual meetings with each stakeholder, which (6) originated in the project manager's intention to conduct stakeholder management. Given such a set of activities, process theories might propose how each activity, and the order of activities influence key intermediate states and facilitate additional actions.

In this way a process theoretical view of the micro level will advance our knowledge about the "how and the why" of project success. This resonates well with Blomquist et al. (2010) who promote the analysis of micro-processes. They suggest that, on the micro level, steps in project management can be enacted in multiple ways, each of which may result in different outcomes. A process theoretical perspective would focus on evidence-based knowledge and understanding to supplement the intuition and implicit knowledge of individual project managers across a wide range of project management activities. This represents a significant opportunity to advance the PMBoK, opening up opportunities to develop the broader theories of project management – even though scholars such as Reich et al. (2013) and Blomquist et al. (2010) are skeptical whether any grander or formal theories of project management are possible.

[1] By "intervention" we mean one or more actions purposely initiated by human actors or systems.

In the next section we describe extensions to process theory and present examples of how these can be used in project management research utilizing a five-level process theory taxonomy.

EXTENDING PROCESS THEORY FOR PROJECT MANAGEMENT

Although there has been some movement toward the creation and testing of process theories in a variety of literatures, we believe it is particularly suited to, and significantly underrepresented in, project management research. We hold that specifying and delineating multiple levels and types of process theory, in addition to the use of existing conceptualizations, will broaden the range of project phenomena subject to rigorous and useful testing. Thus, we propose five formulations that extend the traditional process theory conceptualization (see Table 1). Each, we argue, is rightly titled *theory*, though broadly speaking we see these levels as progressive where each adds additional richness and value beyond those preceding it. We illustrate the idea of varying levels of process theory with the help of a simple hypothetical example.

Table 1. Process Theory Levels.

Level	Indicator	Example theoretical statement
1	That a process can create a specific result	Risk analysis can lead to positive net project outcomes
2	That a process does create a result, but that the result may vary by different outcome measures	Risk management can create user satisfaction and quality benefits but will add to cost and effort requirements
3	That variations in process steps result in the same or systematically varied outcomes	Risk management can create user satisfaction and quality benefits but will add to cost and effort requirements across a broad range of levels of active risk management through back-up plans.
4	That variations in process step sequences result in the same or systematically varied outcomes	Stakeholder analysis will produce better communication with interested parties outside the program where a communication plan is reviewed with the stakeholder prior to rather than following the standard analysis.
5	That a process applies across a range of domains	The process of calculating risk by probability when applied to all estimation tasks can produce quality estimates leading to better project resource utilization.

Consider the following process for addressing project risk. First, we construct a list of all imaginable independent risks. Second, we assign a probability to each. Third, we assign a likely cost should the risk materialize. Fourth, we multiply the probability times the cost for each identified risk. Fifth, we sort the list of risks from highest product of probability by cost. Sixth, we devise a backup plan for the top third of the list in anticipation that the risk is manifest. Seventh, we keep the middle third closely at hand for routine monitoring. Eighth, we drop the bottom third as being of less value to monitor than to simply adjust to if necessary. Finally, ninth, we progress through the project eliminating from our list those that do not manifest, quickly implementing backup plans for the top third if they occur, and watching for the middle third for ad hoc response if they occur, until the project is finished. We check the realized cost, duration, and quality of product against that anticipated and find a positive effect of implementing our risk management program against the organizational standard outcome where risk management is not used.

We propose a “level one” process theory based on this experience, stating that this 9-activity process can lead to some specific positive project value realization (see Table 1). As a theoretical statement this might be specified as:

"*Risk management can lead to positive net project outcomes*" (where risk management is not to be seen as a monolithic construct, but as the aggregate sequence described earlier). Presumably, the 9-step process has been purposefully designed and executed in the hopes of creating positive outcomes or has been developed by "reverse engineering" a successful project (as described above). This is relatively "sparse" theory because we have not shown that we *always* or even *frequently* (in a statistical sense) produce a positive outcome. However, in the example we provide, this process is *observed to initiate* the positive outcome that the theory *specifically* links to the performance of risk analysis. Similarly, we have not created a deep understanding of how or why the 9 steps link to the theorized outcome. However, the basic recognition of the 9 steps is an important foundation. Given this initial proposal, presented in theoretical statement format, if members of the community deem it worthy, it can be tested by following the described process in a variety of contexts and observing if the theorized outcome is obtained.

A "level two" process theory adds the differentiation of multiple outcome measures. For example, in our case, we could look not only at net outcome but separately at cost, time, quality, and perhaps user satisfaction. We might find that the use of risk analysis provides benefits on *all* measures. However, alternatively, and more likely, we may find that while net cost savings are realized, it comes at the price of additional overall project time. Perhaps we have small negative effects on cost and time, but with very high levels of quality or user satisfaction. The concept of benefits realization might, for example, highlight the importance of user satisfaction over cost or time. A level two theoretical statement would illustrate how a particular process can produce nuanced and sometimes offsetting outcomes or trade-offs. This would result in a revised theory that states, for example: "*Risk management can create user satisfaction and quality benefits but will add to cost and schedule requirements*." This can be considered a "level two" process theory because it adds multiple outcome measures and gives a richer sense of the range of outcomes produced by a particular process.

A "level three" process theory shows how varying the character of steps in the process produces different results. For example, consider the case where we change the proportions of cases where we actively seek back up plans from one third to one half and eliminate the middle third focused on light monitoring and ignoring all of the other risks. What impact would such a move have on cost, schedule, quality, and user satisfaction? If we test this once and have similar results to the original formulation of the process, we may learn that the process is fairly robust to the specific number of highly risk managed processes. Alternatively, we may find a different pattern relative to our set of outcomes. As a result of such testing, particularly after many trials, we may reaffirm that risk management provides net or distinct sets of benefits with an additional statement regarding the robustness of the process to variations in the percentage of risks actively managed. We may formulate such a finding with a theoretical statement such as: "*Risk management can create user satisfaction and quality benefits but will add to cost and effort requirements across a broad range of levels of active risk management through back-up plans*." This can be considered a level "three" process theory because it adds nuanced view or comparison of the nature of the steps involved in the process.

A "level four" process theory would address if and how varying the order of steps in the process produces different results. For many activities there is a natural progression or dependency such that a subsequent step is unlikely or even impossible until a prior one is completed. In our risk management example, for instance, it is unlikely that the list of risks can be sorted based on likelihood and cost prior to having estimated likelihood and cost. The order of estimating likelihood followed by cost or vice versa could possibly have some effect on the outcome, particularly if some anchoring or other common bias is systematically drawn into play, but this is not highly likely. A better example would pertain to stakeholder analysis where project managers might begin by making assumptions about stakeholder level of interest and importance to the project, constructing a communication plan for each stakeholder, and then discussing and getting approval from each stakeholder for the plan. Alternatively, project managers could construct a communication plan, discuss this with each stakeholder and infer the level of interest and importance from this discussion. Testing would show which alternative sequence produces better results. Assuming that the latter produces better results, a theoretical statement might be formatted as: "*Stakeholder analysis will produce better communication with interested parties outside the program where a communication plan is reviewed with the stakeholder prior to rather than following the standard analysis."* This can be viewed as level four theory because it varies not only process steps but also the sequence in which activities are performed. Researchers could not only observe systematic variations between alternative processes that vary by their sequence of activities with selected outputs (i.e., customer satisfaction), but could further strive to understand and explain why the different patterns of processes lead to different outcomes (compare to, e.g., Langley 1999). Does the latter sequence work better because it bases stakeholder analysis on stakeholder stated preferences rather than assumptions or for some other reason? This sort of exploration of process also aligns well with the micro logic advocated by Blomquist et al. (2010).

A “level five” process extends the level of generalization from the particular process domain to other reasonably similar domains. For example, the process of estimating the cost by probability of specific risks might be extended to evaluation of project for selection (substituting, perhaps estimated net benefits and probability of achieving them for cost/probability) or assignment of individuals to tasks (substituting, perhaps, estimated quality versus efficient use of resources). Such probing can suggest broader theoretical constructs pertaining to all estimation circumstances. Such a theoretical statement might be formulated as: “*The process of calculating risk by probability when applied to all estimation tasks can produce quality estimates leading to better project resource utilization.”* This would be a level five theory in that it examines a fully developed process theory across multiple settings.

At this point it may be clear to the reader that each step in the process is subject to countless variations in execution. This results in a potential combinatorial explosion of possible cases to test. We posit that it is not necessary to test all cases, but rather it is a better strategy to (1) test changes that appear logical and compare outcomes to the existing base of knowledge and (2) be aware of variations in the process due to exigencies – for example more risks than usual manifesting – with ad hoc responses, and consider these to be “natural experiments” such that the ad hoc responses form an alternative construction of the process. Contrasting the outcomes of these with organization norms can produce new insights, for example, robustness of the process, or particular circumstances where alternative processes show better results. This problem can also be addressed with efforts to understand the “why” or “how” of each step providing input to the next one. Such explanation can lead to (1) elimination of steps unlikely to produce the desired intermediate states and (2) creation of new actions that create intermediate desirable states even if not formally prescribed in the theory statements. Note that such explanatory knowledge should be most effective if fed back into the formulation of theoretical statements.

The purpose of recognizing and distinguishing these five levels of process theory is not to create barriers or controversy about what sort of process theory might be proposed by a particular scholar. Rather it is intended to provide guidance to future researchers about varied, developmental targets for the creation of new knowledge guided by theory in the domain of project management. We hold out the possibility that there are additional variations on the sort of legitimate theoretical statements that can be made linking processes and outcomes.

Although there has been relatively little process theory development in project management, there has been some. Midler and Beaume (2010) provide an example of a study that can be viewed as moving toward process theory. This paper defines three approaches or patterns of new automobile development (concept cars, derivative projects, and vanguard development projects) and considers more specific actions and events that trigger learning across and within these different project types. More detailed specification of the actions involved in learning, assessment of the amount of learning from different action sequences, comparisons across pattern type, and statements of findings in a testable format would generate an initial (level one) process theory. An example of such a statement based on their findings might be: “*Learning occurs more quickly in a ‘multi concurrent projects’ program than it does with a vanguard project approach*,” where both multi-current projects and vanguard project approaches represent somewhat implicit process pathways and the amount of learning is a result of each approach. It is noteworthy that such a formulation can lead to questions about other approaches to projects, to more detailed specification of actions and steps, and to consideration of other outcomes such as cost, quality of product, and the like.

The topic of project escalation and de-escalation has been subject to some process theorizing. Keil and Robey (1999) develop a process model of project de-escalation, identifying actors and the actions taken to address troubled IT projects (also see Keil and Montealegre 2000). These studies propose that de-escalation begins with an actor detecting negative information about a project, communicating that information to another actor “in authority” who will then either continue the commitment of resources to the project (escalation) or take action to redirect or terminate the project (de-escalation). In Keil and Robey (1999), additional information about conditions under which the actual negative information is transmitted, corrective actions taken, how such corrective actions or interventions may vary (particularly with different conduits of information receipt) and how different interventions are formulated and applied can all lead to additional research questions aimed at elevating the implicit theory into consisting of more accumulated knowledge and potentially higher levels of process theory.

Another topic that has received some process attention is user involvement, particularly in information system development projects. Gallivan and Keil (2003) conclude that “despite the appearance that the project manager and the developers did everything right in terms of ensuring high levels of user participation, the resulting system never achieved true acceptance, because several essential stages of user–developer communication failed to occur in an effective manner" (p. 38). Note how in this example the issue of quality of application of a particular action rather than its presence per se has an influential role in its outcome. Further research, particularly in different ways to construct and execute such essential stages or activities, would suggest efforts to establish level three process theory that methodically poses and tests particular ways to address each stage. This notion is reinforced by Majchrzak and Beath (2000) who argue that "user participation," per se, is not the critical factor, but rather it is the *process* of user participation (negotiation, collaborative learning, and cognitive elaboration) that leads to positive project management results. Further specification of the taxonomy of such user participation processes and their application in sequence can be expected to lead to further illumination for theory and practice regarding what is and is not useful in terms of managing user participation in project execution so as to realize more benefit over cost and risk.

A challenge to such thinking is presented by Markus and Mao (2004) who argue that the relationships between participation activities and outcomes are emergent and mutually influential, rather than necessary or deterministic[2]. We agree that humans are creative and that taxonomies of actions and responses may never be complete – the potential for unexpected, unique, or innovative responses by people should never be forgotten. However, with enough observations even emergent and mutually influential behaviors may display some patterns that operate in many if not most or even all circumstances.

By observing, codifying, and learning about such patterns, there should be value for theory and practice. New questions inspired by the opportunity to apply process theory include: Are there steps that aid in the creation, storage, and distribution of knowledge, both explicit and implicit, for groups working together over time? Can new roles (such as knowledge brokers or best practice consultants) positively influence the project management process? Will new tools, such as employing social software in project teams as discussed by Ahlemann et al. (2008), lead to the emergence of new event sequences (i.e., the development of new practices) or alter existing ones? How will managers recognize "troubled projects" and take remedial actions (Keil and Montealegre 2000)? What constitutes meaningful "user participation" and how can it be achieved (Markus and Mao 2004)?

CONCLUSION

We have argued that process theory, because of its focus on activities and sequences of activities, is an appropriate mechanism for the accumulation of project management knowledge. We have presented a five level model representing ways in which the basic elements of process theory can be used to further knowledge gathering related to project management. We conclude that such an approach has significant promise for transitioning much of what is currently "best practice" and anecdotal knowledge in project management into a more rigorous and testable theory-base.

Given the large number of currently observed best practices in project management, it is obviously impractical to test each accepted belief at once. Rather we advocate wise prioritization of key processes that are believed to represent major turning points for the success or failure of projects or that represent areas where current knowledge is viewed as equivocal or subject to varied interpretations. This is consistent with the growing observation that without a strong theoretical base, project management education is over reliant on techniques that "have a 'motherhood' flavor rather than much predictive value" (Reich et al. 2013, p. 938). As mentioned earlier, Highsmith (1999) observes that such techniques "[…] are reduced to a series of steps executed by rote" (p. 14) unless they are guided by underlying theoretical understanding.

In our view the use of process theory can serve as a means of extending and enhancing existing project management knowledge as represented, for example, by the PMBoK. We see these as complementary and mutually useful. We see extensions from: (1) providing a basis for gathering evidence regarding existing processes and micro-processes; (2) providing a basis for increased nuance and contingency – for example differentiating stakeholder analysis prescriptions based on factors such as level of innovation of the product/service of the project, project size and

[2]We note that Marcus and Mao (2004) explicitly indicate that their theoretical framework is not a process theory as such because it does not posit *necessary* conditions for project success. We challenge the assumption that process theory must address only necessary conditions and ignore conditions that increase likelihood or that may be optional but aid in achieving particular outcomes.

scope, or industry; (3) providing a basis for the investigation of existing micro-processes or the invention of new ones; and (4) providing deeper and fuller descriptions of intermediate states between actions and understanding of the "why" of processes creating the outcomes that they do.

We argue that a transformation of project management related knowledge as we have argued for above will not only help advance the science of project management, but can also help strengthen the link between science and practice. First, we concur with Lewin (1945) and van de Ven (1989) that there is nothing quite so practical as a good theory. Understanding project management from a process theoretical point of view can help managers to better under the varied nuances that might go into explaining how and why a certain outcome results from their interventions – along the five levels we proposed above. This can not only help in selecting and arguing for certain interventions, but will also help the reflective process through which the project management practice has evolved and improved since the introduction of "formal" project management. To this end, we imagine that post-mortem analyses and project reviews would stand to profit from the logical underpinnings process theory can provide.

Second, especially related to the idea of selecting and assessing interventions, we believe that appropriately assessing different theories is important for managers. Rather than accepting some idea just because it is published in a scientific journal, the ability to scrutinize any knowledge provided is of paramount importance. In this, we agree with Christensen and Raynor (2003) that in order to appropriately assess theory, executives need a sound understanding of what a theory is and means. We hope that the above can help project managers do just that by better understanding at what level knowledge presented to them is and what, consequently, it does not yet entail.

Third, and even though theory is often a daunting prospect in practice, we believe that a stronger appreciation of process theory can facilitate the knowledge transfer between the practice and science of project management. To this end, the logic of process theory develops a sort of language that allows practitioners frame their valuable experiences in a way that will make it accessible to further scrutiny by science. At the same time, a process theoretical framing of scientific insights can help managers to assess and select theory (as argued above) and, thus, put scientific theory to scrutiny of their own. This way, process theoretical thinking provides a common ground for a mutually beneficial, constructive discourse between the practice and science of project management.

Process theory per se remains relatively underdeveloped in project management. The five level model is presented here as an initial effort to define the range of process oriented theoretical that are possible. We anticipate that further work extending and refining these will increase their value. We argue that the refinement and extension thereof presented in this paper holds significant potential for the project management discipline that can be exported to other fields as well.

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