Understanding the Nature of Use Regarding System Development and Management Methodologies - Using Psychoanalysis to Understand the Influences of Methodology Attributes

Kunal Mohan  
EBS Business School  
Kunal.Mohan@ebs.edu

Frederik Ahlemann  
EBS Business School  
Frederik.Ahlemann@ebs.edu

Maurice Kügler  
EBS Business School  
Maurice.Kuegler@ebs.edu

Abstract

Despite the overwhelming advantages of using system development methodologies (SDMs), organizations are rarely able to motivate their staff to use them. Even when employees use these methodologies, the question regarding the nature of their use remains, i.e. how are they using them? To better understand the way employees use SDMs, we conceptualize usage into three distinct constructs: committed, compliant, and resistant use. Applying a diffusion of innovations perspective, we develop and test conceptual models using the structural equation modeling technique, based on a sample size of 1474 participants, to examine how attributes of an SDM (relative advantage, complexity, compatibility, and image) influence employees’ usage behavior.

1. Introduction

In the search for ways to find replicable, pragmatic, cost-effective, and timely solutions to real-world problems in systematic and predictable ways, organizations either adopt or customize and adaptively apply system development methodologies (SDMs), which consist of tested bodies of methods, rules, and procedures. Despite the overwhelming advantages of using an SDM, only a handful of organizations are able to make their staff use such methodologies. For example, a software development project survey conducted by Russo et al. [26] shows that only 6% of organizations claim that their methodologies are always used as specified. Even when employees use these methodologies, the question regarding the nature of their use remains, i.e. how are they using them? This question is critical, because use alone is not sufficient to ensure sustained productivity gains. This implies that the use of an SDM is an essential condition, though not necessarily sufficient, for achieving task-related performance gains. This problem is reflected in conflicting results, reported in previous studies in the information system (IS) domain, especially regarding the relationship between IS use and productivity gains (for an overview, consult Jain & Kanungo [16]). This might be the case because use behavior has traditionally been studied in terms of time duration and frequency. However, these quantitative dimensions of use behavior fail to capture the qualitative differences in end-user behavior. As such, “simply saying that more use will yield more benefits, without considering the nature of this use, is clearly insufficient. Researchers must also consider the nature, quality, and appropriateness…” [7] of SDM use. We therefore attempt to capture the qualitative difference in the nature of SDM usage behavior by conceptualizing it as destructive resistant use, superficial compliant use or deeply ingrained committed use based upon existing literature. We show that the three behaviors are conceptually distinct and provide an initial validation, based on the diffusion of innovations theory (DOI), by examining how attributes of an SDM influence the three usage behaviors.

Research in a vast array of academic disciplines has applied DOI theory in understanding the process through which people accept new ideas and technologies. Some of these studies attempted to examine individual usage behavior regarding methodologies from a technology adoption perspective. They view software development methodologies as technology innovations and use DOI theory and the technology acceptance model (TAM). These studies come to similar conclusions, and state that methodology characteristic usefulness is the single most important determinant of methodology acceptance and use. Subsequent research focused on this variable, but neglected other potential crucial methodology attributes. Critics also suggested that TAM and the theory of planned behavior (TPB) are too parsimonious and need to be expanded by integrating variables specific to the innovation under investigation [30]. However, even when a handful of researchers examine other methodology attributes, these are found to be either insignificant, or of negligible effect, partly because the studies do not take the nature of use into consideration. Little is known about the interactive effects of the attributes of methodologies on the way
people use them, and it seems reasonable that variables from both sets are important in explaining the problem at hand. Our study is a step towards filling the gap in the methodology development, adoption and implementation literature, which until now has not developed a theoretically and practically complete and relevant taxonomy of potential methodology characteristics and has also not studied their effect on the way people decide to use the methodology. This leads to fundamental questions regarding the impact of methodology attributes on an individual’s usage behavior: a) Which methodology attributes affect an individual’s decision to use it?; b) How do these attributes influence the three distinct usage behaviors? Although a particular methodology is developed and implemented by an organization, the way it is used is determined by the methodology’s actual users. Reasons why SDM adoption and use might be challenging and why usage behavior might differ between employees lie partly in the tacit, organizational, and individual problems caused by the introduction of a new methodology. The stress associated with learning a new methodology, fear, the impact on self-esteem and identity associated with the organizational restructuring or re-engineering as well as the emotional costs of role conflict and ambiguity and/or workplace transformation might be serious inhibitors of methodology acceptance and usage [31]. The remainder of the paper is organized as follows: Section 2 provides an overview of the theoretical foundations that provide the framework for our conceptual model. In Section 3, we present our research model and hypotheses. In Section 4 we discuss the methodology and results, while in section 5 we discuss the study’s implications and contributions.

2. Theoretical foundations

In software engineering, an SDM is viewed as a framework used to structure, plan, and control the process of developing IS artifacts. This includes pre-defining specific deliverables created by a project team to develop or maintain an application. The main idea of SDMs is "to pursue the development of information systems in a very deliberate, structured and methodical way, requiring each stage of the life cycle from inception of the idea to delivery of the final system, to be carried out rigidly and sequentially" [8]. A wide variety of such methodologies have evolved over time, such as systems development life cycle, scrum, dynamic systems development method, and extreme programming. Some of the most fundamental characteristics and advantages that justify the use of such structured system development methodologies, as identified by Fitzgerald, [10] are: i) They reduce complexity by subdividing the project development and management process into plausible and coherent steps; ii) They increase transparency and therefore control of the activities, thus reducing risk and uncertainty of projects; iii) They provide a goal-oriented framework that helps to direct the application of techniques and resources at appropriate times during the project [10]. Regarding such SDMs, we present our conceptualization of the three different usage behaviors, and an overview of DOI.

2.1. Nature of use

In attempting to understand human behavior, literature has largely used a cognitive perspective, according to which individuals make conscious, goal-oriented, and rational decisions (e.g. the plethora of studies based on TPB, TAM, and UTAUT models). This cognitive-rational utilitarian perspective is driven by rational choice theory (RCT), suggesting that people are reasoning entities that weigh means and ends, costs and benefits, and make a rational choice in order to maximize their welfare, utilities or benefits. However, in psychology, in particular Freud’s [12] theory of psychoanalysis, human behavior is primarily driven by the unconscious mind. According to Freud, the unconscious is the source of our motivations, and can range from a basic desire for food or sex to the complicated motives of a starving artist. In such a context, the mind is viewed as an iceberg. The visible, tiny tip of this iceberg is the conscious mind (i.e. what we are aware of at any particular moment, our present perceptions, memories, or thoughts), and the massive, hidden part is the unconscious mind (i.e. all the things that are not easily available to awareness, such as our drives or instincts, and things we can’t bear to look at, such as the memories and emotions associated with trauma). One only sees the tip of an iceberg, unaware that its actual mass is floating below the surface. Similarly, in our daily life, researchers as well as practitioners might feel that a person’s decision-making is a conscious, rational act because it is externally visible to us and our environment. However, this is only the tip of the iceberg; we are unaware of the huge, hidden, unconscious mind that is secretly driving our decision-making. Consider the following example: A person is walking in a street and suddenly a lion jumps out of a bush in front of him. What is the person’s reaction? To us and the person it might feel that he consciously-rationally decides to either run away or climb a nearby tree. But psychoanalytically, we find that the decision to run is only a conscious act on the surface, and is actually driven by a deeply rooted instinct to protect oneself. Our instinctive desire to avoid danger sets in motion a set of unconscious
processes, such as generating feelings of fear, which eventually form the basis of our externally visible behavior, i.e. running away.

Building on Freudian psychoanalysis, the basic understanding underlying our conceptualization of the usage behavior is that behavioral outcome is primarily influenced by largely unconscious affective, emotional-automatic motivational processes and stimuli. The affective dimension is concerned with maximization (minimization) of largely unconscious, emotional intrinsic benefits (losses). As such, an individual’s behavior is determined by psychological processes that, without the person’s conscious knowledge, aim to help him/her experience positive feelings or protect him/her from intolerable emotions, e.g. fear, or anxiety.

**Committed use (CMU):** This refers to an individual’s emotional attachment to, identification with, and involvement with a specific behavior [19]. Freud first raised the matter of identification in 1897 and proposed in his widely acclaimed work “The Ego and the Id” [13] the concept of primary identification as the original and primitive form of emotional attachment to something or someone. Researchers posit that identification with a behavior is likely to occur if that behavior satisfies one or more of their critical self-definition desires. As individuals perceive themselves to be emotionally entangled with a specific behavior, strong identification fosters actions (even if they are not initially pleasant) that support executing and maintaining the behavior. Individuals hereby experience a psychological bond with the behavior, characterized by strong emotions, and feelings of warmth, belongingness, fondness, inner peace and pleasure. The psychological state of mind is characterized by a strong personal desire to follow a course of action, because they “want to” do it [20]. Affective tendencies (including feelings and wishes) make people like what they do and encourage them to continue doing it, even when it is evident that monetary reward is unlikely. Committed behavior results in higher achievement levels in performance, and perseverance domains because people generally invest greater effort when they are intrinsically motivated [6].

Committed use therefore represents dedication to the usage behavior in its purest, unadulterated, and intrinsic form. In such a context, committed use occurs when a user agrees internally to the usage behavior, is enthusiastic about it, and is likely to exercise initiative and demonstrate unusual effort and persistence in order to carry out the necessary actions successfully [9]. Based on the above discussion and in line with Meyer & Herscovitch’s [20] suggestion, we propose that any personal or situational variable that contributes to the possibility that an individual will a) become involved (intrinsically motivated, absorbed) in a usage behavior, b) recognize the personal value-relevance of the behavior, and c) identify himself/herself with the behavior, will eventually contribute to the development of committed use.

**Compliant use (CPU):** This is viewed as tendency to engage in consistent lines of activities based on an individual’s recognition of the costs associated with discontinuing a specific behavior. In such a situation, individuals perceive an obligation to follow a course of action or behavior [19]. When analyzing an individual’s disposition, one needs to be careful that this is done based on the person’s ultimate motive, not intermediary goals, since these “sub-goals” could simply be a means to an end. While cost minimization might superficially/externally seem to be conscious-rational, it is in fact largely driven by unconscious emotions (e.g., fear, and loss of moral or ethical principles) associated with the extrinsic loss. For example, a person trying to avoid loss of power or status might actually be driven by an unconscious desire to preserve/fulfill this psychological need for self-fulfillment, domination, or affiliation [21]. At its base, this form of usage rests on minimizing negative emotions according to which people become used to a course of action or behavior because they perceive the emotional costs as too high. According to Becker’s [2] side-bet theory, individuals continue with a course of action or behavior in order to preserve their side-bets, i.e. some investments that are important to them. These side-bets, whose loss could trigger a strong emotional distress, could be work-related or not. For example, the time and effort spent acquiring tacit skills and knowledge, losing attractive benefits, losing power, authority and related privileges, and destroying personal relationships, can be perceived as potential costs of changing behavior. If adherence to the usage behavior is felt as an obligation or a means to gain benefits or avoid punishments, it would lead to compliant usage. The underlying motivational processes are superficial, since they only make people do what they are doing, not because they desire to do it but because they have to do it (e.g., an employee stays with a firm he/she hates because he/she needs to feed his/her family, due to a psychological moral obligation, and a lack of other job alternatives). This type of use is based on a simple, self-oriented exchange relationship. According to O’Reilly and Chatman, [22] this extrinsic form of value-based commitment evolves from instrumental principles that are based on compliance. Compliant use occurs when the individual in question carries out the action, but is apathetic rather than enthusiastic, makes only a minimal or average effort, and does not show any initiative [9]. A person’s
primary interest is to obtain rewards, avoid punishment or uphold moral obligations in order to avoid strong psychological distress, and his/her usage behavior reflects actions that enable him/her to achieve these goals with minimal effort and without any intrinsic involvement.

Resistant use (RU): Based on this type of rationalism, equity theory of motivation suggests that individuals regularly do a cost/benefit analysis in their relationships with an entity or behavior to examine if the costs they endure in the relationship are justified by the gains. If they feel that the ratio between these benefits and contributions is unjust to them, a state of inequity arises and the individual would do all he/she can to resist the specific “costly” relationship. The strength of the resistance depends on the size of the loss and its perceived importance, i.e. the stronger the inequity, the more likely and stronger the resistance. In the case of compliant behavior, not acting in the specific manner would generate a state of inequity and thereby psychological unrest. However, with resistant behavior the opposite is the case, i.e. executing the behavior would generate a state of inequity and therefore individuals do all they can to oppose the behavior. As we discussed earlier, such a cost-benefit analysis is largely driven by psychological motivational processes. These unconscious processes act as defense mechanisms that emerge involuntarily whenever an individual perceives psychic danger due to negative emotions. In Freudian psychoanalytic theory, these defense mechanisms are psychological strategies to protect an individual’s mind/self/ego from anxiety, a aversive psychological inner state. Anxiety is visible in feelings of fear, guilt, embarrassment, shame, etc. and arises from internal conflicts between one’s deepest desires, from the constraints of reality, from one’s values and beliefs, or when an external threat is perceived. Consequently, when anxiety becomes too overwhelming, individuals deploy defense mechanisms that distort, transform, or falsify reality to protect the person from the unpleasant feelings.

The following defense mechanisms, developed by Anna Freud [11], Sigmund Freud's daughter, might be operating in a person’s unconscious mind when confronted with a state of inequity, giving rise to resistant behavior: 1) Withdrawal, which entails removing oneself from events, stimuli, interactions, etc. that pose a psychological threat or dilemma; 2) Projection, whereby individuals blame the object of resistance (e.g., a new SDM) for their failure in order to avoid acknowledging the painful fact of one’s own incompetence; 3) Denial, which involves arguing against an anxiety-provoking stimulus by stating it does not exist (e.g., knowing that a new SDM is good, a person argues against it and finds fault with it because he/she fears that the SDM might take over his/her tasks, making his/her role/position irrelevant in the organization, leading to possible power or job loss); 4) Displacement, which implies lashing out in front of a less threatening target (e.g., badmouthing an SDM implemented by your boss in front of colleagues because you have negative interpersonal relationships, characterized by hate or distrust of your boss); 5) Rationalization, which means supplying a logical or rational reason as opposed to the real reason (e.g., resisting a new SDM, stating that you want to ensure that the company does not again waste money on useless methodology, when the real reason is that you do not want to learn the new methodology, go through the training classes, and change your usual way of doing things).

From an affective perspective, resistant behavior allows individuals to eliminate the psychological threat by avoiding actions or blaming the object of behavior that might contribute to anxiety. Such a reaction is characterized as unintentional and involuntary, controlled by the person’s fears, phobias, and strong emotions and can therefore sometimes be perceived as irrational. Following the discussion above, we propose that resistant use takes place when an individual is consciously or subconsciously opposed to the usage behavior, due to uncomfortable feelings of anxiety, and tries to avoid the behavior actively or passively and overtly or covertly, for example by refusing, arguing, delaying, or seeking to have the request or order to use the SDM nullified.

2.2. Diffusion of innovations theory

Over the past five decades, DOI theory has been used to study how innovations diffuse and become adopted within wider social networks [25]. While early research using DOI theory concentrated on the diffusion and acceptance of products, the research community recently reached consensus on the fact that ideas and practices such as methodologies can also be regarded as innovations if the potential adopter perceives them to be new [25]. According to Rogers, one of the most influential factors that determine an innovation’s adoption rate is the innovation itself, i.e. its characteristics. Based on DOI theory, a methodology’s characteristics play a crucial role in how potential users use it [4]. The more attractive the attributes of a methodology are perceived to be, the more swiftly potential users accept it, and the more dedicated they are when using it. Extensive empirical research has found that some of the attributes are more important than others. After conducting a meta-analysis of 75 articles pertaining to innovation
characteristics, Tomatzky and Klein [29] found that relative advantage, complexity, and compatibility were the only innovation characteristics consistently related to innovation adoption and implementation. Although extensive empirical evidence in various fields suggests that these influences do hold in the context of methodology use, except relative advantage, most of them have either been neglected or have been found to be insignificant. In the study of Riemenschneider et al. [24], five theoretical models of individual intention to accept information technology tools were tested individually, using least-square regression analysis, to understand why software developers accept or resist methodologies. They came to the following conclusions: Perceived usefulness was the only significant variable across all five models (p < 0.001), voluntariness was found not significant (or was not included) in three models, compatibility was found not significant (or was not included) in four models, and result demonstrability, complexity, observability, and image were found to be not significant (or were not included) across all five models. In their study, Hardgrave et al. [15] also study software developers’ intentions to use methodologies, and find usefulness to be significant (although comparatively weaker), complexity to not be significant, and voluntariness and compatibility to be significant, but weak.

Seeing the large gap in the innovation attributes proposed by DOI theory and those studied in the context of methodology use, we identify two areas in need of attention: a) examining which of the wide number of innovation characteristics apply to the methodology domain, and b) how these different attributes effect the three usage behaviors. While, as mentioned earlier, DOI theory provides a comprehensive list of attributes to examine the former issue, the latter problem is virgin territory.

3. Conceptual model and research hypotheses

Relative advantage (RA) is the degree to which potential adopters perceive a methodology as superior, which is either the previous way of doing things (if there is no current way), the current way of doing things, or doing nothing. A methodology’s superiority is not only measured in economic terms, but also in terms of reduced or increased status and other benefits (e.g., because of increased productivity and efficiency). The higher the relative advantage, the higher the rate of adoption, all other factors being equal. The expected favorable outcome or usefulness of a behavior has emerged as a core construct in the field of MIS, driven largely by the use of the theory of planned behavior (attitude) and the TAM model (perceived usefulness) in examining individual beliefs regarding performing a behavior. Riemenschneider et al. [24] apply five theoretical models and conclude that “…if a methodology is not regarded as useful by developers, its prospects of successful deployment may be seriously undermined”. The relative advantage attribute can drive affective motivational processes. Individuals conducting a cost-benefit analysis would want to use the methodology because it allows them to be productive and eventually acquire material benefits for their performance. Considering that using the methodology is in their own interest, since by using it individuals are put in a state that is better than their status quo, i.e. they are able to enjoy improved extrinsic benefits, they would restrain from resisting the methodology. From an affective perspective, usefulness in the sense of being able to achieve high degrees of efficiency and be effective in one’s job might empower employees with a heightened positive emotional state characterized by motivational feelings of self-achievement, confidence, or self-fulfillment. In his theory of hierarchical needs, Maslow [17] proposes that individuals strive to acquire this type of inner motivation to fulfill their most important self-actualization need, i.e. the desire to maximize one’s potential. Similarly, according to Murray’s theory of psychogenic needs [21], employees with a need for achievement will use a methodology in a committed manner if they perceive that the methodology will enable them to achieve high performance, productivity and become good at their job. In such a scenario, people might commit to using the methodology in order to achieve the psychological state of self-perfection. Furthermore, we posit that since the RA attribute can trigger the fulfillment of intrinsic emotional needs, motivational processes are self-determined. This implies that when employees use methodologies, they do it because they want to do it and not because they have to or ought to do it, as is the case with compliant use. We propose:

H1a: Relative advantage will have a positive effect on committed use
H1b: Relative advantage will have a negative effect on compliant use
H1c: Relative advantage will have a negative effect on resistant use

Complexity (CL) is the degree to which a methodology is perceived as difficult to understand and use. The more complex a methodology is perceived to be, the more resistance it is expected to generate. The complexity construct can be traced back to Bandura’s [1] self-efficacy concept, which refers to the belief that one has the capability to perform certain actions in order to be able to use a methodology. Judgment of one’s personal competence, reflected in one’s self-
efficacy, therefore not only determines if a person decides to use a methodology, but also how much effort he/she will expend to use it, how long he/she will persevere when confronting obstacles, and how resilient he/she will prove in the face of adverse situations. The more complex a methodology is perceived to be, the more an individual doubts his/her own ability to be able to use a methodology properly. This specific attribute is therefore one that induces strong negative emotions, such as intense fear of failure, stress, tension, feelings of apprehension, dread, guilt, embarrassment, shame, or anticipating the worst in an individual. When such feelings of anxiety become too overwhelming, individuals deploy the defense mechanisms we discussed earlier to protect their psychological state. Externally, these might lead to resistant use actions, such as absenteeism, sabotage, negative gossip, and personal aggression. While resistant use might be the instinctive or automatic reaction driven by emotions to a highly complex methodology, individuals might also resort to compliant behavior if they perceive that resistance might lead to some sort of punishment and the effect of the punishment is personally considered to be too high. Consequently, we propose:

\[ H2a: \text{Compatibility will have a positive effect on compliant use} \]

\[ H2c: \text{Compatibility will have a positive effect on resistant use} \]

**Compatibility (CA)** is the degree to which a methodology is perceived to be consistent with existing social cultural values, and past experiences of potential users [4]. The higher the compatibility, the higher the desire to use the methodology. The roots lie in the understanding that individuals in organizations might be reluctant to change the non-intentional habits they learned unconsciously through past repetitions, and might therefore be unwilling to adopt new methodologies if they require radical change. The more a methodology departs from the current habits of an individual, the longer and harder he/she must strive to unlearn old routines and learn new ones [15]. In matters of radical change, as is the case with new methodology adoption, the methodology might not be compatible with the habits of potential users and would therefore activate negative feelings and emotions and, consequently, resistance [23]. On the surface, individuals might consciously evaluate the net benefits of a compatible methodology as no extra time required to learn it, ease of use, no negative impact on the incentive structure, etc. and decide to comply with management’s request to use the methodology in order to avoid any potential punishments. From an emotional perspective, a compatible methodology is felt to be a perfect fit with a person’s beliefs, attitude, and value system. Due to this psychological bond, characterized by feelings of strong sentiments, belongingness, identification, involvement, and pleasure, individuals resort to using a compatible methodology in a committed manner. If the methodology is perceived to be incompatible, particularly the emotional dimension might consider this radical change to be a serious threat to the well-being of the individual (experienced through uncomfortable feelings of fear, anxiety, etc.). In order to protect themselves from psychic distress, employees might resort to resistant use as a form of protest to ensure that the implemented methodology is not successful and will consequently be replaced by management with the older way of doing things. Based on this discussion, we propose the following:

\[ H3a: \text{Compatibility will have a positive effect on committed use} \]

\[ H3b: \text{Compatibility will have a negative effect on compliant use} \]

\[ H3c: \text{Compatibility will have a negative effect on resistant use} \]

**Image (IM)** is defined as the degree to which individuals perceive a methodology to enhance his/her image and status in the social system. Rogers has argued that it is a critical attribute stating that one of the most important motivations for any individual to adopt an innovation is the desire to gain social status [25]. This desire for social status is driven by the need for acceptance and belongingness and has its foundation in Murray’s [21] needs theory. As per Ryan and Deci [27] “…a basic need, whether it be a physiological need or a psychological need, is an energizing state that, if satisfied, conduces toward health and well-being …”. According to Murray, the need for affiliation (nAffi) is the desire to achieve acceptance from one’s social surroundings. Individuals with a high need for affiliation tend to intrinsically enjoy being with other people, making friends, and maintaining personal relationships. In a work environment, endowments such as praise and respect from peers have been found, in a number of studies, to be conveyors of, and an ad

\[ H4a: \text{Image will be positively related to committed use} \]
H4b: Image will have a negative effect on compliant use
H4c: Image will have a negative effect on resistant use

4. Research methodology and results

Data collection: The entire development process, leading to the final survey instrument, was conducted according to Straub’s [28] recommendations. An initial pool of reflective measures was selected, based on their empirical validation in prior research. Instrument refinement was conducted based on interviews with two subject matter experts, Q-sorting exercise in two rounds with seven and eight participants respectively, and a web-based pre-test with 65 participants. Finally, all items were embedded in survey questions using a 7-point Likert scale anchored at strongly disagree (1) and strongly agree (7). Throughout the entire instrument development process, three researchers from different disciplines, nationalities, and institutions were involved, discussing every issue and formulating improvements. Over four months, data was collected via an online survey. Participants were randomly chosen utilizing databases of professionals (e.g., XING, LinkedIn, Viadeo, CompetenceSite), with keyword search such as project manager). This approach was chosen to elicit a wide representation by industry and company size. We then sent a personalized URL of the online survey to every individual identified in such a manner. Personalized survey URLs were administered to 7982 individuals, of which 1474 completed the survey. Since all research questions were mandatory, we did not have to exclude cases due to missing or incomplete responses. The respondents were asked to keep in mind their most recently completed project in which they used a methodology when responding to the questions. We compared the early respondents with the late respondents. We defined early respondent (51.6%) as those who completed the survey within the first 30 days of receiving the initial invitation e-mail. All those who completed the survey after the first 30 days were categorized as late respondents (48.4%). T-tests on the early and late respondents with regard to all the research variables showed no significant differences (at the p < 0.05 level). Hence, we concluded that non-response bias was not a threat to our findings.

Data analysis and results: For each type of usage behavior, we tested the model and their respective hypotheses individually: Model A (DV=CMP), Model B (DV=CPU, and Model C (DV=RU). We chose to avoid testing all hypotheses in one single model in order to avoid loss of parsimonicity due to inclusion of a large number of variables, distortion of results and Type I errors due to due to multicolinearity issues. Due to space limitations, all three models are represented together in a figure 1. The research models were tested and the psychometric properties of the scales were assessed with the software SmartPLS, based on partial least squares (PLS) due to non-normal distribution of data (which can distort results with covariance-based methods). The statistical significance of the parameter estimates was assessed using a bootstrapping procedure with 1000 resamples. In order to provide an overview of the survey instrument and detailed statistical analysis results, which as a result of limited space cannot be reported here, we compiled a document that is available at http://tinyurl.com/HICSS46-Appendix.

Validation of the measurement model: The adequacy of the measurement model was assessed by the reliability of individual items, internal consistency between items, and the model’s convergent and discriminant validity. Cronbach’s alpha (CAP) reliability estimates were used to measure the internal consistency reliability. In this

![Figure 1. PLS results of the three models](4390)
study, the CAP of each construct is greater than 0.88, which indicates a strong reliability for all constructs in our model. We also calculated composite reliability (CR) as an alternative to CA. The CR values for all constructs are higher than 0.92, above the recommended minimum of 0.70. Convergent validity is demonstrated, as a) the AVE (average variance extracted) values for all constructs were higher than the suggested threshold value of 0.50, and b) all item loadings were higher than the 0.70 guideline and statistically significant at the 0.001 level. Evidence of discriminant validity could be found, since a) the square root of all AVEs were larger than interconstruct correlations, and b) all construct indicators loaded on their corresponding construct more strongly than on other constructs, and the cross-loading differences were much higher than the suggested threshold of 0.1.

**Structural model results:** After the validation of the measurement model, the structural model was independently analyzed and the proposed relationships between the constructs were tested. Finally, we calculated the goodness of fit (GoF) of our model, as suggested by Wetzels et al. [32], who define GoF as the square root of the product of AVE and R2. The application of this formula leads to a GoF of 0.57, 0.48, and 0.55 for the models A, B, and C respectively, which exceeds the cut-off value of 0.36 for large-effect size of squared multiple correlations (R2) and allows us to conclude that our models perform well [32]. In assessing the PLS model, we examined the R2 for each endogenous latent variable. We considered proposed relationships to be supported if the corresponding path coefficients had the proposed sign and were significant. Although some of the paths between variables were statistically significant (with large samples such as ours, statistical significance becomes practically meaningless), they did not meet the criterion of practical significance which is repeatedly emphasized by researchers (e.g., [5,18]) for inclusion in a path diagram. Therefore, as per Meehl’s [18] recommendation, only betas with values of 0.10 or higher, and which are significant at the p<0.05 level or better, are discussed. We find that nine of the eleven proposed hypotheses are statistically significant at the p<0.001 level, and also met our criteria of practical significance. Hypotheses H4b and H4c are found to be not significant. Together, the variables explain 28%, 26%, and 34% of the variance in the dependent variables CMU, CPU, and RU respectively.

5. Discussion, implications, and future research

The three usage behaviors emerge as distinct constructs, each with a unique set of predictors and relationships. While most of our hypotheses are confirmed, the non-significant effects of the *image* attribute on CPU and RU suggest that while *image* can contribute to commitment by generating positive emotions, lack of the attribute itself might not be considered reason enough for employees to turn to resistant or compliant behaviors. This might be because of our sample characteristics, which are composed of professionals in a work environment. While employees might have a high need for association and approval in their private lives, they focus on their jobs and careers in a work environment, and are not so much concerned with making long-term interpersonal relationships for non-materialistic satisfaction. This needs to be further investigated and we suggest doing it by modeling Murray’s *nAffi* construct as a moderator between IM →CPU, and IM → RU to see whether in case of individuals with a high *nAffi* the relationships turn significant. This might provide some empirical bases for our proposition.

Our work seeks to further the research on acceptance and use of methodologies by individuals by unifying the theoretical perspectives on the *methodology attributes*, and *psychoanalysis*. Such a holistic and novel approach for understanding how employees use a methodology is important, because people are not always conscious, rational, and passive recipients of innovations. Deep within they might be unconsciously or automatically driven to seek new and effective methodologies, “…experiment with them, evaluate them, find (or fail to find) meaning in them, develop feelings (positive or negative) about them, challenge them, worry about them, complain about them, ‘work around’ them, gain experience with them, modify them to fit particular tasks, and try to improve or redesign them—often through dialogue with other users” [14]. Only when we understand and acknowledge that such a diverse list of actions and feelings are typical of human behavior, we view the acceptance and use of new methodologies as a complex process and realize that research needs a fresh perspective to understand the qualitative nature of use and its antecedents. Our findings might have significant implications, not only for the IS research community but also for related fields, in that it might be able to explain the qualitative differences in the usage behavior of individuals. Because researchers have until now relied on rather simple and straightforward ways to operationalize IS use and
linked it to a number of desirable outcomes, such as user satisfaction and productivity, the construct and the relationships remain a black box. We still know very little about how people are using IS artifacts and whether the differences in their usage style might be a better predictor of the numerous proposed positive effects of IS use. By developing a topology of usage styles, we attempt to narrow this gap in research. Researchers might be able to use our conceptualization and develop new models and theories and test them to find how specific usage styles influence the many positive or negative outcomes associated with IS use. This might be a first step towards demystifying the usage construct and exposing its complex multidimensionality.

The proposed affect-oriented approach based on psychoanalysis represents a departure from the traditional perspective that is largely based on cognitive mechanisms and might reveal more complex and as yet unknown interaction effects on human decision-making, especially in regard to the use of new methodologies. Our findings might be able to explain how psychological needs unconsciously affect human behavior. Human needs have always played a key role in organizational development, and the proposed study is an attempt to “humanize” organizational methodologies, that is, to enable organizations to be more responsive to human concerns when developing and implementing new methodologies. Our results might help management realize that merely forcing employees to use IS artifacts is not sufficient. Even though externally individuals might seem to be using the artifacts, their actual nature of usage behavior might in fact be counterproductive, or even destructive. Each of the proposed usage constructs reveals a different aspect of human behavior and personality, and each can serve as a point of influence for organizations in their attempts to steer them in the desired direction by means of tailor-made methodologies. Our findings could help organizations manage the selection, development, and implementation of new methodologies. We still know very little about how an organization perceives the psychological needs of their employees, since misinterpretation might lead to misleading conclusions. A better understanding of these determinants would enable us to design organizational interventions that would increase new methodology usage in order to improve productivity and quality as well as to reduce effort.

While we provide theoretical as well as empirical insights into the complex nature of use and uncover its multidimensionality, a critical question still remains unanswered: Which one of these behaviors is more desirable or should be perused from a theoretical and/or management perspective? In our opinion, the answer is not simple. Theoretically, it might seem clear that organizations will benefit the most from employees’ committed usage behavior. But, from a practical standpoint, committed behavior is not easy to come by. The resources that one might need to invest in to get employees to commit might be one of the biggest hindrances. Even then, commitment is not a guaranteed outcome, since people cannot always be motivated at an emotional level with artificial and superficial value propositions like money, or status. One needs to genuinely inspire, excite, stimulate, energize, invigorate and connect with employees’ deepest desires. Considering that the possibility of having all or most employees displaying committed usage behavior is realistically low, we have to have a second look at compliant behavior. Is it sufficient? We feel that it does not always have to be committed use, but that in certain contexts compliant usage will suffice and can be considered to be a practically good outcome. For example, one such situation is the nature of the task at hand [9]. Committed use will be a more successful outcome than behavioral compliance for a complex task that requires extra effort, initiative, and persistence to be performed effectively (e.g., using a highly complex SDM with marginal user friendliness). Under these conditions, compliance is less successful than commitment, but is still preferable to resistance. For a task that is simple and routine, compliance may be all that is needed to accomplish the goal. In this situation, compliance may be regarded as a practically successful outcome.

Furthermore, should resistant use be condemned because management views it as an act of employee defiance undermining managerial authority and hindering the achievement of organizational strategic goals of higher productivity, efficiency, quality, and eventually profit? Once again, it is our opinion that resistance should not be viewed as the devil, something that needs to be prevented at all cost, since employees’ resistance might in some circumstances be out of their genuine concern for the organization’s well-being. Employees are the ones who are actually using the methodologies, are operatively involved in the day-to-day projects, and might be the best judge of whether a new methodology is beneficial or might seriously damage their output. Employees who are genuinely concerned about their job and organization might see it as their moral duty to protect the firm from managerial misjudgments and wrong decisions. After all, even managers can make mistakes. In such a scenario, resistant use can be seen as a constructive protest by which employees hope to save the organization from making some horrible mistakes.
and implement a methodology that might adversely affect all involved. While it might be inappropriate for us to take a specific stand on this matter without empirical data, we hope that our conceptual ideas might provoke a new sense of thinking and motivate future research to dig deeper and study this crucial, highly relevant, and ongoing issue in IS/IT domain: What type of usage behavior is theoretically and/or practically better and under what conditions?

6. References