THE DESIGN OF *EFFECTIVE THEORY*

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Abstract

As academic scholars in an applied field our central mission is to develop theory that both contributes knowledge to the academic discipline and applies that knowledge to practice. But the consumption of theories is not straightforward owing both to the cognitive limitations of the human mind and the ineffective cognitive designs of our theories – both of which limit the effectiveness of our theories. We outline the characteristics and a visualisation of effective theory, which we define as theory that is incrementally and iteratively designed in order to be purposeful – both in terms of its utility (which is largely a matter of content) but also in its communication (which is largely a question of presentation) to an audience. We realize that the research community may question our arguments on a number of philosophical grounds. We, therefore, take this opportunity to write a self-reflective piece to make the case for effective theory and to briefly outline an appropriate framework for its study.

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1. Introduction

Theory-building is the basic aim of all science and it is, therefore, difficult to overstate the importance of theory to the scientific endeavour. As academic scholars in an applied field our central mission is to develop theory that both contributes knowledge to the academic discipline (i.e. to internal stakeholders) and applies that knowledge to practice (i.e. to external stakeholders) (Simon 1967). Research is salient to the internal stakeholders if it adds to the current theoretical frameworks of the discipline; and to the external stakeholders if it solves the real life problems faced by practitioners (Bakshi and Krishna 2007). While it is unlikely that a time will come when all "*research will be or should be directed toward improving practice, as an applied discipline surely some … research should have real-world relevance*" (Ford et al. 2005 p. 25). But producing research for such a broad and varied audience can be problematic and results in a number of serious communication gaps, which Hirschheim and Klein (2003) refer to as 'disconnects'.

Taking Shapiro (2007 p. 249) as our point of departure, we posit that these disconnects can be attributed to either a *knowledge translation problem,* whereby our research findings are not being converted into a form that can be readily consumed by our stakeholders, or rather more fundamentally as a *knowledge production problem,* whereby our research is not aligned with the needs of our stakeholders. Both afflictions are endemic in our research efforts (*ibid*). The symptoms of the former are a *presentation issue,* in that our theories cannot be understood by our stakeholders, and the latter a *content issue,* in that we are not producing theories of interest to our stakeholders (Klimoski 1991). Extant literature pays little heed to these issues and indeed it is disconcerting to find that the virtues of *good theory* (e.g. Quine and Ullian 1980; Wacker 1998) are largely divorced from principles of effective communication. We wonder how we can prognose a theory to be *good* when it can suffer from issues that render it incomprehensible and/or irrelevant to our stakeholders. Therefore, in addition to *good theory*, we call on scholars to focus their efforts on building *effective theory*, which is *theory that is incrementally and iteratively designed in order to be purposeful – both in terms of its utility (which is largely a matter of content) in solving problems of interest to an audience but also in its communication (which is largely a question of presentation) to the audience.* The effectiveness of theory, we argue, is a quality of the theory that is detected from the cognitive impact of its content and presentation on its intended audience. Unlike *truth* which is oftentimes regarded as objective and absolute, we view *effectiveness* as subjective and relative. Theory effectiveness is *subjective* in that it is dependant on the perception of the human mind and it is *relative* in that no two minds will perceive it identically. Therefore, a theory that is effective for one audience may be wholly ineffective for another audience.

2. Outline of our Argument for Effective Theory

Most scholars (e.g. Metcalfe 2004; Popper 1959; Wacker 1998; Weick 1989, 1999) do advocate that theory should be applicable to as broad a domain as possible. They support the view that science progresses by increasing the domain of application of its theories. But behind this goal lays an intricate web of anomalies that the academic discourse has to date failed to resolve. For instance, high generality implies theories that are largely *context-free*, "*despite the fact that the context out of which they have been developed is often very rich*" (Bartunek 2007 p. 1327). The *principle of contextualism,* therefore, recognises that there "*is a context-dependent gap between concepts of universal theory and concepts useful in a specific context*" (Mahoney and Sanchez 2004 p. 35). The greater the gap the more difficult it is to relate the theory to a specific situation and the more erratic the theory is likely to be in its accuracy across different situations (Markus and Robey 1988). But conversely, increased contextualisation demands additional detail usually at the expense of simplicity. It is, therefore, not clear how we can

reconcile calls for the contextualization of theory with the scholarly demands for high generality, high simplicity and high accuracy. Our central thesis advocates *effective theory* as a means of addressing this *context conundrum.*

While the concept of effectiveness might be accused of being little more than commonsense and hardly worthy of a title, the approach to achieving it is far from straightforward. Theory effectiveness is moderated by questions of generality, simplicity, and accuracy, such that *effective theories* tend to be of a limited domain (i.e. generality), which may be necessary to ensure a sufficient degree of accuracy and simplicity. But this clashes with the guidelines for *good theory*. For example, Wacker (1998 p. 365) states that *"[i]f one theory can be applied to one type of environment and another theory can be applied to many environments, then the second theory is a more virtuous theory since it can be more widely applied*". However, once we introduce the anchor points of utility and communication the apparent contradiction dissolves. For instance, we posit that the theory should be general only to the degree that it continues to be purposeful – in both its utility and communication. Unfortunately, extant literature largely disregards utility and communication and instead suggests that the function of research is to create theories of ever higher generality per se. For example, Gregor (2006 p. 7) notes that "*abstraction and generalisation … are thought to be at the core of a theory*". We respectfully disagree and suggest that utility and communication should be at the core of all theory. The *raison d'être* of research is after all to be useful and how can a theory be so if it is not relevant or it cannot be understood. We, therefore, argue that effective content and presentation are central to the value of all theory.

In addition to arguing that *effective theories* are likely to be of a limited domain, we also argue that they are untrue (or at least inaccurate) – a statement that some may at first find unsettling. For example, in order that 'truth' does not get overwhelmed in a map, '*white lies'* are essential and necessary (Crampton 2002). For instance, gas mains and electric cables often run in such close proximity along streets that a small scale engineering map may only display both by moving the symbol for one relative to the other. Just as a map is both lie and truth, so too is a theory. When creating *effective theories* through limiting, prioritizing, or simplifying reality, we knowingly introduce inaccuracies as a side-effect. Yet these inaccuracies may be necessary to ensure the utility and communication of the theory. All theories are uncertain and they are no more than approximate representations of a reality (Gregor 2002). We suggest that the accuracy of our theories may oftentimes need to be downplayed in favour of their utility and communication. However, we do need to "*police the boundary"* to ensure that "*there is not too much lie nor insufficient truth*" (Crampton 2002 p. 19). While Wacker (1998) recognizes that a *good theory* may not be a 'true' theory, we concur but add that it should at least be *effective.* We, therefore, argue that in addition to the goodness of theory, we should be concerned with the effectiveness of theory.

Design is the process through which "*we make and we test, and, where necessary, we modify. We are always present, as active agents. What we do is circular because that is the way we do it*" (Glanville 1999 p. 87). At every step and in every action, the scholar should be actively designing theory to be effective for an audience - in terms of both its utility and its communication. The resulting theory is evaluated to ensure it is effective in both its content and presentation. The perspective of the scholar must, therefore, continually shift between the design and the evaluation of the emerging theory – so much so that the audience is to all intents and purposes a fundamental part of the theory-building process. When building theories scholars require a sharpened awareness of the factors that have the greatest impact on the effectiveness of those theories. This resonates with Gregor's (2009 p. 1) recent call for theorizing to "*be considered in a holistic manner that links two modes of theorizing: an interior mode with the how of artifact construction studied and an exterior mode with the what of existing artifacts studied*". Further she states that these two modes are 'two sides to a coin' and contribute to the development of knowledge concerning artefacts. We extend her argument to the area of effective theory-building and we suggest that scholars should perceive theory as a design artefact and that they should strive to understand both the *how* and *what* of its construction. Scholars should come to terms with general questions regarding how theory can be more effectively built but also which features of a theory make it a success or failure in the eyes

and ears of our stakeholders. In other words, scholars should build a knowledge base by systematically extracting and abstracting design principles for theory-building from exemplars of what are perceived to be good and bad theory-building. We therefore argue that we should extend our knowledge of effective theory-building through promoting a design science of theory-building.

In summary, *effective theory* is concerned with closing the disconnect between the theory being constructed and the needs of our stakeholders[2]. Scientific theories tend to be general solutions to general problems, whereas the needs of an audience tend towards specific solutions to specific problems. Therefore, e*ffective theory* is concerned with providing theories that meet the specific needs of an audience in terms of both its content and presentation, while at the same time supporting the simultaneous progression of science as a body of abstract knowledge.

2.1 Criticism of our Argument

Through considered reflection on our argument for *effective theory* we realize that the research community may question it on a number of grounds. Some may even go so far as suggesting that our arguments demonstrate a naivety and a lack of maturity in their construction. We, therefore, have taken this opportunity to write a self-reflective piece to address the following issues that we present in opposition to our own argument:

- That we offer a fundamental and unjustified critique of the current conceptions of science in general and of conceptions of theories in particular.

  Comment: We fully accept that our argument is a critique of the current views of the scientific research process and of theory. Indeed we embrace this fact and we feel that justification for our work comes from the many calls for the IS field to increase its coverage and awareness of such matters. In the remainder of the paper, we will outline our philosophical position and we will demonstrate why our critique is not as radical as one might believe.

- That we deny the central role that truth plays in science and in particular in the evaluation of scientific theories.

  Comment: In our work (for reasons that will become obvious later in the paper), we have not ignored the question of truth but neither have we unduly concerned ourselves with it. In the remainder of the paper, we will outline our philosophical grounds for adopting this position and again we will demonstrate why our position is more mainstream than one might believe.

- That we fail to acknowledge the various epistemological questions that have long been the subject of scholarly discussions in the philosophy of science.

  Comment: In our work we have adopted a view of the scientific process that we feel is inclusive of mainstream ontological and epistemological traditions. Nevertheless in the remainder of the paper, we outline our philosophical position so as to address these concerns.

- That communicating a theory to certain audiences outside the respective scientific community is a demanding task that is commonly not regarded as a key responsibility of theory builders. Instead, there are other roles intended to serve this purpose, such as teachers, technology writers etc.

[2] We recognize that the audience for scientific theory can be both internal and external stakeholders and we make no attempt to prioritise one over the other as *both* are critical to the scientific endeavour.

Comment: As an applied discipline, Information Systems must at some level be devoted to communicating our theories to both internal and external stakeholders. We do not argue that all theories must be communicated to external stakeholders but we do believe that in order for our field to matter more, our theories must be increasingly disseminated to practice. In the following sections, we outline why wide dissemination must always remain central to the scientific research process.

- Regarding theories as design objects in the sense of design science is misleading - because the intentions of design science are different to those of normal science.

  Comment: To guide the design of theories, we suggest regarding them as design artefacts and that IS should study the building of *effective theory* according to the guidelines of design science. Unfortunately, it is unclear what some scholars see as the 'intentions' of design science. Notwithstanding this, in the remainder of the paper we outline why theories are designed artefacts and why they fall within the province of science and may be inquired into using design science.

Acceptance that theory is an artefact that can be purposely designed in order to bridge the context gap between the scientific research process and the needs of an audience, we feel is crucial to promoting the legitimacy of our field. Each of the criticisms just presented is, therefore, worthy of attention in this paper. In the remainder of this paper we seek to lay a strong philosophical foundation for addressing the criticisms and promoting an *effective theory* agenda.

3. The Ontological Position of Theories

Theory is described as answering a "*human need to make sense of the world and to accumulate a body of knowledge that will aid in understanding, explaining, and predicting the things we see around us, as well as providing a basis for action in the real world*" (Gregor 2002 p. 15). Theory-building is inherently iterative and incremental consisting of "*the purposeful process or recurring cycle by which coherent descriptions, explanations, and representations of observed or experienced phenomena are generated, verified, and refined*" (Lynham 2000 p. 161). For us, theory building is the ongoing process by which the scientific community produces, confirms, applies, and adapts theory. Our ontological position is similar to that stated by Gregor (2002) and we recognise theory as having an existence separate from the subjective understanding of individuals.

To explain this ontological position we return to the work of Popper (1978), who proposes that the universe consists of three different but interacting worlds – see Table 1. He sharply distinguishes between knowledge in the subjective sense and knowledge in the objective sense. Knowledge in the subjective sense is associated with world 2 thought processes (e.g. the thought processes involved in conceiving a theory) whereas knowledge in the objective sense is related to world 3 thought contents (e.g. the resulting theory). The process of conceiving theories is a transition from non-linguistic thought processes to linguistically formulated thought contents (Popper 1978). The thought content and thought processes are, therefore, related: firstly, in that the thought content is the product of the thought processes (i.e. world 3 consists of the products of world 2), and secondly, in that the thought content gives the thought processes the power to change the world (i.e. the impact of world 3 on world 1 is mediated by world 2). So while all theories exist independently of the human mind, without its active participation they would never be created and they would lay largely inert.

Type	Description	Nature of objects	Examples
World 1	This is the physical world consisting of living and non-living physical bodies.	Concrete objects and effects	Stones, plants, animals, and humans; but also physical energy, such as radiation and magnetic forces.
World 2	This is the mental world consisting of mental or psychological states, processes, and experiences.	Subjective personal objects	Feelings, thoughts, decisions, perceptions, observations, etc.
World 3	This is the world consisting of the products of the human mind	Abstract objective objects	Languages, songs, stories, myths, symphonies, paintings, sculptures, maps, theories, etc.

Table 1: The Three Worlds of the Universe (after: Popper 1978)

World 3 objects are abstract objects most of which are *embodied*, or *physically realized*, in one or more world 1 physical objects. For instance a theory may be embodied in the scholar's original manuscript, copies of the journal in which it is included, the situations in which it is presented, etc. Through consuming these world 1 embodiments, individuals awareness of the corresponding world 3 object increases. Besides accessibility, limitations of both the human mind and of the objects themselves constrain this process of consumption. Therefore, we argue that consumption of theories is not straightforward owing both to cognitive limitations of the human mind and the ineffective designs of the theories.

3.1 Conception and Justification of Theories

The philosophy of science identifies two main[3] and distinct approaches to scientific research that are characterized by whether facts or theory come first. An *inductive* (or *research-to-theory)* approach begins with empirical inquiry and involves inducing theory from a careful examination of the empirical data. On the other hand, a *deductive* (or *theory to research*) approach starts with hypotheses and involves deducing theory through the interaction between the hypotheses and empirical data. This latter approach is largely founded on the work of Popper (Popper 1959 p. 27), who suggests that the scientific research process can be explained as follows: "*A scientist … puts forward statements, or systems of statements, and tests them step by step. In the field of the empirical sciences, more particularly, he constructs hypotheses, or systems of theories, and tests them against experience by observation and experiment*". This scientific research process, therefore, consists of two main stages – *conception of theory* followed by the *justification of theory*.

The philosophy of science has been quite satisfied to separate out those aspects of the scientific research process that are irrational and creative from those that are rational, and possibly principle-based. It suggests that the former is of little interest to philosophers of science and instead focuses its collective attention on the latter. For example, philosophers of science in general have very little to say about the *conception of theories*, which is largely viewed as being irrational and inaccessible to scientific analysis. For instance, Popper (Popper 1959 p. 31) is of the opinion that the act of conceiving a theory "*may be of great interest to empirical psychology; but it is irrelevant to the logical analysis of scientific knowledge"*. On the other hand, the *justification of theory* is the confrontation between theory and evidence and is where the rationality of science lies and is accessible to scientific analysis. All ideas are fallible and, therefore, the rigour and rationality of science is brought to bear on the process through their justification – both *internally* prior to their dissemination and *externally* on dissemination to the wider audience (Schilpp 1974).

[3] A third approach to scientific research is based on abduction, such as in the case of design science, and we briefly return to this topic later in the paper.

But a fundamental problem with justification and with science in general is that it is logically impossible to justify a theory. For instance, neither one nor any number of *verifications* is sufficient to justify a theory as the very next test may well prove it to be false. For example, Einstein is believed to have asserted: "*No amount of experiments can ever prove me right; a single experiment may at anytime prove me wrong*". An alternative proposal is for a process of *confirmation*, whereby the greater the number and variety of verifications the greater the support for the theory and the higher the probability of it being true. However, this too is logically troublesome as it is unclear how one can relate in advance a given number and range of tests to a meaningful measure of truth. These conundrums led to Popper (1959) proposing the concept of *falsifiability*, which asserts that while one can never verify or confirm a theory, one can demonstrate a theory to be false by observing just one contradictory piece of evidence. Scientific knowledge advances most rapidly through the development of new ideas and the subsequent attempts to falsify them through empirical enquiry. Hypotheses and theories can, therefore, only ever be provisionally accepted, since the possibility of falsification always lies around the next corner. Theories are, therefore, merely conjectures awaiting refutation. The fact that "*the whole of science, of all things, should rest on foundations whose validity it is impossible to demonstrate has been found uniquely embarrassing*" (Magee 1973 p. 21).

In addition to these issues of logic, experimentation as a means of justification is far from being objective. The theories we hold, whether explicit or implicit, form a language that we use to understand the world and to communicate with others (Burton-Jones et al. 2004). For instance, theory plays a number of roles in observations – it guides them, informs them, and gives meaning to the reporting of observations. This has led to the philosophical claim that observation is 'theory-laden' - meaning different scholars can observe the same phenomenon yet see very different things (Hanson 1958). The result is that the "*empirical basis of objective science has thus nothing 'absolute' about it*" (Popper 1959 p. 111). Because of these problems of logic and objectivity, our theories are always fallible - uncertain and no better than approximate representations of reality. But this should not be a major issue provided we expose our theories to rigorous external criticism. Openness to criticism demarcates science from non-science and it is through a process of rigorous criticism that science and scientific knowledge progresses (Popper 1978). Science is, therefore, largely a social enterprise, and dissemination of theory is central to the scientific research process. We, therefore, argue that the effective communication of theory is central to the scientific progress and particularly in overcoming issues of logic and objectivity. Next we look at theory in relation to the scientific research process.

3.2 Theory and the Research Process

We distinguish between Theory (with the uppercase 'T'), which is the abstract world 3 object, and theory (with the lowercase 't'), which is its physical world 1 embodiment. TenHouten and Kaplan (1973 p. 147) refer to the process by which scholars start with the vision but change it "*from entwined ideas at the edge of words to a linear order in which the ideas are unraveled and set forth in the form of a propositional argument*" as a Theory. At some further stage, the scholar may embody the abstract Theory as a theory in, say, a research paper. The nonlinear vision loses some correspondence with the real world when it is converted into Theory. Likewise the theory loses some correspondence with the Theory in its translation into a physical object. As well as being ontologically distinct, the Theory and theory differ in their purpose - the Theory is critical to individuals seeking to grasp an understanding of reality, while the theory is critical to disseminating to an audience an understanding of the Theory. The quality of theory depends on the medium of communication and the context of the recipients, while the quality of Theory does not. Our concept of effectiveness is therefore concerned with theory rather than Theory.

In Figure 1 we depict how Theory and theory are related to each other and to the various steps in the scientific research process. The process usually begins with initial ideas being generated from world 2 thought processes. These ideas are subjected to some sort of critical examination – initially within the mind of the theorizer before more formal justification and criticism - internally and externally.

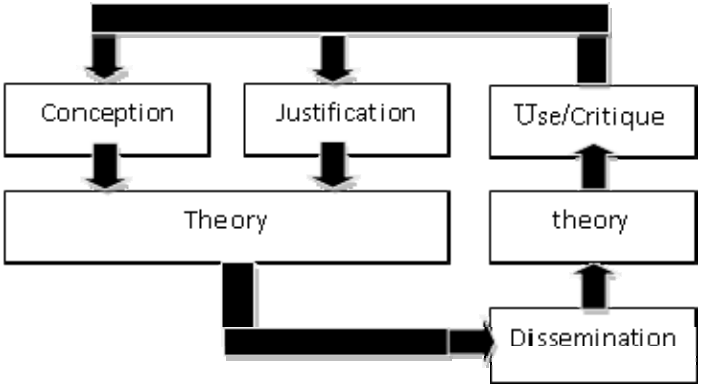

Figure 1: The Scientific Research Process

On examining ideas within our own minds, we decide to proceed with some, while discarding others. While the ideas remain as world 2 objects they are merely part of ourselves, but by formulating ideas into some language, we form them into a Theory (i.e. a world 3 object) and, therefore, a possible object of formal criticism. We subject these Theories to some form of internal justification before deciding to disseminate them to an outside audience. Widespread dissemination generally depends on embodying the Theory as a world 1 object – the theory. "*World 1 embodiments of world 3 objects, such as handwritten books, or printed books, or articles in journals, are extremely important; but they are important not as world 1 objects but as world 3 objects … Of all these world 3 objects it is very characteristic that they can be improved by criticism. And it is very characteristic of them that the criticism may be cooperative: it can come from people who had nothing to do with the original idea*" (Popper 1978 p. 162-163). This criticism may result in the Theory being discarded or it may demand that the Theory be re-conceptualised or that it be further justified. The scientific research process has now moved from a private to a public or community affair and from a question of evaluating Theory to justifying it through its embodiment.

Lee (2001 p. iii) suggests that "*[r]esearch in the information systems field examines more than just the technological system, or just the social system, or even the two side by side; in addition, it investigates the phenomenon that emerges when the two interact*". However, it is impossible to drag an organization or a society into a laboratory in order to examine the interaction between an artefact and these social systems. The ultimate justification of a theory is, therefore, its ability to explain, describe, predict, and prescribe not just what is being observed in a laboratory but what is happening in practice. The value of a theory depends not just on its performance in an artificial setting but more importantly in its interaction with real practice. The dissemination of Theory (including to practice) is, therefore, central to the scientific endeavour. We, therefore, repeat that the effective communication of theory is central to scientific progress and particularly in opening up our theories to criticism. Next we look at how we can determine the quality of our theories.

3.3 The Quality of Theory and theory

While Theories are abstract entities that serve to describe, explain, predict, as well as provide a basis for action in the real world, the general assumption is that science determines their quality in terms of their truth claims. But the scholar "*can never know for certain whether his findings are true, although he may sometimes establish with reasonable certainty that a theory is false*" (Popper 1965 p. 16). So while the idealistic goal of science is the pursuit of universal truth, most philosophers of science agree that Theories can never be proven but only disproven and that Theories will thus always remain conjectures (i.e. doxa) as opposed to indubitable knowledge (i.e. episteme) (Bacharach 1989). Truth is a quality of Theory (rather than theory) and for which no 'objective yardstick' exists (Popper 1978). Compare this situation to

what Popper (1978 p. 148-149) suggests about musical symphonies - "*there are better and worse performances of Beethoven's Fifth Symphony: better and worse live performances, better and worse records, better and worse tapes. … Of course, if a bad performance could be simply identified with one that deviates from Beethoven's original score, and a good performance with one that agrees with the score, then there would be no difficulty. However, it is quite possible that one of the best performances has here or there a minor lapse, and that one of the more clumsy performances agrees with the score in every place*". So while a work of art may be great, an objective measure of its quality is impossible and we have no alternative but to gauge its value indirectly through evaluating the quality of its world 1 embodiment. This evaluation is subjective in the sense that we are interested in the world 2 reaction of the audience to the embodiment. Thus "*people would be used like iron filings in a magnetic field: their reactions would make visible an objective quality of the work of art. This, I suggest, is the true situation; and the reaction of the public is merely an indicator of the quality of the work of art - and certainly not a very reliable indicator*" (Popper 1978 p. 150).

Likewise a Theory may be great, but an objective measure of its value is impossible and we have no alternative but to gauge its value indirectly through the interaction of its world 1 embodiments with the real world. The value of a Theory is, therefore, essentially a question of the ability of its embodiments to provide audience(s) with appropriate descriptions, explanations, predictions, or prescriptions. Appropriate statements are presumably truth-like in that false statements are unlikely to be useful. But a theory that is false for some situations may remain 'true' or accurate in other situations. For instance, Newtonian mechanics is deemed useful for studying the movement of macroscopic entities travelling at speeds not approaching the speed of light but once these assumptions are relaxed then its usefulness becomes questionable owing to accuracy issues. Accuracy is, therefore, not an absolute term – we cannot say in absolute terms that one theory is accurate while another is not – but instead it is relative. We, therefore, argue that the value of a Theory depends not just on the theory per se but on the specific situation to which it is to be applied.

As theories operate through the human mind and not all minds are equal (in terms of ability, needs, or desires), then the appropriateness of a theory, also depends on the specific audience to which it is disseminated. We have no alternative but to evaluate the value of theory from the reaction of an audience to it or, one step further removed, on their ability to use the theory to understand or change the world. This implies that a theory that is appropriate for one audience may be inappropriate for another audience. For instance, Einstein's original manuscript for the General Theory of Relativity was in German and largely inaccessible to the English-speaking scientific community. It was not until Eddington presented a number of articles about the Theory, that it was unveiled and explained to the English-speaking world who up until was largely unaware of the revolutionary work of Einstein. We, therefore, argue that the value of a Theory depends not just on the theory per se but on the audience to whom it is to be disseminated.

We sum up this section by stating that the value of the Theory cannot be objectively measured. Instead its value is indirectly gauged through evaluating the quality of its world 1 embodiment – the theory. This evaluation is subjective in the sense that we are interested in the world 2 reaction of the audience to the embodiment or their ability to use the theory in order to understand or change the world. We suggest that the value of the theory is relative in that it depends on the theory itself but also on the audience to which it is disseminated and the use to which they put it. The value of theory is, therefore, closely tied to questions of communication and utility. The utility of theory is indirectly related to the 'truth-likeness' of the Theory. So while concerns of truth and goodness apply to Theories, concerns of utility and communication apply to theories. Utility and communication are largely matters of content and presentation respectively, which are, therefore, both critical to the perceived value of our Theories.

4. Towards the Effective Design of Theory

We have previously distinguished between Theory (i.e. world 3) and theory (i.e. world 1), which although distinct are dependent on one another. Theories generate abstract domain knowledge, whereas theories generate more situated domain knowledge. Essentially theories (and theory-building) can be viewed as the exploratory and empirical part of Theories (and Theory-building). In other words, a Theory receives its empirical grounding from the justification of its theories, but at the same time the theories receive their theoretical grounding from their Theory. The abstract domain knowledge of Theories should be applicable to a general class of situations and audiences, whereas the situational domain knowledge of theories is specific to a narrower class of situations and audiences. The two types of knowledge are intrinsically linked in that the abstract domain knowledge is generalized and extracted from situational domain knowledge and on the other side, abstract domain knowledge may be adapted and applied to situational instances - this is similar to what Goldkuhl and Lind (2010) argue in terms of design knowledge (see later in this section). In order to flesh out further characteristics of *effective theory*, in Table 2 we build on the concept of ill-structured design problem-solving (c.f. Conklin 2006) to further develop some of the points previously raised in this paper. We remind the reader that the effectiveness of theory is concerned with the physical embodiments of Theory (rather than Theory itself).

Characteristic	Description
Each theory is essentially unique and novel.	No two theories are equally effective for solving a problem in the eyes of an audience. In addition, a theory that is found to be effective for one audience is unlikely to be equally effective for another audience. This implies that the theory required for a different combination of problem and audience may need to be new. Each theory-building exercise may, therefore, be unique and novel and scholars are essentially beginners when faced by a new problem and/or audience.
The theory emerges through building and exposing it to its audience.	Each theory that is built exposes new aspects of the needs of the audience, which in turn can require further adjustments to the theory. Indeed, there is no definitive statement of the needs of the audience but instead they emerge by exposing them to the theory.
There is no right or wrong theory and therefore 'no stopping rule' for theory-building.	As there is no definitive statement of the needs of the audience, neither can there be a definitive statement of the optimal theory. The theory-building process ends when either the theory is good enough or when the theory-building runs out of resources, such as time or energy. There is no optimal theory.
The value of theories must be determined from its audience.	Theory value is not objective and cannot be derived from some simple formula. Instead theories are assessed in a social context in which many stakeholders are entitled to judge the theories. These judgements may vary widely and depend on the stakeholder's values and goals. It is, therefore, a matter of creativity to devise potential theories, and a matter of judgement to determine which are appropriate and should be pursued and implemented

Table 2: Characteristics of Effective Theory-Building

Effective theory-building instigates a host of potential outcomes and where the appropriateness of each depends on the perspectives of many stakeholders – both internal and external. There is unlikely to be an ideal theory acceptable equally to all stakeholders - instead we aim for a satisfactory theory. We call on scholars to scientifically inquire into the process by which effective theories can be designed. Thus we are calling for a design science of effective theory-building. Design science has been established as a research paradigm in Information Systems for many years. Natural science is essentially a "*problem understanding* paradigm" and design science is a "problem *solving* paradigm" (Niehaves 2007). Rather than being in conflict with each other, both activities are encompassed under a broad notion of science (Simon 1996). Inquiry into the design process is informed by knowledge of the laws of natural science (in the form of kernel theories), both for an artefact's internal operations and its interactions with the external

environment (Gregor and Jones 2007). Natural and design sciences are essentially two sides of the one coin.

The practice of design and the science of design are both problem solving activities whose differences lie in their contributions to the body of design knowledge. The prime focus of design practice is artefact construction through applying existing knowledge, while design science aims at knowledge generation through artefact construction (Niehaves 2007). The main intention of design science is to produce abstract design knowledge (such as how to build *effective theory*) as design theories through either constructing new artefacts or observing already constructed artefacts. This abstract design knowledge should be seen as the research end result from design research, while the resulting artefact (i.e. the theory) is, therefore, just an intermediary result (after: Goldkuhl and Lind 2010). This means that design practice (within design research) is to be seen as an exploratory empirical part of design research (*ibid*). In other words, design research receives its empirical grounding from design practice, but at the same time design practice receives it theoretical grounding from design research. The abstract design knowledge (generated from design research) should be applicable to a class of situations and audiences, whereas the situational design knowledge (generated from design practice) is specific to a particular situation and audience. These two types of knowledge are intrinsically linked in that abstract design knowledge is generalized and extracted from situational design knowledge and on the other side, abstract design knowledge may be adapted and applied to situational instances (*ibid*). The purpose of abstract knowledge is to create an understanding of phenomena and be a basis for use in different (practical) situations (*ibid*).

We, therefore, can divide our thesis into a number of layers – see Figure 2. Firstly, we have design practice, which is focused on the recursive building of Theory and theories (and their related abstract and situational domain knowledge). [An example of domain knowledge would be the knowledge pertaining to the user acceptance of information systems]. While this design practice generates the situational design knowledge referred to above, its principal output is the Theory and theories. Secondly, we have meta-design or design research, which is focused on the building of design theories. Meta-design generates the abstract design knowledge referred to above as a design theory. Meta-design can be seen either as a preparatory activity before situational design is started, a continual activity partially integrated with the design practice, or a concluding theoretical activity summarizing, evaluating and abstracting knowledge (Goldkuhl and Lind 2010).

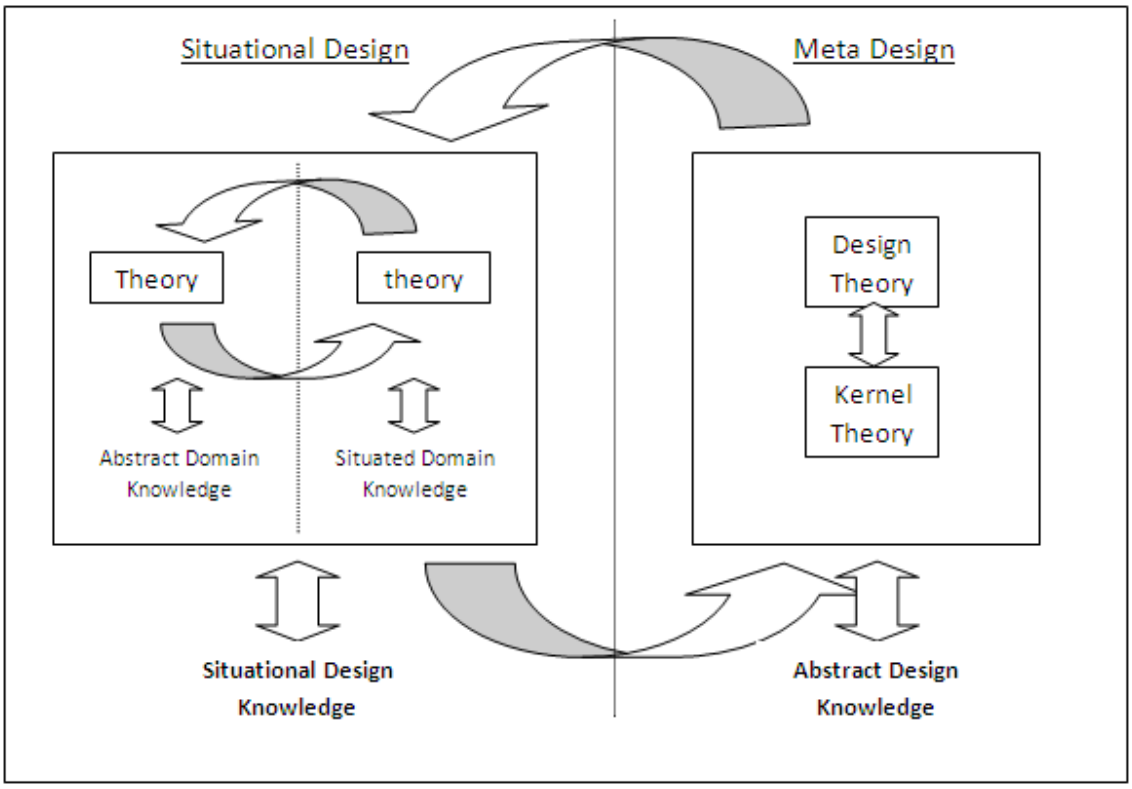

Figure 2: Effective Theory-Building as Scientific Enquiry

5. Final Discussion and Concluding Remark

The IS field has experienced repeated and prolonged bouts of concern about the field's identity and legitimacy (King and Lyytinen 2006). The legitimacy of the field is tied to the *social salience* of the topics studied and in turn the effective communication of these topics to internal and external stakeholders. The main body of this paper has been constructed around the argument of Hirschheim and Klein (2003), *inter alia*, that there exists significant communication disconnects – both with internal and external stakeholders - in the IS field and that these are a serious concern for the future of the field. We argue that *effective theory* plays a role in at least strengthening the future of the field in that (by definition) it ensures that we are producing content relevant to our stakeholders and that this is presented in a way that remains accessible to them. In this way we close disconnects afflicting our field. In presenting our philosophical position, we believe we provide a firm grounding for our calls to focus more of our collective attention on effective theory-building. In addition, we call for scientific inquiry into effective theory-building. While there now appears to be widespread acceptance that we can build theory from within design science, the interesting question of a *design science of theory-building* has not been pursued. "*[D]esign theory can … be produced by researchers who reflect at second-hand on what others have done in constructing artefacts*" (Gregor 2009 p. 6). We feel that theory-building has a lot to learn from considered reflections on exemplars of not just well built theory but also poorly built theory. Gregor (2009 p. 7) suggests that "*systemization of knowledge gained through practice is a legitimate academic activity and one that has led to a number of influential design theories*". We need to systematically extract and abstract design principles for theory-building from extant literature. Our field is in need of the knowledge base that would result from such an initiative. We see no obvious ontological or

epistemological issues blocking such an approach but we leave it up to the reader to judge the value for IS in our call for action.

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