Understanding Acceptance of Information System Development and Management Methodologies by actual Users: A Review and Assessment of Existing Literature

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ABSTRACT
Despite the advantages of using IS methodologies, they are often rejected by actual users. Consequently, researchers have repeatedly attempted to understand why individuals accept certain methodologies while rejecting others. In order to differentiate what has been done from what needs to be done in research, a systematic review of academic studies that examine the acceptance of IS methodologies by actual users was conducted. This review revealed 19 articles. We found that the studies were either: a) descriptive, b) focused on specific determinants, or c) applied a holistic approach, examining methodology acceptance from a number of dimensions. Furthermore, while cognitive aspects have received considerable attention, none of the publications studied the effect of habits, emotions and the personal characteristics of individuals. We also examined the studies with respect to the reported research practices, and thereby identified areas of improvement. Based upon our findings, we developed a research agenda to guide future studies on this crucial subject.

General Terms
Management, Human Factors, Theory

Keywords
Methodology acceptance, literature review

1. INTRODUCTION
Early systems development projects often applied unsystematic methods. As these systems, embedded in a dynamic environment, became increasingly complex, the use of more disciplined methodological approaches proved to be indispensable [1]. Some of the most fundamental concepts that justify the use of structured methodologies, as identified by Fitzgerald, [1] are: i) they reduce complexity by subdividing the development and management process into plausible and coherent steps, ii) they increase transparency and therefore control of the development process, thus reducing risk and uncertainty, iii) they provide a goal-oriented framework that helps to direct the application of techniques and resources at appropriate times during the development and management process, and iv) they enable the standardisation of the development and management process. This facilitates the application of lessons learned from past experiences and also increases productivity and quality, because resource requirements can be predicted and made available as and when necessary [1].

As such, in search of ways to achieve predictable results, organisations either adopt, or customise and adaptively apply, information systems development (ISD) (e.g. object oriented systems development, agile system development etc.) and information system management (ISM) methodologies (e.g. IT project management (PM), enterprise architecture management (EAM), project portfolio management (PPM), IT benefits management (BM) etc.). These consist of tested bodies of methods, rules, and assumptions that fit the organisation [2,3]. Even though a methodological approach to solving complex tasks holds certain benefits, a methodology in itself is no silver bullet [3]. Despite the overwhelming advantages of using an IS methodology, only a handful of organisations are able to develop and implement one that is useful to the individuals that actually have to use it. Furthermore, only about 50% of organisations are able to motivate their staff to use such IS methodologies [4]. In a survey conducted by Russo et al. [5], they report that only 6% of organisations claim that their methodologies are always used as specified. Eva and Guilford [6] conducted a survey of 152 organisations, and found that only 17% of respondents use a methodology as a whole. As a result of this inconsistent use, despite the high investment in the development of IS methodologies and the pressure to use them, their practical usefulness is still a controversial issue [7]. The root of these problems lie, among others, in the failure to understand the needs of actual methodology users, which ultimately leads to the development and implementation of an IS Methodology that does not suit the user's needs and skills, and which they consequently reject.

The reason why user acceptance of IS methodologies is so much more important for consistent use, than acceptance at an organisational level is because, although an IS methodology is "adopted" by an organisation, the extent of its use (i.e. breadth and depth) is usually decided by the actual users of the methodology [8,9]. The importance to distinguish between the intentions of individuals to use a methodology from those of an organisation, is also suggested by Fichman [10]: "the relative lack of attention to individual adoption of technologies is unfortunate because, while the organisation as a whole makes the initial adoption decision for such technologies, the actions of individual adopters (e.g., how enthusiastically they embrace the innovation) can be expected to have a large impact on the implementation process". Thus, overcoming resistance to IS

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methodology acceptance at an individual level is a critical area of concern in IS research [12].

Another issue, critical to understanding acceptance of methodologies, is recognising that comprehensive methodologies are not similar to individual methods (e.g. stakeholder analysis, use cases, entity relationship diagrams etc) and tools (e.g. ARIS, CASE tools, project management information systems, etc.). Although literature exists on the use of methods and tools, there is not sufficient justification for assuming, without empirical validation, that the results from the method/tool acceptance domain would be applicable to the *methodology* usage context [8]. Reasons why the adoption and success of new methodologies might be so different and so much more challenging than the adoption and success of specific methods and tools lies partly in the tacit organisational and individual problems that are caused by the introduction of new methodologies (which still remain insufficiently explored) [13]. Radical changes that are accompanied by new methodologies justify the need for exclusive research on their impact, instead of simply considering research on the adoption of methods and tools (which represent minor changes), to be directly applicable in the context of methodologies [14]. For example, the stress associated with the learning of a new methodology, the fear, and the impact on self-esteem and identity that is associated with the organisational restructuring or re-engineering can be grave. Little consideration is given to the emotional costs of role conflict and ambiguity, organizational conflict or workplace transformation, which recognizes the communication practices, personal relationships and co-ordination within the organization [13]. Consequently, the magnitude of behavioural change entailed by the adoption of a methodology is greater than that of a method or a tool [8]. All this warrants considering the antecedents of adoption and success of methodologies and the interrelationships between them to be different than that of individual methods and tools.

In order to better understand the domain of methodology acceptance, there is a need to conduct a critical review of the extant literature with the aim of: a) distinguishing what has been done from what needs to be done, b) synthesising and gaining a new perspective, c) discovering avenues for future research on methodology adoption at an individual level [15], and d) developing a research agenda for future studies. Consequently, our critical analysis is organised along the following research questions: 1) What findings have been reported in studies up to now?, and 2) what are the potential fruitful avenues for future research regarding an *individual's* acceptance of IS *development* and *management* (ISDM) *methodologies*? As to our knowledge, no systematic review of ISDM methodologies has been published before. Existing reviews focus on very specific types of ISD methodologies, especially agile and object-oriented system development (for e.g. [16,17]. Furthermore, the previous reviews, except that of [17], generally do not include any examination of the research design and methodology of the published studies, as in this systematic review. We feel that this overview will be important for researchers who wish to identify areas that have been researched or in which research is lacking, as well for practitioners who want to stay up to date on the current state of research in the general domain of ISDM methodologies.

The remainder of the paper is organized as follows: section 2 defines IS methodology as it is used in this paper, differentiating it from methods and tools. In this section, we also provide justification for the necessity of this differentiation. Section 3 explains the literature review and research practice assessment methodology. In section 4, we present the results, critically examine the literature review, and discuss future research opportunities. In section 5, we discuss the limitation of the literature review and provide an overview of the next steps in our research that i) aims at providing a solution to the limitations and ii) elaborates on how we plan to build upon our literature review results in order to develop a better understanding of the research topic at hand. We conclude with section 6, highlighting the contributions of the current research.

2. BACKGROUND – WHAT IS A METHODOLOGY?

One of the most fundamental problem in the literature – as identified by Iivari et. al. [3] – is the debate on the use of method as opposed to methodology, or vise versa. They find that some authors use method and methodology interchangeably; that some think methods encompass methodologies; that some think methodologies encompass methods; and that some believe that there are no methodologies, only techniques. Results of our literature review revealed that this debate can be extended to include tools, since some studies regard methods to be tools (e.g. [18]). Therefore, we consider that the discussion on ISDM methodologies can be updated to methodologies vs. methods vs. tools. The four-tiered conceptual structure, developed by Iivari et al. [3], makes it relatively easy to classify the large number of existing methodologies as a result of its abstract and parsimonious construction. Using this structure, we propose the following definitions, which help us to better understand methodologies, their parts and the interrelationships between them (see Figure 1).

Methodology. An ISDM methodology is a collection of goal-oriented, problem solving methods/techniques governed by a set of normative principles [19], beliefs, and a multi-step procedure that prescribes what to do and how to do things [20,21].
Methods/Techniques. An ISDM method/technique consists of a well-defined sequence of elementary operations for conducting a portion of a phase of a methodology (consult [22] for a detailed overview of existing IS methods).
Tools. An ISDM tool is an artifact, (usually software programs) that individuals may or may not use to support and facilitate the execution of a method/technique [12,14].

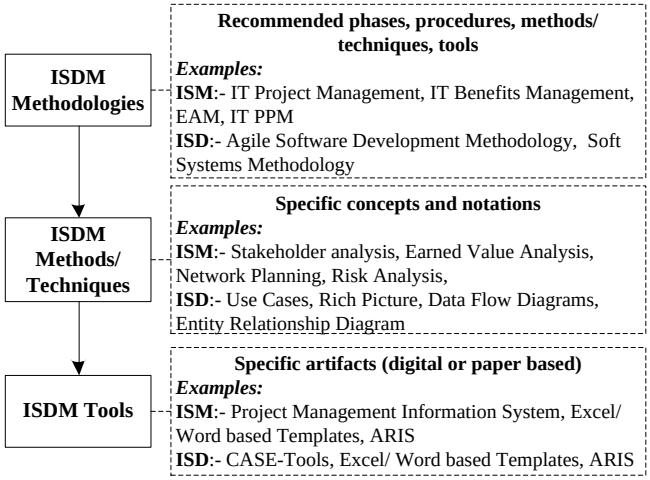

Figure 1. Overview of ISDM Methodology, Methods, & Tools

An ISDM methodology implies a holistic goal-oriented approach, with cultural, educational, ideological and/or strategic implications, that guides the work and cooperation of the various parties (stakeholders) involved in the *development* and *management* of IS/IT [23]. Methods and tools are only a subset of methodologies meant to support them (a means to an end) [23]. It is important that we distinguish between the use of tools, techniques/methods, and the use of an entire methodology, since tools and techniques can be used in the absence of a formal methodology. Furthermore, the use of a methodology represents a much more radical change than the use of tools and methods [12,8]. This distinction was demonstrated by Orlikowski [14], and mentioned by Hardgrave et al. [12]. Orlikowski [14] examined two CASE tool adoption environments: in the first environment, a methodology was present and CASE tools were adopted to support the existing methodology (a minor change for the stakeholders); the second environment had no methodology in place. Therefore, an ISD methodology and a CASE tool, specifically designed for that methodology, was adopted (a radical change for the stakeholders). Comparing the two adoption scenarios, Orlikowski found that the reactions of the stakeholders significantly differed. He concluded that this was because stakeholders in the first environment did not have to undergo radical change, compared to those in the second environment who had to adopt a complete new methodology with the CASE tool. This particular example illustrates clearly the need for a more holistic approach when studying methodology acceptance.

3. RESEARCH METHODOLOGY

We conducted an extensive review of existing literature between July 2009 – Nov 2009, as recommended by Webster and Watson [24]. Contrary to the more popular review approach of studying only selected top journals, we also included conference proceedings, working papers, editorials, book chapters, and dissertations. We felt that a complete review should not be confined to one methodology, one set of journals, or one geographic location [24].

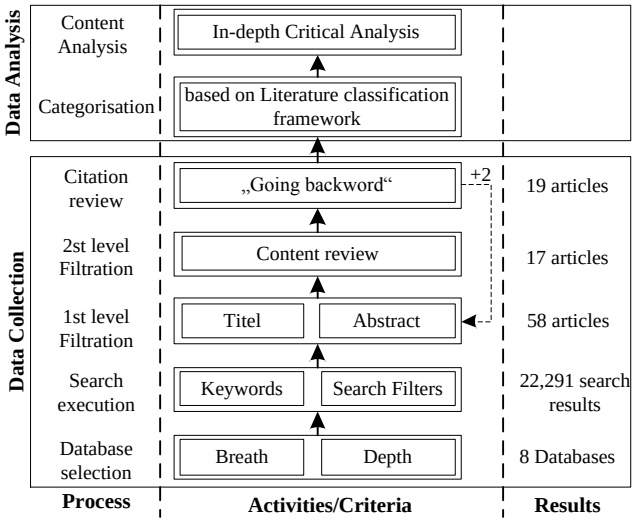

Figure 2: Data Collection and Analysis Methodology

Additionally, because MIS is an interdisciplinary field, we extended our review to include related fields such as marketing, psychology, sociology, and operations research. Figure 2 provides an overview of our literature review methodology as it is explained in the subsequent sections.

3.1 Data collection

For purposes of data collection, we again relied on the advice of Webster and Watson [24], and applied a structured approach. We searched a number of online databases, using a combination of keywords, for example methodology, adoption, use etc. The use of multiple databases and keywords allowed us to cover a large number of different publications, preventing the review from being too narrow or shallow [25]. Since our goal was to potentially investigate all published academic articles in the area of interest, we did not confine the search to certain time periods. The search resulted in a total number of 22,291 results (see Table 1).

Table 1. Search Criteria and Results

Database	Search Filters	Hits
EBSCO (covers 4 sub-databases)	case study, editorial, interview, proceeding, report, scholarly (peer reviewed) journals, collective volume, working paper, dissertation, journal article, periodicals, conference proceedings, book chapter, report	6,719
Science Direct	article, editorial, report, discussion, short survey, publisher's note	6,055
ACM Portal	journal, proceeding , thesis, report	4,932
Emerald Insight	conceptual paper, general review, case study, literature review, research paper, technical paper, viewpoint	351
SpringerLink	journal articles, book chapters	4,234

Although the number might seem overwhelming at first, a large number of search hits had little in common with the specific research area and were consequently dismissed quickly. The initial filtering through the search results was done by examining the title and the abstract. However, in a large number of cases, the abstract was not examined, because the title was found to provide sufficient evidence that the article did not address the

research topic at hand. We identified 58 publications that were related to the research at hand and were consequently selected for further examination. The full text of each research paper was further reviewed to eliminate those that were not actually related to ISDM methodology usage behaviour of individuals. The review yielded 17 articles related to our very specific research interest. This sharp reduction in the final list of research papers can be explained by the fact that many papers studied methods and tools but classified them as a study of methodologies (for e.g. [26,27]) or focused on organisational adoption decisions instead of individual acceptance [3]. Such papers appeared in the search results only because their title contained the keywords we used, but were discarded after we recognised that they did not address the research topic at hand. To conclude the data-gathering phase, we "went backward" [24] by reviewing the citations of the pool of 17 articles to find relevant articles that we might have overlooked and that should be considered. This revealed another 2 articles, increasing the final number of publications to 19. A work-log revealed that a total of 74 hours were spent on data collection (this does not include data analysis) and that the majority of the work i.e. 71% was done on weekends and holidays.

3.2 Data analysis

We subjected the final pool of 19 papers to a classification, to systematically categorise and describe the selected literature. The classification framework (see Figure 3) was constructed after examining the classification scheme of similar studies (for e.g. [28], [29], [30]), which present the most comprehensive classification of MIS topics. We also adapted by added further categories and items to cover all the important aspects of the research objectives at hand. The full text of each of the papers was studied to classify the entire literature, based on a number of dimensions of our classification framework such as object of analysis, unit of analysis, independent and dependent variables, theories used, sample source, sample size, data collection method, data analysis method and research type [29].

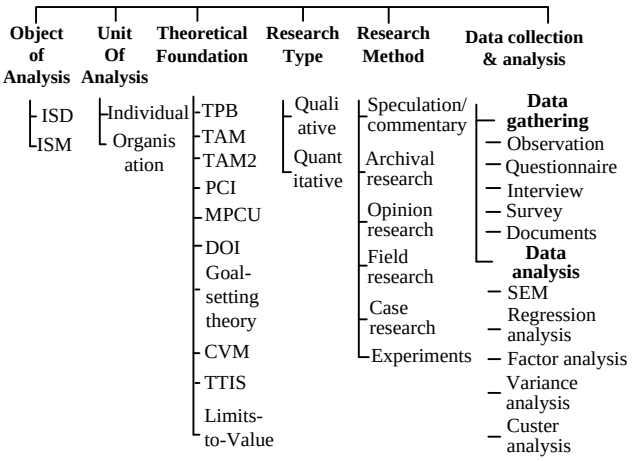

Figure 3. Literature Classification framework

3.3 Examination of Research Practices

Each of the final 19 studies was examined according to 10 criteria (C1-C10 in table 2). These criteria were based on principles of good practice for qualitative (for e.g. [31,32]) and quantitative research (for e.g. [33,34]), in a process similar to that applied by Dybå and Dingsøyr [17]. The 10 criteria, adopted from Dybå and Dingsøyr [17], covered four main issues pertaining to quality, which need to be considered when evaluating studies: a) *Academic* - Is it an academic Article?, b) *Rigour* - Has a thorough and appropriate approach been applied to key research methods in the study?, c) *Credibility* - Are the findings well-presented and meaningful?, and d) *Relevance* - Are the findings useful to the industry and/or the research community?. These 10 criteria provide a deeper understanding of the *"reported"* research practices/methodology of the studies. Each of the 10 criteria was examined, using an evaluation form that consisted of 34 questions, developed and validated by Dybå and Dingsøyr [17] (in some cases, wording of the original questions were changed to suit our research.) (Please contact the authors for the evaluation form.)

Table 2. Evaluation Criteria adopted from Dybå and Dingsøyr [17]

Academic	**C1. Research**: Is the paper based on research (or is it merely a ''lessons learned" report, based on expert opinion, without a concrete methodology)?
	C2. Aim: Is there a clear statement of the aims of the research?
	C3. Context: Is there an adequate description of the context in which the research was carried out?
Rigour	**C4. Research Design:** Was the research design described sufficiently and was it appropriate to address the aims of the research?
	C5. Sampling: Was the sampling strategy described sufficiently with regard to the aims of the research?
	C6. Data Collection: Was the data collected in a way that addressed the research issue?
	C7. Data Analysis: Was the data analysis described sufficiently with regard to the aims of the research?
Credibility	**C8. Reflexivity**: Has the relationship between researcher and participants been considered to an adequate degree?
	C9. Findings: Is there a clear statement of findings?
Relevance	**C10. Value:** Is the study of value for research and/or practice?

4. RESULTS AND FUTURE RESEARCH OPPORTUNITIES

4.1 Critical Review

In general, while development of methodologies has been widely researched, there has been little research on the determinants of individual intentions to use methodologies in the more general context of ISDM methodologies. A number of studies suggest that the use of methodologies is limited in practice, and that – even when they are used – are not literally applied. This signals a fundamental flaw in methodology engineering. Other authors go so far as to suggest that methodologies are useful to beginners, rather than to experienced individuals [3]. A number of studies have attempted to understand the adoption of methodologies by organisations, using organisations as their unit of analysis (for e.g. [35-38]). While these studies shed light on the important organisational-level decision to adopt software development innovations, they do not focus on the individual-level determinants of intentions. Others study the effects of using a methodology on project success or task performance (for e.g. [17,39,40]). On the whole, while there is abundant software engineering research on development of particular methodologies

(for e.g. [41]), studies that examine the determinants of methodology use and success at an individual level, considering not only ISD but also ISM methodologies, are scarce [42]. A plethora of research projects address the use of certain tools and techniques/methods [43-47] that may form part of a methodology. Some studies regard adoption merely as *intention to use* and do not study the *actual use* of the methodology (for e.g. [8], [48], [12]). In the following subsections we provide an overview of the specific studies related to the research topic at hand.

4.1.1 Descriptive results

Our literature review revealed, as shown in Figure 4, that research on ISDM methodology acceptance and usage at an individual level started as early as 1993 and peaked in 2002 when 3 articles were published. There was a significant gap in research in the 1990s. No articles were published between 1994 and 1996. After 2000, the number stabilised, with regular publications. Furthermore, 17 articles were published in academic journals, and 2 appeared in conference proceedings. The contribution and innovativeness of these publications needs to be examined further, since almost all studies were published in second tier or lower outlets (we analyse this situation in the "Discussion and Research Agenda" section after critically examining the content of the studies).

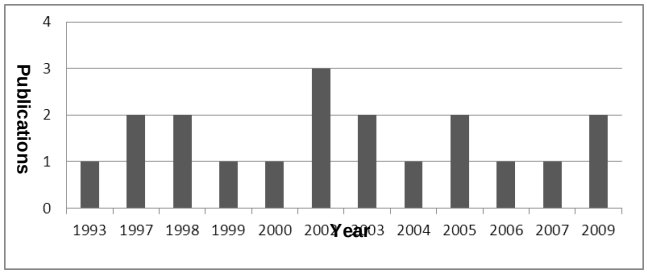

Figure 4. Overview of the studies by publication year

We also found that previous studies in the area of qualitative research consisted mainly of case research (CR) (2 publications), opinion research (OR) (1 publication), archival research (AR) including literature reviews (3 publications), and field research (FR) (2 publications). Surprisingly, all 19 studies focused on ISD methodologies and none analyzed ISM methodologies.

Table 3. Overview of Research Approach of Previous Studies

	Qualitative Research				Quantitative Research		Total
	AR	OR	CR	FR	Descriptive/ Exploratory	Confirmatory/ Positivistic	
ISD	3	1	2	2	8	3	**19**
ISM	-	-	-	-	-	-	**0**
Total	3	1	2	2	8	3	**19**
	8				**11**		

Table 3 summarises the research approach of prior studies on the adoption of ISDM methodologies, based on the categorisation scheme of Stone [28] and exposes areas in which research is severely lacking. Studies based on quantitative research comprise mostly descriptive and exploratory research (8 publications) with few studies of confirmatory positivist nature based on valid measures and extensive statistical analysis [8]. The lack of quantitative confirmatory studies that conform to the generally accepted validity criteria [33,34,49-51] highlights the need to develop a conceptual theoretical framework, which can then form a basis for future confirmatory positivist research. In the next section, we discuss and critically examine a subset of these publications, which we consider to have significantly contributed to the existing body of knowledge on this very specific topic.

4.1.2 Assessment of Research Practices

The goal of the assessment was not to criticise the commendable efforts of the researchers, but to point out aspects/issues of academic research that future studies should clarify and demonstrate with appropriate depth, so that the readers can better understand the context, method, and limitations of the research, thereby increasing comparability of findings with other similar studies.

We found that almost all the articles had clearly formulated research questions, and an adequate description of the research context. Only one article failed to state the research objectives clearly. For three of the 19 studies, the research design was found to be described insufficiently, and three did not apply a sampling strategy suitable for their research design. In these studies either a) data characteristics and origin was not mentioned, b) sample was not random, c) participants were chosen subjectively and therefore potentially affected by researcher bias, or d) the sampling did not fully cover the various segments of the target population. Two studies did not mention how data was collected and six articles did not describe their data analysis procedures sufficiently. For example, in some studies authors failed to address aspects of researcher triangulation, or did not mention analysis methods applied or tools used. In three studies we found the possibility of researcher bias was mentioned. Only three studies were found to have reported in a manner as to meet the 10 criteria. In general, we found that a) methods were not described sufficiently, b) biases in qualitative as well as quantitative studies were not addressed adequately, and c) data collection and analysis methods were not always described well. This is similar to the findings reported by Dybå and Dingsøyr [17], which suggests that studies in the domain of methodology acceptance are also plagued by common shortcomings found in other domains.

4.1.3 Content overview

As illustrated in the previous section, earlier studies on ISDM methodologies are largely descriptive and do not explain acceptance at an individual level [52]. It is only very recently that more explanatory studies that actually study the research problems at hand [52], have appeared. Westrup [53] conducted longitudinal case studies of the development and implementation of IS to explore how ISD methodologies are acquired by developers, and describe some of the ways in which methodologies are used in practice. An important conclusion of the study is that users reinterpreted the methodologies in each situation. Therefore, they did not follow the methodology rigorously. They also observe that developers used methodologies to complete deliverables and as insurance, to deny responsibility in case of project failure. Based upon the use of methodology manuals, Hidding [54] comes to a similar conclusion. He finds that even though practitioners seldom read methodology material, they are still able to produce the deliverables. Based on his research, Hidding [54] suggests that people assume different

roles when they use methodologies. Based on their roles, they have different information needs, which, when not satisfied, may lead to a rejection of a particular methodology. Roberts et al. [55,56] identified a number of factors, based on an exploratory factor analysis (EFA) of 88 survey items, that might affect the acceptance of methodologies among software developers. However, researchers (e.g. [57]) have pointed out that the study lacked a theoretical basis, compromising its internal validity; used measures that were not rigorously validated, and did not analyse the relationship between the identified factors and developers' usage intentions. Fitzgerald [1] found, after conducting a survey, that project size, -type, -client, user experience, and contingency might affect the decision of individuals to use an ISD methodology.

Some studies focus on very specific determinants of methodology adoption and suggest (directly or indirectly) determinants that could impact the behavioral decision. Kautz and Heje [58] conducted explorative studies to understand the role of formal university education on the adoption of systems development methodologies by means of grounded theory. They found a positive effect. However, the authors mentioned themselves that only a simple statistical analysis was carried out in their research. Huisman and Iivari [48] studied the perceptions of IS managers and developers, and found that managers had more positive views on the use of ISD methodologies than the developers. They concluded that ISD methodologies reflect management's agenda, implying different expectations, assumptions and norms. This provides further evidence for the widespread understanding that while developing and implementing IS methodologies, organisations often do not consider the values, beliefs and needs of the actual users. This might be the cause of the methodologies eventually being rejected. In a related study, Iivari and Huisman [52] found that organisational culture orientations, especially hierarchical and rational organisational cultures, affect the use of ISD methodologies. Most of the factors that have been reported have been studied separately and, for this reason, the relationships among them have not been explored sufficiently [9]. Although these studies identify some factors to have a significant effect on usage, when grouped together with other factors, they might become insignificant. Therefore, we suggest, along with Khalifa and Verner [9], that in order to determine what factors really drive the extent of use of ISDM methodologies, the combined effects (instead of isolated study of the effects) of these factors need to be examined.

In a plethora of research, the use of ISDM methodologies per se has not been studied, but rather the adoption of certain methods/techniques (such as object-oriented programming) and tools (such as CASE tools) [8]. Some of these studies have contributed in a major way to understanding the antecedents of an individual's decision to use ISDM methodologies. For example, Leonard-Barton [46] studied innovation acceptance, based on the adoption or rejection of structured systems analysis (SSA), and suggested that social pressure and training positively influence the use of methodologies. Although the author herself mentions that SSA is a *method* used only in the first phase of systems development and not a comprehensive methodology, we still consider her findings worthy of acknowledgement since they were published at a time when research on the adoption of IS methodologies was in its infancy. Khalifa and Verner [9] studied several determinants of software developers' use of two specific approaches, namely prototyping and waterfall. Although, similar to Palvia and Nosek [22], they regard prototyping to be a methodology, we consider it to be a method/technique since it is very often used within the waterfall methodology, as the authors point out themselves. Johnson et al. [59] applied TPB to examine the beliefs that underlie attitudes, social norms and behavioural control constructs, to examine IS developers' beliefs underlying intentions to use object oriented (OO) *methods*; however, they did not empirically test the relationships between the constructs. Research discussed in this paragraph represents an important step towards examining the underlying topic, but since the use of ISDM methodologies involves radical change compared to using simple methods and tools, we consider human behaviour, in the context of using complete methodologies, to be more complex. This requires a deeper examination that should take into consideration not only cognitive but also automatic user behaviour, such as emotions and habits.

Riemenschneider et al. [8] attempted to remedy some of the shortcomings of the research of Johnson et al. [59] by using five theoretical models to study the intentions of software developers to use methodologies. He found that the usefulness of methodologies plays the most crucial role in the adoption process. Being the first study to empirically test these five models in a methodology context, Riemenschneider et al. [8] provided thoughtful insights on the determinants of intention to adopt methodologies. In a related study (based on the quantitative data of Riemenschneider et. al. [8]), Hardgrave et al. [12] investigated the determinants of the individual developer's *intentions* to follow methodologies, based on TAM and DOI. In their study, perceived usefulness, social pressure, perceived compatibility and organisational mandate were found to have a direct influence on individual developers' intentions to follow methodologies, whereas social pressure, complexity and perceived compatibility were found to be significant determinants of perceived usefulness. In a similar study, Hardgrave and Johnson [60] found that organisational usefulness (OU), subjective norm and perceived behavioural control-internal significantly influenced intentions of software developers to use OO-SD processes. Although they propose that personal usefulness (PU) might also affect the intention to use, they could not psychometrically separate it from organisational usefulness. They suggest that the cause of this might lie in that "…developers do not view their personal benefits separately from organisational benefits" [60]. We suggest differentiating OU and PU based on other dimensions, influenced by purely personal interests (independent of organisational usefulness) such as materialism and enjoyment. Kacmar et al. [61] conducted a field study of ISD methodologies, applying theories of social exchange, task-technology fit, and technology acceptance. They found that perceptions of the outputs and deliverables from a methodology, and perceptions of challenges and obstacles to using and applying a methodology, to significantly and positively influence perceived usefulness. They found that these factors also negatively influence ease of use of a methodology, respectively, within a developer's organisation. Although Riemenschneider et al.[8], Hardgrave et al. [12] and Hardgrave and Johnson [60]

contribute significantly in understanding the topic at hand, they consider adoption to be merely the *intention to use* and do not study the *actual use* of the methodology. In our view, the mere *intention* to use a methodology, even though it plays a major role in determining actual use, does not imply that the individual will actually use the methodology. As such, future research could focus on studying the *actual use* of a methodology, rather than the mere intention to do so.

4.2 Discussion and Research Agenda

Existing research has attempted to examine usage behavior of individuals regarding IS methodologies from a technology adoption perspective. Some of these studies view software development methodologies as technology innovations and make use of technology adoption theories and models, such as Diffusion of Innovations Theory (DOI) and Technology Acceptance Model (TAM) (for e.g. [8,12,62,61]). Others apply sociological models such as the Theory of Planned Behaviour (TPB) and Triandis' Theory of Interpersonal Behavior (TTIB) to examine the development of the intention of individuals to use methodologies (for e.g. [63,9]. While previous studies, based on the technological and behavioural models, have been found to be suitable for examining the acceptance of IS methodologies, they focus mainly on *technology characteristics*, such as perceived usefulness, perceived ease of use, perceived complexity, and adaptability [16]. Moreover, these technical characteristics examine the decision-making process of individuals to adopt a methodology based upon the (potential) *benefits* that the particular methodology provides. *Costs* of adopting and using new methodologies have, up until now, not been studied, and depicts a potential gap in this research topic. In order to remedy this, future studies might be able to use the extensive switching costs topology proposed by Burnham et al. [64]. In the context of methodology acceptance at an individual level, following switching costs in particular might inhibit a person's desire to use new methodologies [64]: a) *Economic risk costs* are the costs of accepting uncertainty with the potential for a negative outcome when switching to a new methodology about which the user has insufficient information, b) *Evaluation costs* are the time and effort costs, associated with the search, and analysis is needed to make a decision to switch to a new methodology, c) *Learning costs* are the time and effort costs of acquiring new skills or know-how in order to use a methodology effectively, and d) *Personal relationship loss costs* are the affective losses associated with breaking the bonds of identification that have been formed with the people with whom the individual user used to interact before, when using old methodologies/processes (e.g. new reporting processes/roles change the way users interact with whom).

In order to fully understand the effect of costs, researchers should, in addition to switching costs, also examine *sunk costs* (i.e. irretrievable expenditures). Numerous empirical studies (for an overview, consult [65]) have shown that sunk costs cause a decision-making bias known as sunk-cost fallacy (or also escalation of commitment) that reflects the tendency in individuals to invest more future resources in a situation in which a prior investment has been made, compared to a similar situation in which a prior investment has not been made. Based on this research stream, sunk costs might hinder individuals from adopting and using new methodologies since these people have already invested considerable time and effort in learning their present methodology/way of doing things (some might even have costly certifications such as PRINCE2 or PMI, which might be of use in the context of a new methodology).

There has been a significant movement in the psychology discipline, in recent decades, in which the affective or emotional aspect is moving towards mainstream psychology, [66] based on the realisation that a realistic human being has more than just the physical and cognitive aspects. However, strikingly, none of the studies conducted in the past have attempted to examine the effect of *non-technological characteristics* such as a) traits of individuals, b) habits and emotions, c) self-beliefs such as self-concept, and d) organisational and national culture in the context of methodology usage. Research, in particular, has not attempted to understand the effect of deep-rooted personal characteristics and traits of individual users, such as their needs, as examined by needs theories, such as Maslow's hierarchy of needs [67] and Murray's theory of psychogenic needs [68], expectancies, age and gender. Needs theories, specifically, have become widely accepted in research studies because they are considered to be the most enduring ways to understand the motivation of an individual to act in a particular way [69]. According to the needs theories, individuals are motivated to use a particular methodology by their individual desire to satisfy certain needs. Many definitions of basic needs have been proposed. The one presented by Ryan and Deci [70] is most consistent with the scope of methodology acceptance. They indicate that "a basic need, whether it be a physiological need or a psychological need, is an energising state that, if satisfied, conduces toward health and well-being but, if not satisfied, contributes to pathology and ill-being" [70]. This implies that if a methodology fails to satisfy an individual's basic needs, this might result in serious discomfort, and this dissatisfaction might be visible in the individual's rejection of the particular methodology.

On another note, a lack of significant innovativeness and originality can be observed in the field of quantitative research (e.g. [8,9,12,59,63]). Studies based upon this research type, in particular, have generally resorted to simply applying highly validated theoretical models from other fields, for example TPB, TAM, DOI, TTIB etc. without modifications on the domain of methodology acceptance. Such research is not without merit. However, it leads to conclusions that are at best already known and well established. This might help explain why almost no studies have been published in top tier journals (see descriptive results section). Researchers are therefore advised to conceptually analyse the problem at hand from different angles, rather than only from what is already known, in order to develop new theoretical concepts and a deeper understanding of human behaviour, specific to the methodology acceptance domain.

Future research could also focus on understanding the actual use of methodologies (measured via documented usage) and not just self-reported intention of using methodologies, since intention might not always lead to actual use. Another crucial area that was neglected in past studies is post-adoption use, i.e. reuse of methodologies past the initial adoption and usage. This is important because, while seeking to examine why individuals

accept particular methodologies, the goal is not just to understand "one-time" use, but rather the repeated continued long-term use of a methodology. Furthermore, past studies have been conducted almost exclusively in the field of software development (e.g. agile and object-oriented software development methodologies), neglecting IS management methodologies. We feel that the discussion on IS methodologies should be more general, taking into consideration not only IS development but also IS management practices, since both ISD and ISM methodologies usually tend to address tasks and processes, consist of phases and procedures that are to be followed strictly [13]. Both types of methodologies are "…concerned with exploring and understanding information technology as a corporate resource that determines both the strategic and operational capabilities of the firm in designing and developing products and services for maximum customer satisfaction, corporate productivity, profitability and competitiveness" [71]. As such, results of research on ISD methodologies might not be different from ISM methodologies. This calls for research on methodology adoption to be of higher generalizability by taking into consideration not only ISD but also ISM methodologies. From a research design perspective, while previous quantitative and qualitative studies are largely cross-sectional research, longitudinal studies involving repeated observations of the same individuals over long periods of time might be better suited to observe the development of behaviour, since time is one of the most important explanations of change. Therefore, longitudinal studies can give answers to questions concerning behavioural change/intention to change that cross-sectional studies cannot.

5. LIMITATIONS OF THIS REVIEW AND NEXT STEPS

The main limitation of this review is potential bias in the selection, classification and assessing of the literature, which might be caused by subjective opinions of the researchers. In order to reduce this bias and, as part of the next steps, another researcher will independently analyse and classify the final pool of 19 articles. Subsequently, in discussion with the researcher, we will develop a common understanding of the results by comparing his evaluation with ours and critically reflecting on it. In case of unresolvable differences, we will call upon another independent researcher to provide further feedback. Another limitation pertains to the data collection that might be hindered by the keywords we used. Considering that there were more than 1,000 ISDM methodologies and that most of them are commercial products named creatively and not standardised [36,1,3], our choice of keywords and search strings might have failed to address "buzz words" and unique names of methodologies. Concerning data extraction, we found that some studies did not describe their methods and samples adequately. There is therefore a possibility that the extraction process might have resulted in some inaccuracy in data. Furthermore, our categorisation might have suffered, and could not always be conducted to a very satisfactory degree because some articles lacked sufficient details about the design and findings. Owing to this, we might have differed in what we actually extracted. There is therefore a possibility that the extraction process may have resulted in some inaccuracy in the data.

What follows in our research program will build upon our literature review findings. After uncovering what has been done and what needs to be done, the next step is *how* to do it. Our long-term goal is to discover new variables and relationships, beyond what is already known. For this, two researchers will catalogue and classify existing validated and tested theories and models that might be useful in examining methodology acceptance by individuals, especially in the areas lacking research. Following the cataloguing and classification, the researchers will extract, from these theories, relevant factors and constructs that might help explain methodology acceptance as per guidelines of good qualitative analysis (for e.g. [31,32]), with the help of the software Atlas.ti. The research community might be able to use our work as a rich source to develop a better understanding of the theoretical fieldwork of methodology usage and success. We hope that such a "database" might prove to be a useful source of guidance to researches when looking at the problem at hand from different perspectives. It might help them by sparking new ideas and developing exciting concepts. Regarding the current status of our categorisation and classification project, we have to date identified and conducted an initial classification of 46 theories. We acknowledge that, as a result of subjectivity, limited resources and information processing capabilities, we are sure to have missed out some potential theoretical concepts. We also advise researchers to be critical when they use a theory, because theories are subjectively measured and as such one must make a judgment about which theories are most helpful.

6. CONCLUSIONS

The present study attempts to further the research on individual acceptance and use of ISDM methodologies by providing an overview of research conducted in this area, and by discussing what needs to be done. Our assessment of research practices of the extant literature is a rigorous approach to identify areas of improvement. While such a thorough assessment might not be practically possible for large-scale literature reviews (because of time constraints), we feel that reviews focusing on specific topics of interest, analysing a relatively small number of studies, should not fear going the extra mile to enrich the research community with deeper insights.

The 19 identified studies fell into three broad categories: a) those that are mainly descriptive, providing a snapshot of current state of methodology acceptance, b) those that focus on very specific determinants of methodology use, such as education and training, and c) those that apply a holistic approach in examining a methodology acceptance from a number of dimensions, including usefulness, social pressure, ease of use and organisational support. Our research has implications for practitioners as well as researchers. The various areas reveal a different aspect of human behaviour and personality, and each can serve as a point of attack for organisations in attempts to steer it in the desired direction [72]. A better understanding of these topics would enable organisations to design interventions that would increase the use of ISDM methodologies in order to improve productivity and quality, and to reduce effort.

A clear finding of this review is that non-technical, or "soft factors", such as culture, needs of individuals, habits and

emotions have not been addressed. We also do not know much about post-adoption use of methodologies. Another very promising field of focus is how culture influences the decision of individuals to adopt methodologies. Although the understanding of cultural influences has been repeatedly emphasised by top journal editors – e.g., Straub [73] – it is seldom incorporated in research, generally because of the difficulty of data collection. From a research design perspective, we found that previous studies were mostly of qualitative nature. Even quantitative research is mainly descriptive. This calls for building conceptual models and testing them in a confirmatory fashion, to discover causal relations that might aid a better understanding and predict ion of methodology usage. Furthermore, studies could adopt a longitudinal approach in order to better understand change in behaviour of individuals over time, since time provides one of the most important explanations of change. In conclusion, user acceptance of ISDM methodologies remains a complex and elusive, yet important, phenomenon. Past research has made progress in unravelling some of its mysteries, but we see that there is a backlog of research issues, which still need to be addressed.

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